



COVID-19 as a catalyst of a new container port hierarchy in Mediterranean Sea and Northern Range

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Abstract

COVID-19 has dramatically impacted the organization of value chains and the pattern of international trade. The manufacturing sector has had to act resiliently, and the maritime sector was no exception. Container shipping lines have adapted their routes, services and fleet deployment with direct effects on many port activities. Our analysis focuses exclusively on container vessels by considering number of calls and calculating total containership capacity deployed within 45 Western Mediterranean and Northern European ports throughout 2018, 2019 and 2020. 2018 is considered as a ‘business as usual’ year, without exceptional events. 2019 is the start of the outbreak and 2020 is the year most impacted by the economic consequences of the pandemic. As we cover at least one port in each country, we considered ports that handled more than one million TEUs per year and if the country did not have such a port, we considered the largest one. The aim of our analysis is dual. First, we attempt to point out the importance of certain ports as major hubs and the downgrading of others to regional hubs, gateways or feeder ports in the Western Mediterranean and Northern Europe. Second, our objective was to assess the way shipping alliances have impacted the ranking of these ports during COVID-19. As a result, this exceptional crisis has not been a catalyst of a new port hierarchy while it has revealed contrasting situations with ‘poor’ and ‘good’ crisis resilience for ports meaning that some were downgraded, and others maintained their ranking. Moreover, COVID-19 has exacerbated the maritime alliances’ shortcomings, their capacity to unilaterally impose their decisions through their Cooperative Working Agreements, regardless of the consequences both for transport users and ports. One of the key lessons of the COVID-19 crisis is that the time for change for maritime alliances has come.

Keywords Ports · Port hierarchy · Container shipping · Global shipping alliances · CWAs · COVID-19

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1 Introduction

COVID-19 has dramatically impacted the organization of value chains and the pattern of international trade (UNCTAD, 2020a). The manufacturing sector has had to act resiliently, and the maritime industry has been no exception. At a global level, container shipping lines have adapted their routes, services and fleet deployment with direct effects on many port activities (Notteboom et al., 2021). Shippers have also been impacted, especially through lower transport quality services, blank sailings (ESC, 2020, 2021) and record-high freight rates (UNCTAD, 2021a, b). A share of responsibility implicitly weighs upon shipping alliances since their current organization allows them to efficiently adjust their capacity and to deliver transport services along maritime supply chains ‘as they wish’. Many scholars have recently raised their voices to denounce the dominant position of shipping alliances (e.g., Corruble, 2021; Fedi, 2021; Merk—ITF 2018) and the existing imbalance in their relationships with transport users (Brooks et al., 2019). Paradoxically, competition authorities have not tackled this matter (Merk, Hoffmann, Haralambides, 2020), except for the Federal Maritime Commission in the U.S. (FMC, 2021), notwithstanding the severe complaints raised by shippers before and during the COVID-19 pandemic (GSF, 2019; ESC, 2020, 2021).

The aim of our analysis is dual. First, to stress the importance of some Northern European and Mediterranean ports as major hubs and the downgrading of others as regional hubs, gateways or feeder ports in the container sector during the COVID-19 epidemic. Second, to assess the way shipping alliances have impacted the ranking of the above ports during COVID-19. Our research questions are the following: (a) has the COVID-19 crisis served as a catalyst of a new container port hierarchy in the Mediterranean Sea and Northern Range? (b) what has been the impact of strategic alliances and their decisions to address the pandemic context?

Our contribution sheds light on the contractual provisions of *Cooperative Working Agreements* (CWAs), shaping container shipping, that alliances utilized during COVID-19. We argue that these contracts allow shipowners considerable contractual freedom in the daily management of their business, affording them expanded rights and comprehensive powers, that face few restrictions regarding key anti-trust principles. The persistent negative consequences of alliances for transport users and port service providers during the COVID-19 scourge demonstrate the failures of the alliance system and call into question its legal foundations in the medium term.

After this introduction, a literature review is presented in Sect. 2 and our applied research methodology is explained in Sect. 3. The main results are detailed in Sect. 4. A discussion on port hierarchy and the impact of alliances is engaged in Sect. 5 and final remarks are put forward in Sect. 6.



2 Literature review on the impacts of COVID-19

2.1 Impacts on container shipping

The impacts of COVID-19 on maritime transport have been recently scrutinized (e.g., Notteboom et al., 2021; UNCTAD, 2020a; EMSA, 2021). The United Nations Conference on Trade and Development (UNCTAD) described the patterns of trade flows in developing and developed countries and showed that all sectors of the economy were affected. Shipping, ports and supply chains as a whole faced significant disruption at varying levels, caused by governmental restrictions, longer transit times, delayed shipments due to staff shortages, raw materials shortage, limited working hours or temporary port closures. In comparison with the 2008–2009 crisis, seaborne trade has shown its resilience, ensuring the continuity of supplies of food, medical products (e.g., masks) and essential commodities even though seafarers faced harsh working conditions due to closed borders that prevented crew changes (Charbonnaux et al., 2020; Weerth, 2020). International seaborne trade faced a 3.8% drop, with around 10.7 billion tons (UNCTAD, 2021c; Clarksons Research, 2021), while European maritime traffic fell by 10% (EMSA, 2021b).

As regards container shipping, this segment benefited from a modest 1.1% rise in 2019, compared to 2018, reaching around 152 million TEUs, against more than 150 million TEUs in 2018 (UNCTAD, 2020b). In 2020, this segment was estimated at 149 million TEUs (UNCTAD, 2021c). Notteboom et al. (2021) evaluated the short-term implications of COVID-19 on container shipping and related operators. They concluded that the patterns of the coronavirus crisis as an ‘external shock’ were clearly different than those of the 2008–2009 recession. From a general perspective, container shipping carriers were reactive, setting up different strategies to prevent the negative consequences of the sanitary crisis. They especially suspended some services, re-routed vessels, or multiplied blank sailings and reduced their transport capacity in the second quarter of 2020 (UNCTAD, 2020b), when international trade flows faced the strongest impact, with a decline of 21% (UNCTAD 2021a). While most supply chains were disrupted due to government lockdowns (ALLIANZ, 2020), and key economic indicators turned down in all regions, a rapid recovery ensued in the second half of 2020, especially in China. Furthermore, freight rates did not decline as they did in the aftermath of the financial crisis and on the contrary, they were higher mid 2020 compared with 2019, reaching very high levels in autumn 2020, particularly in the Asia-Northern Europe and Asia-Mediterranean trades (Notteboom et al., 2021). Consequently, carriers benefited from higher revenues and profits vis à vis 2019 (UNTACD, 2020b). This upward trend of box rates continued in the first quarter of 2021 with significant peaks on the Asia-Europe route (multiplied by four) and on the Asia-North America route as well (multiplied by two) (Wire, 2021). In early June 2021, according to Drewry World Container



Index, box rates were higher than USD 10,000 in the Europe-Asia trade, representing the highest level since 2011.¹

2.2 Shipping alliances and related contractual tools

The World Shipping Council (WSC) defines liner shipping as ‘the service of transporting goods by means of high-capacity, ocean-going ships that transit regular routes on fixed schedules’ (WSC, 2021). Liner shipping has historically organized its business model through different forms of cooperation since its early developments (e.g., Haralambides, 2007, 2019; Stopford, 2009; Brooks, 2000). A close commercial and technical collaboration between container shipping companies has taken place in the twentieth and twenty-first centuries, benefiting from exemptions from competition law principles (e.g., Lavissière et al., 2021; ITF, 2018; OECD, 2015, 2002). Indeed, shipowners have been legally entitled to fix prices through different multilateral or bilateral instruments such as conferences and rate discussion agreements, with the aim of preventing price wars and adjusting transport capacities (e.g., Parola et al., 2014). This singularity is expressly or tacitly recognized in numerous legislations all around the world, including countries where stringent antitrust rules are in force, such as the U.S. or the European Union (EU). Indeed, a Block Exemption Regulation (BER) is in force in the European Union, known as the EU Consortia Block Exemption Regulation (CBER). The regulation governs alliances (EC, 2009; Brooks et al., 2019) and it was recently extended to 2024 (EC, 2020). Moreover, although the conference system has been weakened in the past few decades and prohibited in the EU trades as from 2008 (EC, 2006; Fedi and Besancon, 2009), shipping companies are still legally entitled to discuss sea freight prices in particular through *rate discussion agreements*, or in conferences not active in the EU, e.g., Canada, Japan, Singapore or the U.S. (ITF, 2018). Nevertheless, considering the current prevalence of alliances in container shipping, conferences seem to be a thing of the past.

To the best of our knowledge, there is no accurate legal definition of ‘shipping alliances’. According to Brooks et al. (2019), ‘an alliance’ refers to any agreement between two or more companies (legal entities) that does not involve the exchange of shares (ownership) or the creation of a new entity.’ Alliances are generally considered as ‘technical’ agreements since their members pool ships and terminals, define sailing schedules and itineraries while are supposed to pursue an independent marketing strategy and not to manage ‘joint sales, marketing, pricing, joint ownership of assets, pooling of revenues, profit or loss sharing or joint management’ (ITF, 2018). Aiming at consolidating and rationalizing transport offer in the maritime segment and along logistics chains (Cariou, 2000), they are defined as ‘mega-consortia’ (Fedi and Tourneur, 2015) where risks are apportioned and minimized (OECD, 2015). Often called ‘global or strategic alliances’ (ITF, 2018), they are deployed on a worldwide scale and dominate major trade routes such as Asia-Europe, U.S.-Europe

¹ <https://www.drewry.co.uk/supply-chain-advisors/supply-chain-expertise/world-container-index-assesed-by-drewry>.



and Asia-U.S. Since 2019, there have only been three alliances, i.e., 2 M, THE Alliance and Ocean Alliance, instead of four in 2016. They are based on numerous cooperative agreements or CWAs that encompass different purposes and geographical scopes of application (Lavissiere et al., 2021). The Vessel Sharing Agreement (VSA) and the Slot Charter Agreement (SCA) are the most common contracts, organizing the parties' relationships, whereas other CWAs are in force (e.g., Fedi, 2021; Brooks et al., 2019).

