2

MARITIME TRANSPORT SERVICES AND INFRASTRUCTURE SUPPLY

The present chapter focuses on key developments related to the supply of maritime transport during this past year. It also assesses the early impact of the COVID-19 pandemic on the supply of maritime transport services and industries and discusses the responses, lessons learned and possible implications of the pandemic in terms of forces shaping supply and the industry's long-term goal of decarbonization.

The pandemic has had a significant impact on the shipping industry. On the one hand, lockdowns and factory closures gradually affected demand for maritime transport, due to reduced cargo volumes (see chapter 1). On the other hand, safety measures applied to contain the spread of the virus, such as lockdowns and travel restrictions, affected the movement of maritime transport workers and procedural changes introduced in ports, and induced operational disruptions in the supply of maritime transport. These prompted changes in shipping operations and requests for government support in the sector. They made the industry reflect on ways to enhance resilience of the sector to future shocks.

This chapter reviews world fleet developments such as annual fleet growth, changes to the structure and age of the fleet. It considers selected segments of the maritime supply chain, such as shipbuilding, ship recycling, ship ownership, ship registration and the maritime workforce, emphasizing the impacts of the pandemic on maritime transport and marine manufacturing industries and on the supply of shipping services.

It also examines the impact of the pandemic on the container, dry bulk and tanker freight markets; government responses to support shipping; and industry prospects, in particular with regard to accelerated digitalization and the prioritization of environmental sustainability. Lastly, it explores the impact of the pandemic on the supply of port-related infrastructure and services, explaining how technology-based solutions relating to trade facilitation, automation and digitalization could support increased resilience to future shocks.

MARITIME TRANSPORT SERVICES AND INFRASTRUCTURE SUPPLY

In early 2020,
the world fleet totalled
98,140 ships
of 100 gross tons and above
2,061,944 thousand dwt
of capacity

Ship types representing largest proportion of global fleet value

Bulk carriers	**19.6%**
Oil tankers	**17.3%**
Offshore vessels	**17.1%**

FREIGHT RATES

Container ships

Blank sailing and other capacity-management measures applied to adapt supply capacity to reduced demand for seaborne trade and allow freight rates to remain strong

- Third quarter of 2020: capacity-reduction measures pursued in container shipping, although demand picking up, keeping freight rates on the rise.
- Sustaining these measures for a long period during recovery may lead to dysfunctionalities in the sector, undermining performance of shippers and global supply chains.

Tankers

Lockdown repercussions, geopolitical events, oil price fluctuations and increased use of vessels for floating storage --> higher freight rates (March–April 2020)

Dry bulk carriers

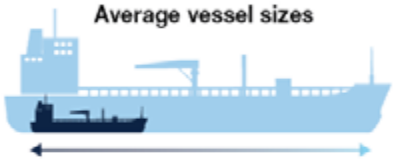
Oversupplied market and shock of negative demand from China, owing to the outbreak of the pandemic, pulled down dry bulk freight rates

FLEET CHARACTERISTICS

Average fleet age

9.28 years	*Bulk carriers*
9.91 years	*Container ships*
10.38 years	*Tankers*
19.46 years	*General cargo ships*

Average vessel sizes



Ships built **20 years ago** ⟷ Ships built **in the last 4 years**

*Oil tankers **9 times** bigger*
*Container ships **4 times** bigger*
*General cargo ships **3 times** bigger*
*Bulk carriers **twice** as big*

FLEET GROWTH

Newbuildings
65,911,000 gross tons delivered in 2019
of which:

Bulk carriers	**34.5%**
Oil tankers	**30.2%**
Container ships	**16.5%**

Decreasing global volumes of **ship recycling** tonnage
(thousand gross tons)

29,135	2016
23,138	2017
19,003	2018
12,218	2019

- COVID-19 crisis: container shipping industry sustained earnings as carriers applied discipline and strict capacity management
- 2008–2009 crisis: freight rates reached dramatic lows, as carriers sought to gain greater market shares through scale and capacity expansion, leading to great losses in container shipping trade

A. WORLD FLEET AND MARITIME WORKFORCE

1. Structure and age of fleet and vessel sizes

In early 2020, the total world fleet amounted to 98,140 ships of 100 gross tons and above, equivalent to 2,061,944,484 dwt of capacity. In the 12 months prior to 1 January 2020, the global commercial shipping fleet grew by 4.1 per cent (table 2.1), registering the highest growth since 2014, but still below levels observed during the 2004–2012 period. The market segment that achieved the highest growth was that of gas carriers, followed by that of oil tankers, bulk carriers and container ships. Gas carriers remained the most dynamic segment, recording the highest growth throughout the 2015–2020 period. In 2019–2020, growth in the oil tankers segment was the highest observed since 2015. In comparison, for the first time in many years, the slowest-growing segment was not that of general cargo ships, but of offshore vessels, where tonnage declined year on year (figure 2.1).