Regarding alliance taxonomy, a more precise description would be welcome, in spite of the efforts and overviews of some scholars which have already appeared (Fedi, 2021; Brooks et al., 2019; ITF, 2018). Traditionally, these contracts are divided into two categories depending on their aim: i.e., commercial or technical. As shown in Table 1, the different CWAs negotiated among alliance members, deal with all key components of container shipping: vessels, slots, equipment, ports or terminals. In addition, new forms of CWAs on Information Systems and digitalization have recently appeared aiming at developing and sharing common IT standards between ocean carriers. The 2020 'Tradelens Agreement' between MAERSK, CMA CGM, HAPAG LLOYD and OCEAN NETWORK (CWA n° 201,328) illustrates how leading container shipping carriers are investing in new technologies, such as blockchain, to digitalize transport documents, trace shipments and optimize information flows.

Nevertheless, considering the high level of integration of transport services provided by the alliance partners, the distinction between commercial and technical agreements appears outdated. Indeed, the commercial benefits generated by the so-called 'technical' cooperative agreements, such as competitive tariffs obtained from diverse providers (e.g., for bunkers and port services such as pilotage, towage and mooring) due to the size of the alliance (number of vessels, number of port calls, etc.); economies of scale enjoyed from the size of containerships; mutualization of equipment (chassis, IT systems, etc.); and use of container terminals where alliance members are partially or totally owners (ITF, 2018), represent, all in all, a greater benefit than simple price-fixing. Furthermore, insofar as there is no international convention governing shipping alliances (Fedi and Tourneur, 2015), the latter are ruled by national or regional laws (e.g., the EU), when they are in force (Brooks et al., 2019; ITF, 2018). Obviously, as the 'P3 Network' VSA case revealed, this lack of uniform legal framework can lead to contradictory evaluation of conformity (Fedi and Tourneur, 2015; Braakman, 2013) and 'it leaves the door open to collusion' (ITF, 2018). *A fortiori*, the exchange of sensitive information is not excluded between alliance members directly, or through a third party, as affirmed by Braakman (2017) who has put forth the idea of a 'hub and spoke cartel'. According to this, ocean carriers can collude on shipping prices since they operate in different alliances and notably where conferences are still allowed (e.g., Singapore or South Korea).

In the same vein, even though there is abundant research on shipping alliances with regard to their main typology, objectives, and causes of their success (for a synthesis Panayides and Wiedmer, 2011), little is known on the content of these agreements, which still appear as a 'black box' (Lavissiere et al., 2021). According to these authors, the confidentiality of such contracts can justify the existing gap in



Table 1 Taxonomy of CWAs shaping maritime alliances

Category	Agreement title	Purpose	Regulatory framework
<i>Technical dimension</i>	Vessel sharing agreement	Improving the productivity and operating efficiency of parties' vessels and equipment	Entitled by most legislations under possible BER (e.g., the U.S., EU, Hong-Kong)
	Global vessel sharing agreement	Same as above but implemented on a global scale with a large number of vessels and often combined with other CWAs	Entitled by most legislations
	Space/Slot Charter Agreement	Selling and buying slots in specific trades	Entitled by most legislations
	Slot/space/swap exchange agreement	Exchanging slots/space on the parties' vessels – no financial flows between parties	Entitled by most legislations
	Equipment discussion agreement	Improving quality and efficiency of operations and use of equipment	Entitled by most legislations
	Marine terminal services agreement	Handling a certain volume of containers by a carrier at specific terminal(s)	Entitled by most legislations
	Digital shipping agreement	Adopting and sharing common information technology standards	Entitled under U.S. law
		Digitized solutions (e.g., blockchain) enabling parties to exchange documents and information on supply chain events	Not expressly prohibited in the EU
		'Cooperation in the joint operation of a maritime transport service' (EC, 2009) including different forms of cooperation such as vessel sharing, slot exchange or slot charter	Entitled under EU BER (EC, 2009; 2020)
	<i>Commercial dimension</i>	Rate Discussion Agreement	Exchanging, discussing information on tariffs and general rate levels (sea and overland)
Conference		Fixing ocean freight rates and transport capacity	Entitled by some legislations (e.g., the U.S., Singapore, Japan, South Korea, Australia, Canada) Prohibited in the EU since October 2008 (Regulation EC n°1419/2006)
Maritime credit agreement		Sharing credit and collection information, billing practices	Entitled by some legislations (e.g., the U.S.) Not expressly prohibited in the EU

Source: Authors based on FMC data and EC rules, Fedi (2021) and Brooks et al. (2019)



the literature. However, their evaluation is possible thanks to the Federal Maritime Commission (FMC), the American competition authority in charge of regulating maritime transport and related activities (Lavissiere et al., 2021; Fedi, 2019). The existing contracts grant a large degree of freedom and comprehensive rights to alliance members in the daily management of their transport operations. For instance, most VSAs applicable to the Northern Range and Mediterranean Sea entitle alliance members to:

- ‘meet, discuss, reach agreement, and take actions necessary to implement or effectuate agreements regarding sharing of vessels, chartering or exchanging ship space, rationalization and related coordination of tonnage, and cooperative activities pertaining to their operations and services, and related equipment, vessels and facilities in the Trade.’ (source: art. 5.1 THE Alliance Agreement—VSA no 012439).
- ‘discuss and agree on the number, size and other characteristics of vessels to be operated.’ (source: art. 5.1 MAERSK/MSC GULF-ECSA VSA—no 201256).
- ‘discuss and agree upon the terminals to be called by the vessels operated and/or the volume of cargo to be handled by such terminals. [...] such selection will also take into account any financial interest of a party in the terminal.’ (source: art. 5.9a Ocean Alliance Agreement—no 012426).
- ‘select terminals where parties (alliance members) have equities.’ (source: art. 10b CMA CGM /MARFRET VSA Mediterranean – Caribbean / USGulf no 201305).
- ‘blank (skip) sailings when utilization is likely to fall below such thresholds as may be established by the Parties.’ (source: art. 5.1d MAERSK/MSC VSA—no 012293).
- ‘consult and agree upon the sailing patterns, ports to be called, port rotation, vessel itineraries, schedules, number of vessels, frequency, and character of sailings at port, transit times, adjustment of the speed of vessels (including slow steaming), on-time performance [...] and all other aspects of the structure, scheduling and coordination of vessels and services [...]’ (source: art. 5.2b Ocean Alliance Agreement—no 012426).

Furthermore, one recalls that these alliances coordinate their actions through dedicated ad hoc committees and operational centers such as the ‘Operation Coordination Centre’ of Ocean Alliance in charge ‘to coordinate, operate, manage, and maximize the efficiency of the services’ (art. 5.2 h—contract n°012426), or ‘THE Alliance Coordination Center’ performing ‘day-to-day management, administrative, data/information collection, and/or service coordination functions’ (art. 5.2n—contract n°012439). On the contrary, the ‘Joint Co-Ordination Committee’ of 2 M that handles ‘the day-to-day issues’ and ‘monitors the operation of the Agreement to ensure the maximum efficiencies [...]’ only makes recommendations and ‘has no operational responsibility’ (art. 6.1—contract n°012293).

Finally, in spite of some filing procedures in the U.S. -i.e., formally informing the regulator about their agreements-CWAs are subject to few controls and limitations in the daily management of shipping lines, especially as regards *transport*



capacity management (Pelagidis and Haralambides, 2020). As long as these agreements state that their provisions comply with key anti-trust principles, or specific competition rules (requirements of the 1984 Shipping Act or EU BER regulation for instance), contracts are agreed, producing effects not only for alliance members but also for third parties such as shippers and port service providers (e.g., Fedi, 2019; ITF, 2018). Through the lens of their contractual provisions that we identified above, one can better understand what happens in practice: alliance members have a great margin of maneuver. Indubitably, the effects of decisions taken by shipping alliances have been particularly important during COVID-19 (FMC, 2021; ESC, 2020; 2021) and one assumes that the pandemic has exacerbated the flawed aspects of container shipping. Considering the recurrent and severe criticisms (e.g., ITF, 2018; Brooks et al., 2019; Fedi, 2019), the existing situation calls into question the relevance of the current business model of liner shipping and its regulatory framework.

2.3 COVID-19 and container shipping: a global picture

From a worldwide perspective, one can affirm that seaports have shown their resilience in the same way as maritime transport itself. ‘Ports have succeeded in playing their crucial role in keeping the world economy running through this once-in-generation global pandemic crisis’ affirmed the IAPH Managing Director² (PortEconomics, 2021). COVID-19’s impacts on container ports have been significant all around the world (Notteboom and Haralambides, 2020), while the severity of the impacts has varied depending on the region and port size (Notteboom et al., 2021). According to the latter authors, the largest container ports (over 10 million TEUs per year) faced a smaller decrease (− 4%) compared to those handling between 3 and 10 million TEUs (− 10%). Further, the 2020 IAPH-WPSP survey on world ports concluded that ports sustained a 5% fall in port calls between April and Mi-July 2020, while a recovery globally started in September (Notteboom and Pallis, 2020).

Accounting for approximatively 20% of international maritime trade, the EU owns numerous seaports and important container terminals playing a ‘vital’ role for the European economy (ESPO, 2018). Indeed, around 75% of import and export flows transit through seaports (EC, 2013). European ports faced a severe downturn until mid-June 2020, with approximatively 14% less calls compared to 2019 (UNCTAD, 2020a). The European Maritime Safety Agency (EMSA) has recently analyzed the specific European situation, confirming a 5% reduction of port calls, underlining that Croatia, France, Iceland and Spain faced the most severe decrease in port calls, around 20%, between 2019 and 2020, especially due to the temporary suspension of passenger traffic caused by COVID-19 (EMSA, 2021a).

According to Notteboom (2021), the 15 largest European seaports moved 76.8 million TEUs in 2020, with a slight decline of 2.8% in comparison with 2019, highlighting contrasted port situations and therefore notably different impacts compared to the 2008–2009 recession. European ports overall experienced a 10.2% fall in

² <https://sustainableworldports.org/iaph-wpsp-port-economic-impact-barometer-one-year-report-makes-way-for-new-iaph-global-port-tracker/>.



traffic and have lost 226 million tons during COVID-19 (EMSA, 2021b). Regarding specifically the Northern Range (NR), most ports ‘suffered’, including leaders such as Rotterdam, Hamburg and Bremerhaven while others showed a large drop, notably Le Havre (-14.4%) and Hamburg (-7.9%). Exceptions to this drop are represented by Zeebrugge (+19.3%) and Antwerp (+1.4%). Concerning the Mediterranean, ports faced a comparable situation except for Gioia Tauro with a significant increase (+26.6%) thanks to more freight carried by MSC—2 M Alliance—in line with the acquisition of Medcenter Container Terminal. Further, it is important to emphasize that MSC set up different policies to support its customers and to mitigate the negative consequences of diverse restrictions preventing smooth trade flows. MSC notably proposed a suspension of its transit service program in some strategic transshipment hubs (located in Asia, Americas, Europe, Middle-East and Western Africa) that allowed shippers to reduce storage costs and adjust their deliveries (UNCTAD, 2020b).

Nonetheless, the role of strategic alliances during COVID-19 and the impacts of their decisions particularly on seaports have received little attention so far. With the exception of Notteboom et al. (2021), who provided a relevant general picture of the ‘effective joint capacity management’, arranged by container shipping lines at international level, our analysis aims to analyze in depth what has occurred in both the NR and the Mediterranean Basin.

3 Methodology

Our methodological approach was based on three steps. First, we considered only EU ports since most maritime flows had origin or destination a European port (RMT, 2020). As explained by Ducruet and Notteboom (2020), two thirds of the main European hubs are located in the NR. Regarding the Mediterranean, we made this choice as numerous hubs are present such as Tanger-Med, Algeciras, and Gioia Tauro in the western part. Further, we integrated seaports from the eastern part of the Mediterranean notably Piraeus which has become a major hub in recent years and now represents the fourth largest European container port. We considered that each country had to be represented by at least one port. Finally, if there were more ports per country, we considered ports handling more than one million TEUs per year.

Secondly, our database was built from IHS Markit (2020), completed by Refinitiv database (2021) and Alphaliner (2021). We collected the number of vessels calling at each port over three years: 2018, 2019 and 2020. We gathered ship size data, the respective names of the company, the alliance membership, the concerned ports and the year. We also considered intra-flows since vessels sailing from one terminal to another were part of the port activity and this showed how shipping companies managed their fleet and their presence within this port. The implementation of the database faced several challenges regarding ship sizes. As Refinitiv and IHS Markit might be incomplete regarding this point, we used the Alpha Liner database. The second issue was the operator’s name in 2018, 2019 and 2020. As vessels can



change their name, we exclusively used the IMO number and looked at the operator each year when its name was not provided by IHS or Refinitiv.

In order to draw out the main patterns, we chose to gather vessel sizes from 5,000 TEUs upwards, and we used the typology of containerships (Rodrigue, 2020) as follows: Panamax (– 5000 TEUs), Post Panamax (+5000 TEUs), VLCS or Very Large Container Ship (11,000–15,000 TEUs), ULCS or Ultra Large Container Ship (18,000–21,000 TEUs). We considered that no specific events were sufficiently critical in 2018 to disrupt world trade, thus 2018 became our ‘business as usual’ year. 2019 remained the year when the pandemic started to spread and 2020 the impacted year.

Thirdly, we focused on the contractual provisions of shipping alliances. We identified and collected different CWAs from the FMC data, in order to determine a categorization and to provide a critical analysis of the key cooperation clauses. We selected contracts of the three alliances (i.e., 2 M, Ocean Alliance and THE Alliance), applicable in the NR and the Mediterranean. As HMM broke its partnership with Maersk and MSC, to join *THE Alliance* at the end of the first quarter in 2020,³ we considered all ship calls of HMM as pertaining to 2 M, up to March 31st. Further, in order to ease the analysis, American President Line (APL hereafter) was integrated to CMA CGM after 2018. Consequently, we considered the three alliances detailed in Table 2 as follows:

4 Results

4.1 Port analysis

4.1.1 Northern Range

Figure 1 presents the evolution of the NR port ranking over the three years from 2018 to 2020, and the share of calls between terminals in the same port. First, Rotterdam faced a loss of 578 calls in 2020 which represented a decrease of 5.5% compared to 2018. German ports faced a double-digit decline of 10.9% of calls in 2020 as well as British ports, showing a drop of 8.1% in comparison with 2018. Beyond COVID, the loss of calls in British ports could be a direct consequence of Brexit and this could justify the 4.8% gain of Dublin in the Republic of Ireland that remains in the European Union. Regarding Belgium ports, Antwerp gained 1.3% and Zeebrugge 31.6%, representing a combined total rise of 3.8%.

Figures 2a and b shed light on the evolution of the different sized vessels between 2018 and 2020. In Fig. 2a, before Brexit and COVID-19, all ports except Rotterdam, Bremerhaven, Le Havre, Felixstowe, and Liverpool, increased their port calls. The greatest loss occurred in Bremerhaven (– 20.2%), and Rotterdam represented the smallest decline with -1.5% of calls. The English ports of Liverpool and Felixstowe respectively lost 3.3% and 11.3% calls in 2019, compared to 2018. They notably

³ <https://theloadstar.com/hmm-takes-100000-teu-of-capacity-from-the-2m-to-its-new-alliance/>.



Table 2 List and composition of shipping alliances per year

	2018	2019	2020
2 M	Maersk MSC Hamburg Sudamerikanische HMM	Maersk MSC Hamburg Sudamerikanische HMM	Maersk MSC Hamburg Sudamerikanische HMM (until 03/31/2020)
THE Alliance	Hapag-Lloyd ONE Yang Ming	Hapag-Lloyd ONE Yang Ming	Hapag-Lloyd ONE Yang Ming HMM (as of 04/01/2020)
Ocean Alliance	CMA-CGM COSCO Evergreen OOCL	CMA-CGM COSCO Evergreen OOCL	CMA-CGM COSCO Evergreen OOCL

Source: Authors

received fewer Panamax vessels. Concerning Felixstowe, one observes a significant shortage of 113 VLCSs. As regards Le Havre, the French port lost on all the categories except VLCSs. For ports that attracted more ships, this was mainly thanks to the deployment of Panamaxes.

In 2020, Antwerp and Zeebrugge were the only ports with a positive evolution compared to 2019, with +0.9% and +10.4% respectively. Antwerp globally gained 42 calls mainly due to Post Panamaxes (+118). Regarding Zeebrugge, the growth is explained by the calls of Panamax vessels (+45) and ULCSs (+16). Further, the strongest declines occurred in Le Havre (-18.9%), Dunkirk (-15%), Liverpool (-14.6%) and Felixstowe (-10.2%). For all these ports, the Panamax category represented the most sizeable drop and Rotterdam confirmed this trend with a loss of 358 Panamaxes.

4.1.2 Mediterranean sea

Mediterranean ports are divided into three groups. Figure 3 presents the evolution of the Mediterranean port ranking over the three years 2018, 2019 and 2020 and the share of calls between terminals in the same port. The first group consists of ports with more than 3000 calls per year. The second group represents ports with at least 1000 calls and the rest with ports below this limit.

Throughout the period 2018 to 2020, Fig. 3 highlights that five ports managed more than 3000 calls per year: Port Said, Algeciras, Piraeus, Valencia, Marsaxlokk and Tanger-Med. Among them, only Algeciras and Tanger-Med witnessed growth in 2020. However, Marsaxlokk lost 627 calls in 2020 in comparison with 2018 and thus left this group. Port Said and Marsaxlokk faced the strongest decrease with -24.5% and -31.9% respectively. At the opposite, Tanger-Med and Algeciras benefited from +34.9% and +8.6% calls in 2020 versus 2018. It



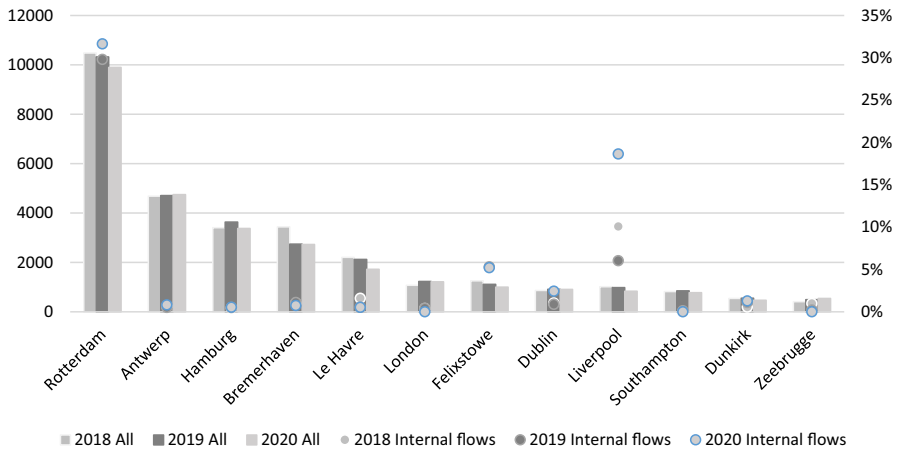


Fig. 1 Northern Range port ranking from 2018 to 2020. *Source:* Authors

is noteworthy that Tanger-Med, which reached +3000 calls in 2020, gained 786 calls compared to 2018.

Regarding the second group, six ports received more than 1,000 calls in 2018, four in 2019 and five in 2020. Marseille lost 160 calls in 2019 and failed to win them back. Genoa saw a dip of -15.9% in 2020 versus 2018. On the contrary, Gioia Tauro reached +17.4% of calls over the same period. The third group gathered 23 ports in 2018, 25 in 2019 and 24 in 2020 due to the evolution of port calls at Marseille and Ashdod.

Figures 4a and b highlight the impact of different sized vessels on the frequency of calls for ports with at least 1,000 calls per year. Looking at Fig. 4a on the evolution 2018–2019, except for Marsaxlokk, Genoa, Port Saïd and Marseille, all other ports attracted VLCSs and ULCSs. Algeciras, Piraeus, Tanger-Med, Mersin and Gioia Tauro managed more vessels in 2019 compared to 2018 with +2.8%, +0.1%, +22.5%, 2.3% and +7.7% respectively. Additionally, all these ports also benefited from Panamax vessels. Algeciras and Gioia Tauro increased the number of Post Panamaxes. Further, Tanger-Med, Gioia Tauro improved the number of VLCSs and both Algeciras and Piraeus attracted more ULCSs.