At the start of 2020, the average age of the global fleet was 21.29 years in terms of number of ships, and 10.76 years in terms of carrying capacity in dwt (table 2.2). In terms of dead-weight tonnage, bulk carriers are the youngest vessels, with an average age of 9.28 years, followed by container ships (9.91 years) and oil tankers (10.38 years). On average, general cargo ships are the oldest vessel type (19.46 years). Box 2.1 explains why the age of the fleet matters for decarbonization and provides an example illustrating the case of the Pacific islands.

The highest average vessel sizes are found within the youngest fleet segments (zero to four years). Among this group, oil tankers have the highest average size, followed by bulk carriers and container ships (figure 2.2). In terms of country groupings, developed and developing countries record higher average sizes fleets aged zero to nine years, whereas for countries with economies in transition, the highest average sizes are found in vessels that are between 10 and 19 years old.

Over the past 20 years, vessel sizes have been increasing to optimize costs through economies of scale (see chapter 3). Average bulker and container ship sizes have grown significantly since the 1990s – the average size of container ships has more than doubled since 1996.

The distribution of average sizes across vessel types (figure 2.2) suggests that the average capacity of vessels built in the last four years is much greater than those built 20 years ago. For example, compared with vessels built 20 years ago, the average capacity of oil tankers is nine times greater; of container ships, four times greater; of general cargo ships, three times greater; and of bulk carriers, two times greater.

Table 2.1 World fleet by principal vessel type, 2019–2020
(Thousand dead-weight tons and percentage)

Principal types	2019	2020	Percentage change 2020 over 2019
Bulk carriers	846 418 *43 per cent*	879 330 *43 per cent*	3.9
Oil tankers	568 244 *29 per cent*	601 163 *29 per cent*	5.8
Container ships	266 087 *13 per cent*	274 856 *13 per cent*	3.3
Other types	226 568 *11 per cent*	232 012 *11 per cent*	2.4
Other vessels	80 262 *4 per cent*	79 862 *4 per cent*	-0.5
Gas carriers	69 081 *3 per cent*	73 586 *4 per cent*	6.5
Chemical tankers	46 157 *2 per cent*	47 474 *2 per cent*	2.9
Ferries and passenger ships	7 096 *0 per cent*	7 289 *0 per cent*	2.7
Other/ not available	23 972 *1 per cent*	23 802 *1 per cent*	-0.7
General cargo ships	74 192 *4 per cent*	74 583 *4 per cent*	0.5
World total	**1 981 510**	**2 061 944**	**4.1**

Source: UNCTAD calculations, based on data from Clarksons Research.

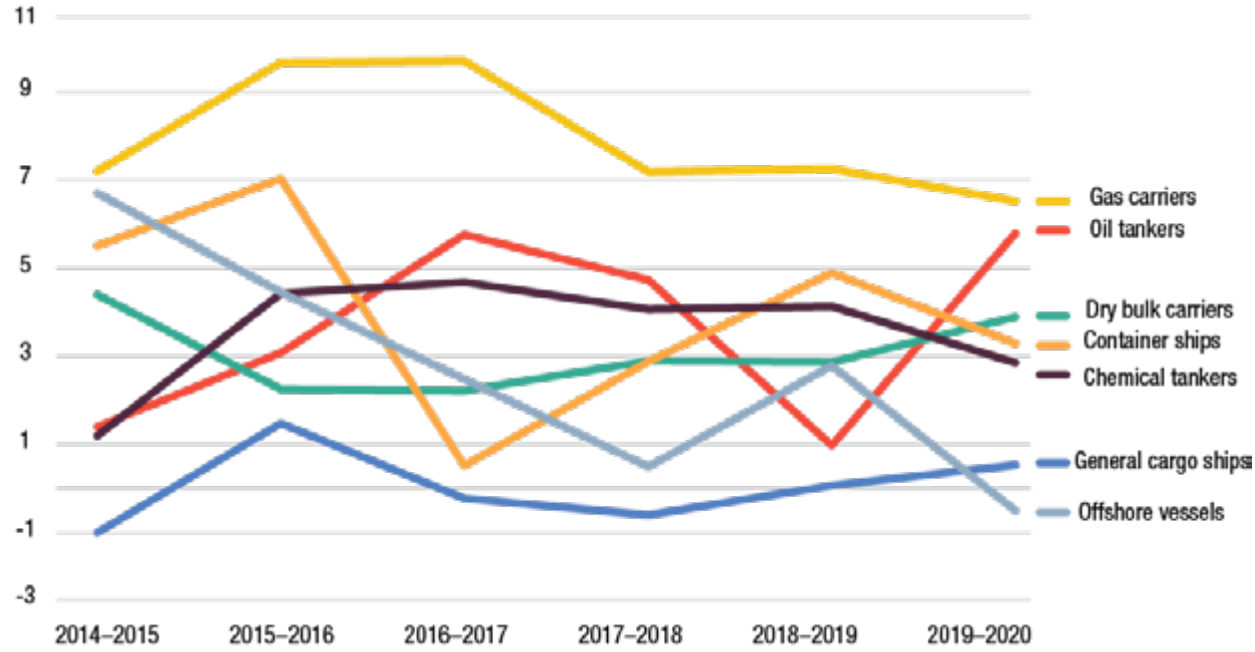
Notes: Propelled seagoing merchant vessels of 100 tons and above; beginning-of-year figures.