Regarding Fig. 4b on the evolution 2019–2020, Ashdod showed the highest rise with +16.1% due to a 25% growth in the number of Panamax vessels. Tanger-Med being the only port that handled more vessels irrespective of size in comparison with 2019 came in second with +10.2% in 2020. Gioia Tauro also benefited from a growth of 8.9% despite a fall in VLCSs (-24%). Concerning Port Saïd and Marsaxlokk, one notices a drop of all sizes of ships except for ULCs. Genoa also experienced a decrease despite a slight gain (+1 call) of VLCSs.



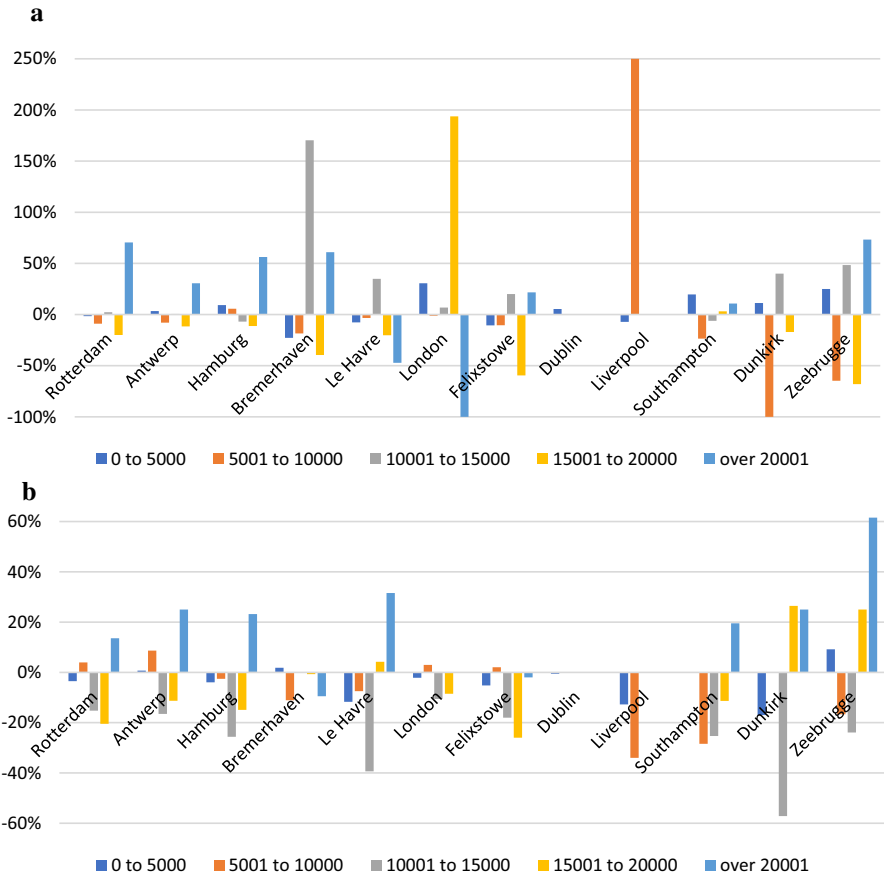


Fig. 2 **a** Percentage evolution of NR ports 2018–2019. **b** Percentage evolution of NR ports 2019–2020. *Source:* Authors

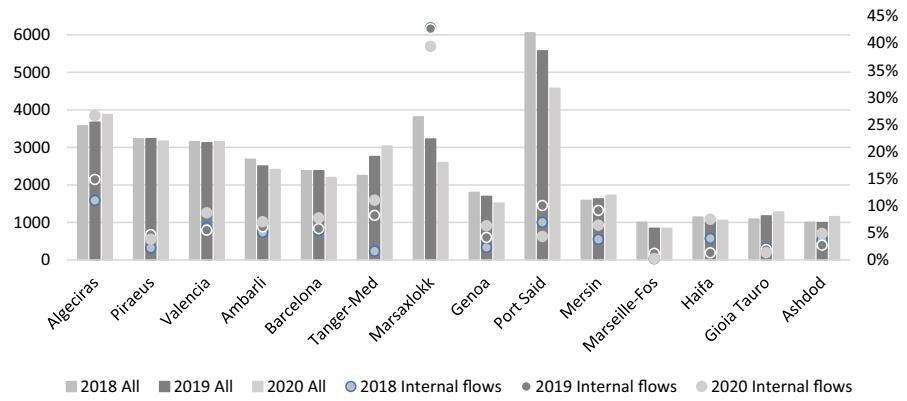


Fig. 3 Mediterranean Sea port ranking from 2018 to 2020. *Source* Authors (2021)



4.2 Shipping alliance analysis

In this section, we analyze the number of ships and their size that each shipping alliance deployed in the concerned ports. Our aim is to understand the relation between alliances and ports. In 2018, 2 M represented at least 50% of calls in four ports: one in the NR and three in the Mediterranean. For its part, Ocean Alliance represented more than 50% of the calls in one port (NR). In 2019, this number reached seven for 2 M (two in the NR and five in the Mediterranean) and it remained at one for Ocean Alliance. In 2020, as a probable effect of the COVID-19 epidemic, 2 M lost its leadership in two ports (in the NR) and kept the leadership in five in the Mediterranean, while Ocean Alliance gained two ports (Dunkirk and Marsaxlokk) with more than 50% of calls, compared to 2019. Regarding Dunkirk, first, the Ocean Alliance represented 46.2% of the total calls in 2019, while its share was 50.2% in 2018; second, CMA-CGM maintained its position within the French ports. In 2020, Marsaxlokk lost 627 calls vis à vis 2019; the Ocean Alliance reoriented 65 vessels to other ports; 2 M sharply reduced its presence of 232 vessels and THE Alliance kept 222 vessels in 2020. Thus, the strategy of 2 M benefited the Ocean Alliance.

4.2.1 Northern Range

Figure 5 stresses the importance alliances may have on ports belonging to NR. One notices that 2 M had a dominant position versus THE Alliance and Ocean Alliance, and COVID-19 did not impact the hierarchy of the alliances.

Regarding the breakdown of the different vessel types for 2 M in the twelve ports of the NR, one observes some changes throughout the 2018–2020 period, as shown in Fig. 6a. The main progress concerned Dunkirk and Southampton both for Panamaxes; Zeebrugge for Post Panamaxes; and Felixstowe for VLCSSs. Regarding losses, Rotterdam, Le Havre, Felixstowe, and Liverpool saw a decrease in the deployment of Panamaxes, while Dunkirk and Southampton received fewer Post Panamaxes and Zeebrugge and Felixstowe fewer ULCSs.

As illustrated in Fig. 6b on THE Alliance, much of the growth came from the use of Panamaxes in Felixstowe and Dunkirk, while Bremerhaven and Le Havre saw an increase in the share of Post Panamax vessels. With regard to the main loss, THE Alliance left Dublin, but also reduced its share of Panamaxes in Bremerhaven, Felixstowe, Southampton and also used fewer Post Panamaxes in Dunkirk and VLCSSs in Rotterdam, Antwerp, Hamburg and Felixstowe.

Concerning the Ocean Alliance, as highlighted in Fig. 6c, the main growth occurred in Zeebrugge, Felixstowe and Southampton thanks to the positioning of Panamaxes and Post Panamaxes. The Ocean Alliance used more Post Panamax ships in Bremerhaven and Le Havre. In addition, it deployed more ULCSs in Hamburg, Felixstowe and Rotterdam. Finally, it used fewer VLCSSs and ULCSs for Zeebrugge and Felixstowe.



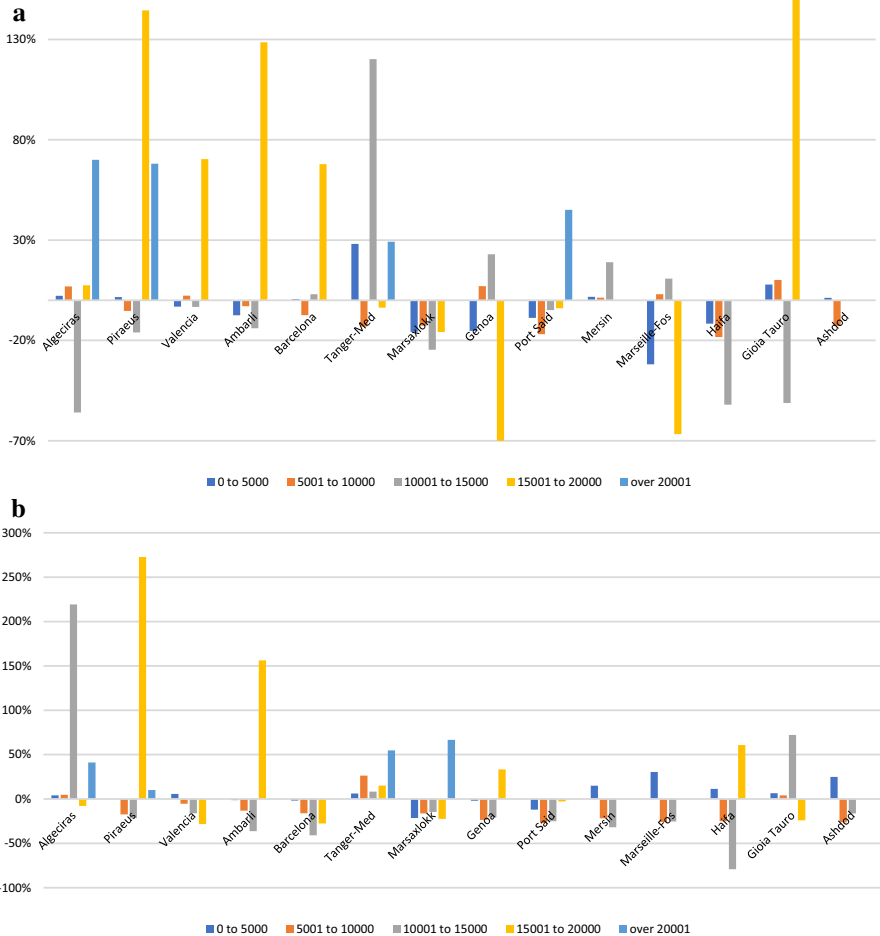


Fig. 4 a Frequency of service at Med ports per size of vessels 2018—2019 (1,000 calls per year). *Source:* Authors. **b** Frequency of service at Med ports per size of vessels 2019—2020 (1,000 calls per year). *Source:* Authors

4.2.2 Mediterranean Sea

As shown in Fig. 7, 2M represented the alliance with the strongest impact on most Mediterranean seaports. However, compared to 2018, Ocean Alliance strengthened its influence as it took the lead in four additional ports in 2020.

Figures 8a–c illustrate the possible evolution of the relation between ports and alliances in the Mediterranean over the 2018–2020 period. Looking at Fig. 8a on 2 M, one observes the breakdown of the type of vessels in the ports with more than 1,000 calls per year. First, Barcelona and Marseille saw the share of Panamax vessels increase, while both ports received fewer Post Panamaxes. Moreover, 2 M delivered fewer ULCSs in Barcelona. Marsaxlokk benefited from an increase in the



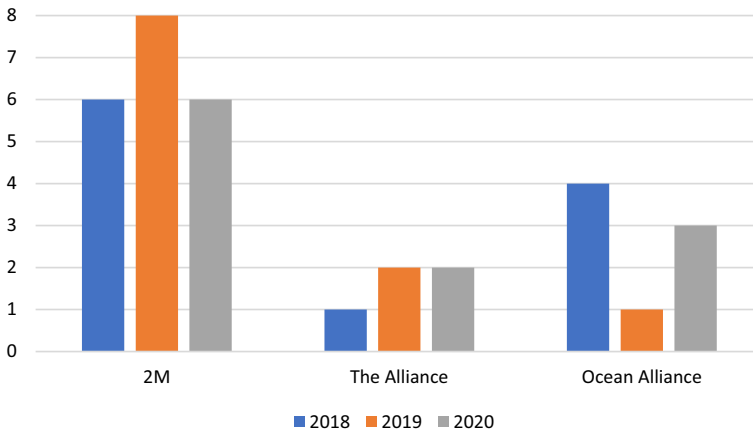


Fig. 5 Number of times an alliance has a leading position in the Northern Range over 2018 – 2020.
Source: Authors

share of Post Panamax vessels while it also faced a decline of Panamax vessels. Further, 2 M positioned more VLCSs and fewer ULCSs in Haifa.

Figure 8b highlights the way THE Alliance reorganized its services. As a result, Marseille, Port Said and Barcelona increased their share of Panamax vessels while Ashdod was positively impacted by Post Panamax vessels and VLCSs and Marsaxlokk only by VLCSs. On the other hand, Ashdod experienced a decline in the share of Panamax vessels. Barcelona and Marseille faced the same issue but with Post Panamax vessels when Algeiras and Port Said were dealing with the relative loss of VLCSs.

As shown in Fig. 8c, the Ocean Alliance reinforced its share of Panamax vessels in Ashdod, Gioia Tauro, Haifa and Mersin, but also Post Panamax vessels in Barcelona, Valencia, Marseille and Genoa. Port Said benefited from an increase of ULCSs. At the opposite, the Ocean Alliance decided to reduce the number of Panamax vessels in all Spanish ports as well as in Marseille and Genoa. It is noteworthy that the most sizeable loss concerned Post Panamax vessels for Ashdod, Gioia Tauro, Haifa and Mersin.

4.2.3 The cases of Rotterdam, Piraeus, Tanger-Med and Gioia Tauro

We have selected these ports as they present certain specificities. First, Rotterdam, is the largest European port. Piraeus is the port that saw a change in alliances' leadership over the three years analyzed. We have included Tanger-Med due to its



evolution as one of the main hubs in the Western Mediterranean and finally Gioia Tauro since this is the smallest hub in the area, with the highest dependency on one company i.e., MSC. Indeed, since April 2019, MSC has fully controlled this port through Medcenter Container Terminal owned by Terminal Investment Limited (TIL), a MSC subsidiary specialized in port terminal management.

Figure 9 presents the ratio of the number of containers handled over the number of vessels managed in the concerned ports, calls from intra-flows being excluded from the computation. First, compared to 2018, all ratios increased except for Zeebrugge in 2020. Compared to 2019, Piraeus is the second that decreased (-2.7%). This result confirms the fact that alliances facing the decline of international trade in the first months of COVID-19 decided to adapt their capacity and optimize their loading ratio (Notteboom et al., 2021).

Furthermore, Gioia Tauro as well as Tanger-Med, benefited from a positive evolution in both the number of containers and vessels, between 2018 and 2020, with respectively $+66.2\%$ and $+22.1\%$. Gioia Tauro experienced a second growth both in terms of containers and vessels with respectively $+38.8\%$ and $+18.2\%$.

Figure 10 sheds light on the importance of alliances on the number of port calls. Surprisingly, Rotterdam, the only port which saw a loss versus other seaports (-1.1% between 2018 and 2020 -intra flow excluded) was also the port with the most balanced impact of the alliances; the Ocean Alliance had a greater impact than 2 M in 2020. One further notices that Tanger-Med and Gioia Tauro were largely dependent on 2 M. Finally, regarding Piraeus, 2 M had a more noticeable impact than Ocean Alliance in 2018 but this situation evolved and the latter alliance represented around 30% of all calls in 2019 and 2020.

In addition, one observes that alliance members did not have the same weight upon the ports. Looking at Table 3, CMA CGM was leading in Rotterdam, Tanger-Med and Gioia Tauro, whereas COSCO was the leader in Piraeus. Looking at 2 M, Maersk led in Rotterdam and in Tanger-Med while MSC was the leader in Gioia



Fig. 6 **a** Share of the different types of vessels in the Northern Range (2 M). *Source:* Authors. **b** Share of the different types of vessels in the Northern Range (THE Alliance). *Source:* Authors. **c** Share of the different types of vessels in the Northern Range (Ocean Alliance). *Source:* Authors

Tauro and Piraeus. The evolution of Ocean Alliance in Rotterdam was mainly due to CMA CGM. In 2018, 948 CMA CGM ships called at Rotterdam versus 1,936 from 2 M. In 2019, the number of vessels reached 1,004 for CMA-CGM while the number of vessels managed by 2 M decreased to 1,714. In 2020, these figures became 1,085 for CMA CGM and 1,531 for 2 M. Looking at Fig. 11a, it appears that the strategy was to increase the number of calls of Panamax and ULCSs over 20,000 TEUs.

Tanger-Med was mainly impacted by 2 M and more precisely by Maersk. Looking at Table 3, since 2018, Maersk had increased shares from 75.9% to 86.2% of 2 M calls. As for CMA CGM in Rotterdam, the main types of vessel that justified this evolution were small Panamax feeders and ULCSs (Fig. 11b). The situation of Gioia Tauro was slightly different. Although 2 M was the leader with more than 90% of calls, MSC was at the origin of this result since it acquired the Medcenter Container Terminal in 2019. Additionally, even though no ULCSs called at Gioia Tauro in 2018, these were 32 in 2020. Besides, as illustrated in Fig. 11c, the number of Post Panamax vessels in 2020 increased in comparison to 2018 and 2019.

It is noteworthy that 2 M was the leading alliance in Piraeus in 2018 but Ocean Alliance took the leadership via COSCO in 2019 (Table 3). The Chinese company mainly deployed Panamax and ULCSs in this port. Data regarding the other typologies of containerships did not change but for VLCSs, one notices a loss of 25 vessels between 2018 and 2020.

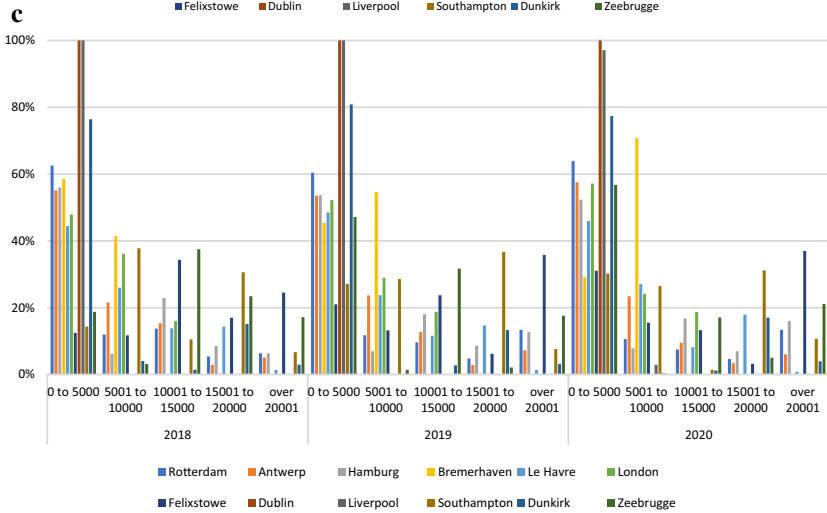
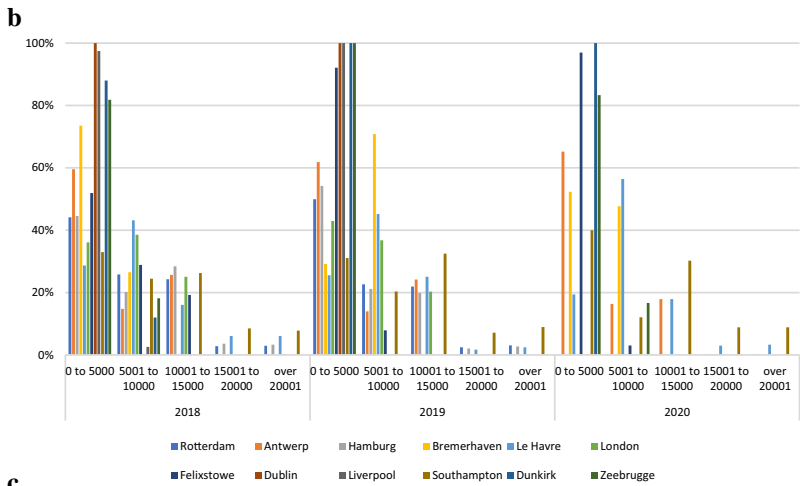
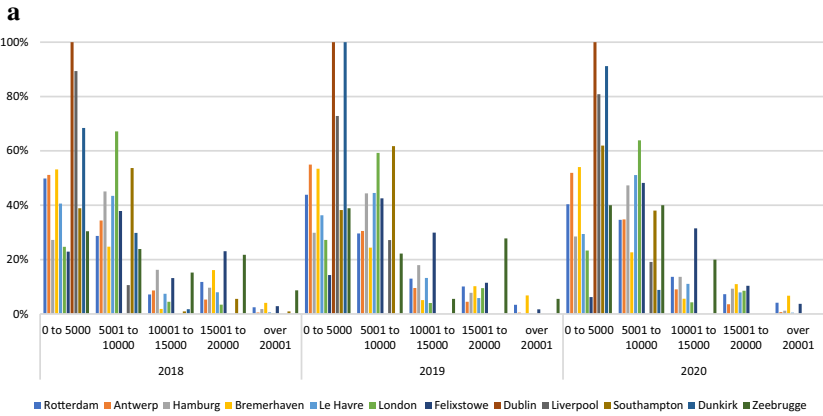
5 Discussion

5.1 Port hierarchy in the Mediterranean Sea and Northern Range

Our first research question was to assess whether the COVID-19 crisis served as a catalyst towards a new port hierarchy for the container segment in the 45 largest ports of the Mediterranean Sea and NR. In line with Notteboom (2021) and EMSA (2021b), our results confirm that most of the largest container ports saw a decline in traffic while the intensity of this downturn was not the same for the concerned ports.

These results firstly show that no major evolution has yet occurred due to COVID-19 and thus, we assume this pandemic has not been a catalyst of a new port hierarchy. Nevertheless, this crisis has revealed very contrasting situations for ports, showing ‘poor’ and ‘good’ resilience to the COVID-19 pandemic as occurred in the 2008–2009 Great Recession (Notteboom et al., 2021). It should be mentioned though that a consolidation of certain positions has occurred both in the north and south of Europe. Concerning the NR, the three leaders in 2018 were still the same in 2020. Rotterdam confirmed its leadership with 14,439 million TEUs, albeit with a decline in 2020, followed by Antwerp (12,023 million TEUs) and Hamburg (8,527





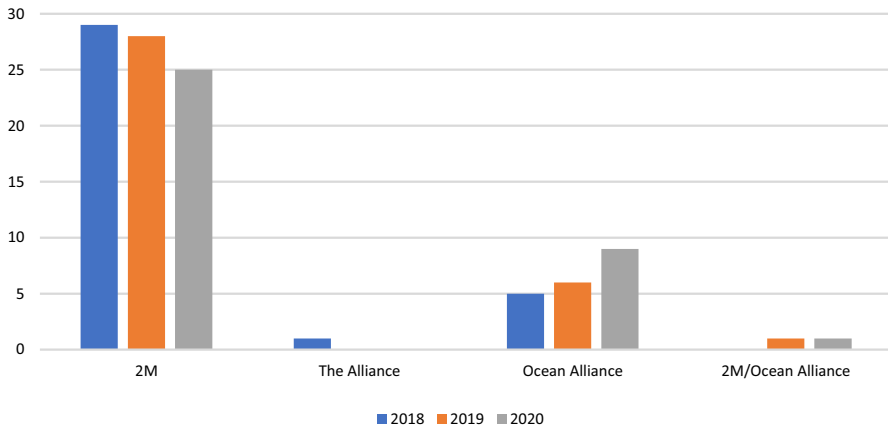


Fig. 7 Number of times an alliance is in a position of leader in the Mediterranean Sea between 2018 and 2020. *Source:* Authors

million TEUs). Nevertheless, *developments* could be expected in the short run. The merger between Zeebrugge and Antwerp formalized in February 2021, creating the Port of ‘Antwerp-Bruges’⁴ may represent a serious threat to Rotterdam and challenge its leadership in Europe. Indeed, if the ‘danger’ for Rotterdam seemed far away in 2019, COVID-19 has brought Rotterdam closer to the new ‘couple’. Additionally, as shown in Table 4, in terms of performance, the ratio of TEUs over the number of vessels managed is at the advantage of this new entity, meaning that the new Port of Antwerp-Bruges could become as attractive as Rotterdam. Will 2021 therefore be the year for Rotterdam to recover the lost calls or the advent of a new European leader?

Furthermore, one observes that some NR ports genuinely suffered from COVID-19 and other economic issues, especially British ports as a result of the uncertainties of Brexit (e.g., London, Felixstowe and Southampton), or social unrest, such as that of Le Havre, with strikes against the French pension reform plans in late 2019 and early 2020. Notwithstanding an increase of 4% of ULCSs in 2020, the leading French container port fell in the European ranking from 9th position in 2018 to 11th in 2020. Since 1 June 2021, Le Havre has merged with Rouen and Paris, and through its new entity ‘HAROPA Port’,⁵ it should find new synergies and return to 2018 levels for the container segment.

Concerning the Mediterranean container seaports, our analysis underlines some clear trends. The COVID-19 impacts did not have the same gravity as for Northern ports. In spite of its negative growth (– 3.8%) in 2020, Piraeus consolidated its position as the fourth European container port followed by the two Spanish ports of Valencia (5th) and Algeciras (6th), which faced a very gradual decline between

⁴ <https://newsroom.portofantwerp.com/the-ports-of-antwerp-and-zeebrugge-to-join-forces>. 5 April 2020.

⁵ <https://www.haropaports.com/en>.



2019 and 2020. For its part, Barcelona lost 11% volume (around 9% of ships calls) and was thereby downgraded to the 10th place in favor of Gioia Tauro. The latter moved forward in 2020, affirming its hub status, and moved from the 13th to 9th position with a sizeable 26.6% increase, benefiting from the MSC strategy. On the contrary, places such as Ashdod, Marsaxlokk, Genoa and Marseille, faced notable declines. Concerning Marseille, its collapse was particularly strange and it might be the cumulative consequence of strikes in 2019 (– 15.8%) and COVID-19 (– 53.5%) in 2020. Ten years after the latest port governance reform that implemented the landlord port model for the largest seaports (Cariou et al., 2014; Lacoste and Douet, 2012), the French port system is continually on the lookout for better competitiveness and performance (Fedi et al., 2022). Along the southern shores of the Mediterranean, Tanger-Med showed on the contrary excellent results with a total of 5.8 million TEUs in 2020, probably at the cost of Barcelona. With the commissioning of the new container terminal PC3 Tanger-Med 2, 2021 should confirm this performance and the port's positioning as a major Mediterranean hub.

From a general perspective, the COVID-19 consequences on NR and Mediterranean seaports pointed out that the principle 'big is beautiful' was evidently true for the largest ports compared to the medium-sized or smallest ones. Whereas the leadership of current hubs should not significantly evolve in the medium run, feeder ports will have to set up innovative and differentiated strategies to maintain or improve their position. The role of new forms of cooperation, mergers, and therefore the governance of seaports will be of strategic importance in the post-COVID years to come (Notteboom and Haralambides, 2020).

5.2 Global maritime alliances: time for change

Our second research question concerned the analysis of the impacts of the decisions of shipping alliances during the pandemic, and the way they affected NR and Mediterranean seaports. In line with Notteboom et al. (2021), our results showed that alliances were resilient to the COVID-19 crisis and finally stable in their composition; no mergers or acquisitions took place over this period. Obviously, although seafarers played a strategic role in this context (Charbonnaux et al., 2020; Weerth, 2020), container shipping lines promptly reacted to the drop in world demand in comparison to the 2009 financial crisis (Notteboom et al., 2021; Fusillo and Haralambides, 2020). Thanks to a particularly higher concentration and both horizontal and vertical integration (e.g., ITF, 2018), alliance partners benefited from diverse CWAs, especially VSAs and SCAs: in the first half of 2020, they shared slots; optimized vessel deployment; and coordinated a large number of blank sailings (Notteboom et al., 2021). They used their operational coordination centers to jointly adjust their transport capacity with the aim of mitigating the consequences of failing demand at the onset of the pandemic. Their common IT tools indubitably facilitated the efficiency of their decisions, and one can understand why specific Digital Container Agreements were signed, such as the 'Tradelens' that entered into force in early February 2020. We assume that this type of cooperation represents the ultimate stage of carrier integration, which could introduce a new generation of 'highly integrated



Fig. 8 **a** Share of the different types of vessels in Mediterranean ports (2 M). *Source:* Authors. **b** Share of the different types of vessels in Mediterranean ports (THE Alliance). *Source:* Authors. **c** Share of the different types of vessels in Mediterranean ports (Ocean Alliance). *Source:* Authors

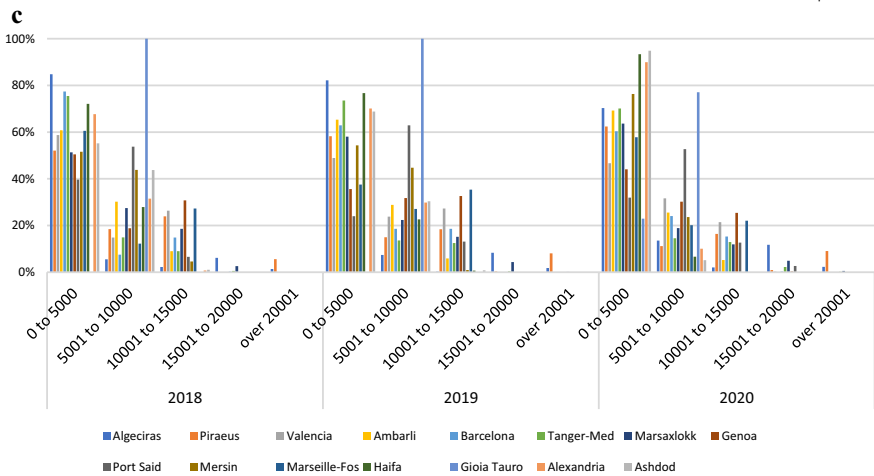
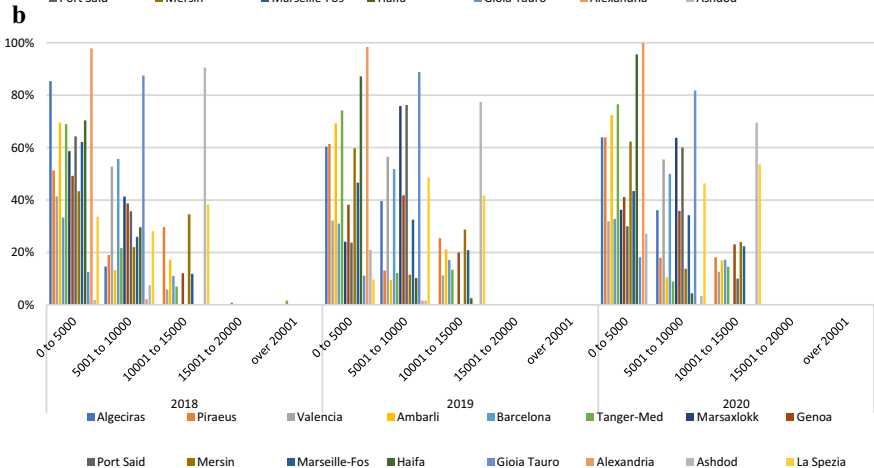
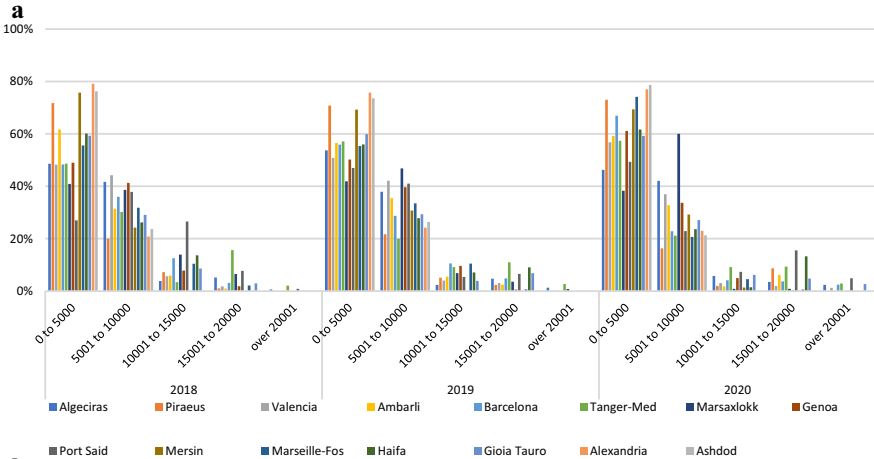
strategic alliances' (ITF, 2018), where carriers develop and operate common IT systems to coordinate their international networks more than ever.

Additionally, our results also show that shipping alliances share common strategies on fleet deployment, vessel size and port calls. As detailed in Sect. 4, carriers generally deployed two types of containerships in a large number of ports: ULCSs of 20,000 TEUs and Panamax / feeders of -5,000 TEUs. In line with Notteboom et al. (2021), one observes the use of more ULCSs, leading to fewer port calls, whereas more cargo volumes had to be moved per call. COVID-19 had some impact on alliance fleet deployment (number and typology of ships), but not on alliance hierarchy. This said, the positioning of alliance members was slightly different, depending on the selected hub or feeder port. It would be interesting to observe such evolutions in the future.

Furthermore, one can confirm that the COVID-19 crisis exacerbated the shortcomings of shipping alliances, and their capacity to unilaterally impose their decisions, whatever the consequences for both transport users and ports. As we explained in Sect. 2, the CWA provisions currently in force, especially VSAs, enable alliance members to take all corrective decisions necessary in periods when transport demand falls. In any case, this business model where ULCSs concentrate more cargo calling at fewer large ports shows its limitations, since transport users do not seem to benefit as much as they might (UNCTAD, 2020b). The European Shippers' Council (ESC) particularly denounced high freight rates which have negative consequences for trade, particularly as regards raw materials. ESC called on the European Commission (EC) 'to ensure that EU producers continue to have access to fair and accessible shipping services' (ESC, 2021). Also representing freight forwarders, ESC stressed the shortcomings of the 'liners', such as the lack of schedule reliability or equipment; container shortages; reduction of vessel capacity; container imbalances; and additional surcharges on fixed-contractual terms (ESC, 2020). In the same spirit, UNCTAD (2020b) confirmed that 'sustained cuts in shipping capacity over longer periods would be problematic for international trade and subsequently, for shippers and ports.' That report further underlined the detrimental consequences especially for small island developing states and transport users that faced increasing costs.

It should be recalled in this respect that these criticisms, raised by shippers and port service providers, existed prior to the pandemic (e.g., ESC, 2019; FEPOR, 2019), stressed also by recognized organizations such as ITF (2018), which underlined adverse effects of the existing alliances. Scholars too (among others Corruble, 2021; Fedi, 2021; Brooks et al., 2019) have pointed to the unbalanced relationships between carriers, transport users and port service providers. We, also, could conclude that strategic alliances have led to the same negative outcomes of conferences, that were supposed to 'stabilize the supply chain and assure steady services in several maritime routes' (Parola et al., 2014). Obviously, states and related competition





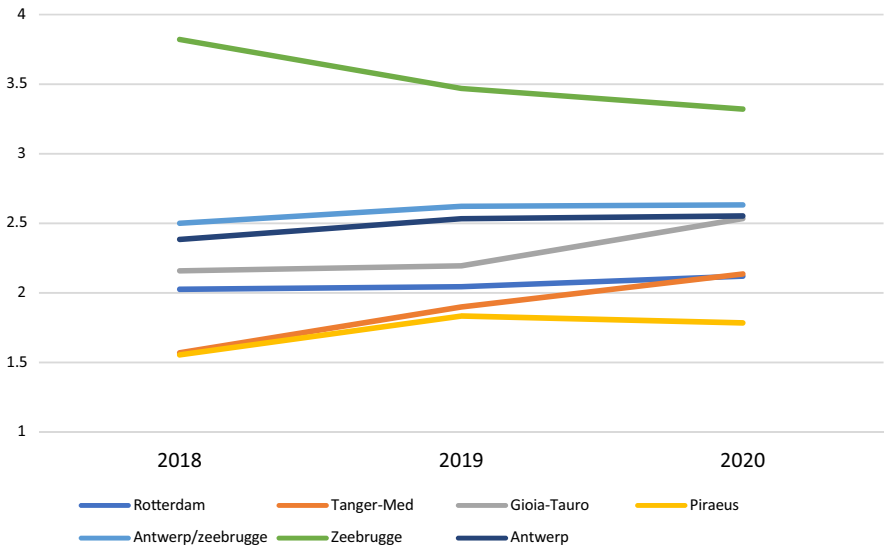


Fig. 9 Ratio of the number of containers handled to vessels managed. Source: Authors

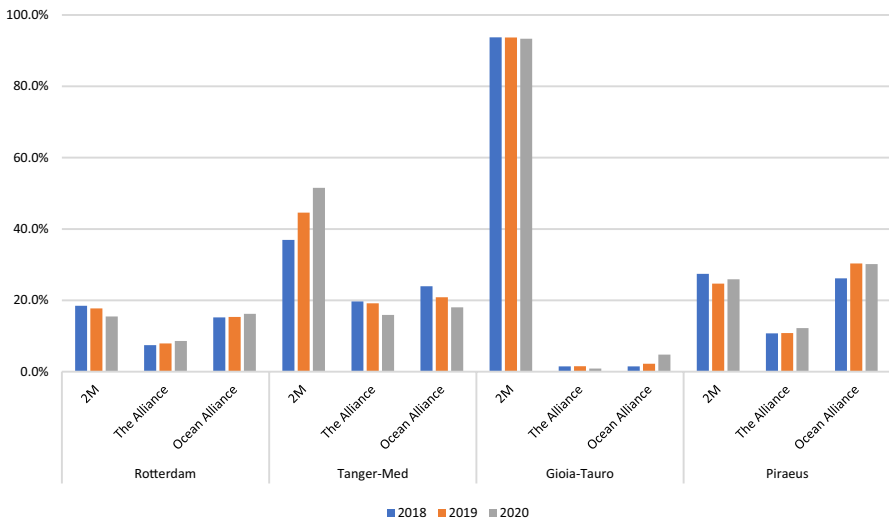


Fig. 10 Impact of alliances on ports. Source: Authors

authorities bear responsibility for this situation. While one cannot ignore the geo-strategic dimensions of shipping alliances (Fedi and Tourneur, 2015), that the various liner companies represent for powerful nations (e.g., COSCO for China, ONE for Japan, HMM for South Korea, HAPAG LLOYD for Germany) and regions (e.g., Maersk, MSC and CMA CGM for Europe), harmonized rules would be welcome considering the international nature of container shipping. This said, after 150 years



Table 3 Share of the company within each two major alliances in 2018, 2019, and 2020 by ports analyzed. *Source:* Authors

			Rotterdam	Tangier-Med	Gioia-Tauro	Piraeus
2018	2 M	Maersk	54.9%	75.9%	9.2%	11.6%
		MSC	41.9%	19.7%	90.3%	87.6%
		Hamburg Sud	2.2%	4.2%	0.4%	0.1%
		HMM	1.0%	0.1%	0.1%	0.0%
	Ocean Alliance	CMA-CGM	59.4%	92.8%	56.3%	22.5%
		COSCO	23.6%	4.3%	31.3%	51.0%
		Evergreen	9.1%	2.4%	0.0%	24.3%
		OOCL	7.9%	0.6%	12.5%	2.2%
2019	2 M	Maersk	54.7%	82.4%	4.9%	11.7%
		MSC	41.1%	16.0%	95.1%	87.8%
		Hamburg Sud	2.3%	1.3%	0.0%	0.5%
		HMM	1.9%	93.9%	0.0%	0.0%
	Ocean Alliance	CMA-CGM	63.4%	93.9%	69.2%	17.9%
		COSCO	21.1%	5.7%	11.5%	55.7%
		Evergreen	9.5%	0.3%	15.4%	23.1%
		OOCL	6/0%	0.0%	3.8%	3.4%
2020	2 M	Maersk	48.7%	86.2%	4.6%	21.1%
		MSC	45.4%	9.4%	95.4%	78.5%
		Hamburg Sud	5.7%	4.4%	0.0%	0.4%
		HMM	0.2%	0.0%	0.0%	0.0%
	Ocean Alliance	CMA-CGM	67.6%	89.1%	90.2%	16.1%
		COSCO	18.8%	10.0%	8.2%	57.1%
		Evergreen	8.7%	0.9%	1.6%	21.9%
		OOCL	4.9%	0.0%	0.0%	4.9%

of existence, liner shipping regulations are still fragmented, in different jurisdictions and rules (ITF, 2018). This absence of harmonization and the lack of (stricter) regulation on some alliance aspects such as management and control of transport capacity (Pelagidis and Haralambides, 2020), have led to the present concerns faced by shippers in recent months.

One might argue that situational factors not directly linked to alliance decisions have accentuated issues and bottlenecks in maritime supply chains (Notteboom et al., 2021). Nevertheless, it is questionable whether operational and financial matters can be resolved rapidly by alliance partners. At an operational level, with around 5,371 containerships (Statista Research, March 2021⁶), alliances own robust and efficient organizations to be performant within the entire supply chain, notably thanks to their joint operational coordination centers and interoperable IT systems. It

⁶ <https://www.statista.com/statistics/198227/forecast-for-global-number-of-containerships-from-2011/>.



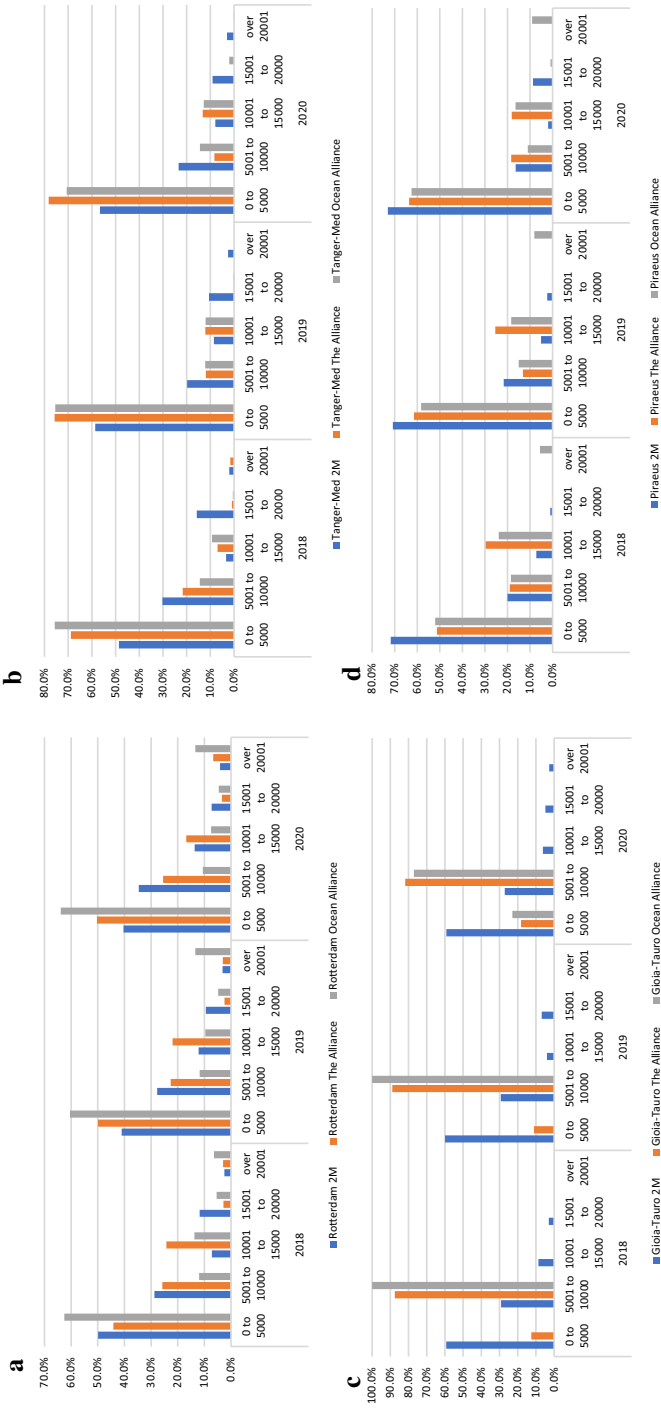


Fig. 11 a Share of alliances per type of vessel and year for Rotterdam. c. Share of alliances per type of vessel and year for Gioia Tauro. Source: Authors. b. Share of alliances per type of vessel and year for Tanger Med. d. Share of alliances per type of vessel and year for Piraeus

Table 4 Comparison of TEUs handled to vessel call ratio of Rotterdam and Antwerp-Bruges

	Total traffic (in million TEUs)			Vessels			Ratio		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Rotterdam	14,513	14,811	14,349	7,164	7,245	6,768	2,026	2,044	2,120
Antwerp+Zeebrugge	12,659	13,560	13,823	5,063	5,172	5,252	2,500	2,622	2,632

Source: Authors

is surprising that the top ten carriers, controlling more than 91% of transport capacity, have faced difficulties in providing empty containers for exports, and satisfying higher demand since mid-2020. At first glance, equipment availability raises the question whether ‘scarcity’ was artificial or actual. On the pecuniary front, considering the record levels of freight rates, some practices were questionable: notably, invoicing surcharges, and detention and demurrage fees. Consequently, one can reasonably expect the intervention of competition authorities as recommended by UNCTAD (2021b). While, at the time of writing, the EC has not officially reacted, the FMC has launched investigations against alliance practices, to identify anti-competitive behavior, in light of the situation in the U.S. since the spread of COVID-19 (i.e., port congestion, ship delays, blank sailings, equipment shortages, level of freight rates and more). To date, findings are still pending whereas ‘potential unreasonable demurrage and detention charges’ are suspected (FMC, 2021). An *Ocean Shipping Reform Act* should be adopted in 2022 with the aim to impose more transparency and stricter obligations for ocean carriers especially as regards equipment availability, detention and demurrage charges (U.S. Congress, 2021).

Finally, we assume that one of the key lessons of the COVID-19 crisis is that the time for change for maritime alliances has arrived. As suggested by ITF (2018), this could involve the repeal of the BER regime without excluding individual exemptions. Which country or region (e.g., EU) will initiate this process? And would it lead to a collective and comprehensive policy by other states? The 2008 repeal of maritime conferences in EU trades finally remained regional and no other competition authorities followed the EU example (Fedi and Tourneur, 2015). Thus, the EU should not pursue the same unilateral strategy before deciding to repeal or implement stricter conditions on alliances. Additionally, one cannot neglect the counterproductive effects of BER prohibitions, possibly leading to more mergers. By contrast, intermediate solutions are feasible, notably the implementation of a stronger coordination of competition authorities for a worldwide response or at least in some ‘critical’ regions such as the U.S., EU and Asia, as initiated after the P3 case (ITF, 2018). A relevant arena for this coordination could be the International Competition Network (ICN) that ‘builds consensus and convergence towards sound competition policy principles across the global antitrust community’ (ICN, 2021). Including most national competition authorities all around the world, ICN is in a position to recommend some safeguards regarding CWAs of alliances. Particular attention should be given, *inter alia*, to the constant transport capacity offered by shipping lines, the strict respect of schedules, the prohibition of blank sailings and the respect of transit times. Shippers hold a legitimate right to expect ‘quality of service’ in



liner shipping (Haralambides, 2007) and optimization gains as do alliance members themselves. Consequently, more than ever before, a rebalance of the relations between ocean carriers and shippers appears obvious (Brooks et al., 2019).

6 Conclusions

This research firstly aimed at evaluating the reinforcement of some NR and Mediterranean ports as major hubs and the downgrading of others during the COVID-19 scourge. We calculated total containership capacity deployed at 45 ports, from 2018 to 2020. Secondly, we tried to compare their respective situation and to find out how the port hierarchy evolved during this period. We assumed that this exceptional crisis was not a catalyst of a new port hierarchy, although it revealed contrasting situations with ‘poor’ and ‘good’ crisis resilience for ports meaning that some were downgraded and others maintained their ranking. Our results also confirmed and completed previous studies (e.g., Notteboom et al., 2021; EMSA, 2021a; UNCTAD, 2020a), illustrating the resilience of container shipping and the determining role of strategic alliances which rapidly adapted their strategy in order to prevent the negative consequences of the economic downturn as of early 2020. Obviously, alliances took lessons from the Great Recession of 2009 and thanks to the comprehensive powers afforded by the CWAs which shape their partnerships, they benefited from the legal and thus operational tools to efficiently address the global slowdown in demand.

This paper contributes to the existing literature on shipping alliances by providing, *inter alia*, a complementary taxonomy of CWAs, including digital ones, and a more accurate knowledge of some key provisions in the related contracts which not only govern the ocean carriers’ relationships but also impact transport users, as the COVID-19 crisis demonstrated. In terms of limitations, our taxonomy requires more investigation especially in the area of digital cooperation, both with regard to its legal and managerial implications. In addition, our analysis did not consider questions of port pricing, reliability, governance models, and inland and logistics networks, that constitute important factors, probably considered in ‘shipping lines reconfiguration’ over the crisis (Notteboom et al., 2021). Some of these aspects are part of our future research agenda.

At this time of writing, the emergence of COVID-19 variants⁷ raises uncertainties for the end of the worldwide pandemic and the complete economic recovery. Paradoxically, the container shipping industry rakes in substantial profits from record-high freight rates⁸ and now more than ever, this calls into question the very legality of alliances. Considering the cumulative advantages of combined CWAs, notably the related economies of scale, bargaining power, cost optimization, equipment rationalization and interoperable IT systems, one can be skeptical on the practical relevance of the current policy framework that remains fragmented and unharmonized. Even

⁷ World Health Organization: <https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/>.

⁸ <https://www.hellenicshippingnews.com/container-rates-up-to-13000-per-40-foot-container-drewry-maritime-financial-insight-july-2021/>.



though the adoption of a universal legal framework seems difficult, competition authorities should be able to demand a greater harmonization of anti-trust practices and define a common ‘reading grid’ of alliances in the medium run. The time has come for a paradigm shift that would restore a level playing field for shippers who legitimately expect proportionate counterparties. Moreover, these counterparties are legally required by the EU BER, whereas the EC surprisingly does not seem to react rapidly. For its part, the FMC follows a stricter approach and it would be interesting to observe if sanctions will be imposed against alliance partners and if other competition authorities will follow the same path. In conclusion, as ‘highly integrated strategic alliances’ are taking shape through stronger digital cooperation, COVID-19 offers an unprecedented opportunity to change the ‘rules of the game’ in container shipping.

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