2. Ship ownership and registration

Ship ownership

Greece, Japan, and China remain the top three ship-owning countries in terms of cargo-carrying capacity (table 2.3), representing 40.3 per cent of the world's tonnage and 30 per cent of the value of the global fleet (table 2.4). The list of the top 35 ship-owning countries in terms of cargo-carrying capacity has remained stable since 2016. In the 12 months prior to 1 January 2020, countries recording the highest increases in carrying capacity compared with the previous year included Nigeria (up 17.2 per cent), the United Arab Emirates (up 5 per cent) and the United Kingdom (up 11.9 per cent). By contrast, Germany, Saudi Arabia and Malaysia lost ground (minus 6.2 per cent, 3.6 per cent and 3.4 per cent, respectively).

Figure 2.1 Growth of world fleet by principal vessel type, 2014–2020
(Dead-weight tonnage and percentage change)



Source: UNCTAD, *Review of Maritime Transport*, various issues.

The value of the fleet is linked to expectations of revenue and performance of shipping markets (Hellenic Shipping News Worldwide, 2020a; Marine Insight, 2019) and hence to return on investment, an important consideration from the perspective of owners. The value of the fleet can also be linked to the transport and logistics value chain and to the level of sophistication of the fleet, that is, the embedded digital technology making it possible to improve efficiency, safety, equipment maintenance and operational processes (Riviera Maritime Media, 2020). At the beginning of 2020, the main ship types representing the highest proportion of the value in the global fleet were bulk carriers, oil tankers and offshore vessels (table 2.4).

The top three ship-owning economies (Greece, Japan and China) represent a higher share of the global carrying capacity than of the global value of the fleet (figure 2.3), unlike the fourth- and fifth-ranked countries (United States and Norway, respectively). The characteristics and composition of commercial fleets explain the contrast between the two percentage shares. In some countries, this is linked to high-value non-cargo ships. For instance, the highest proportion of the value of the fleet of Norway, the United Kingdom, the Netherlands and Brazil comes from offshore vessels, whereas in the case of the United States, Switzerland and Italy, it comes from cruise ships.

Ship registration

Panama, Liberia and the Marshall Islands remain the three leading flags of registration, in terms of carrying capacity (table 2.5) and of value of the fleet registered (table 2.6). As of 1 January 2020, they represented 42 per cent of the carrying capacity and 33.6 per cent of the value of the fleet. The flags of the Islamic Republic of Iran, Taiwan Province of China and Thailand registered the highest increases in terms of dead-weight tonnage. Ships under the flag of the Islamic Republic of Iran more than tripled their growth compared with 2019. The three registries that saw the level of tonnage decrease in the 12 months preceding 1 January 2020 were the United Kingdom, Bermuda and the Isle of Man.

The quadrupling of the number of ships flying under the flag of the Islamic Republic of Iran derives from increased pressure exerted by sanctions, which led several registries, including those of Liberia, Panama, Sierra Leone and Togo (Reuters, 2019a), to de-flag vessels associated with trade from that country (Lloyd's List, 2020a). The most recent guidance to the maritime industry, issued in May 2020 by the Office of Foreign Assets Control of the United States Department of the Treasury, was an important milestone. The guidance expanded the compliance responsibility for fleet control and monitoring to actors beyond shipowners and operators, including flag registries, port operators, freight forwarders, classification societies and financial institutions (Lexology, 2020; The Maritime Executive, 2020a).

Between 1 January 2019 and 1 January 2020, the registries from the United Kingdom and some of the international registries categorized as crown dependencies and overseas territories – Gibraltar and the Isle of Man – witnessed a reduction. Tonnage registered under the flag of the United Kingdom

Table 2.2 Age distribution of world merchant fleet by vessel type, 2019–2020
(Percentage and dead-weight tonnage)

Country grouping		Years					Average age	Average age
		0–4	5–9	10–14	15–19	More than 20	2020	2020
World								
Bulk carriers	Percentage of total ships	20.22	42.17	18.70	8.99	9.93	10.18	9.69
	Percentage of dead-weight tonnage	23.30	44.86	16.73	8.22	6.89	9.28	8.87
	Average vessel size (dead-weight tonnage)	84 714	78 169	65 767	67 246	50 973		
Container ships	Percentage of total ships	15.60	20.39	32.79	14.67	16.55	12.72	12.29
	Percentage of dead-weight tonnage	24.41	29.14	28.19	11.74	6.53	9.91	9.43
	Average vessel size (dead-weight tonnage)	80 070	73 137	43 993	40 934	20 186		
General cargo ships	Percentage of total ships	4.64	12.34	15.67	7.99	59.36	26.93	26.30
	Percentage of dead-weight tonnage	8.52	23.16	19.76	9.88	38.69	19.46	18.89
	Average vessel size (dead-weight tonnage)	7 933	8 029	5 455	5 902	2 772		
Oil tankers	Percentage of total ships	14.45	18.95	20.19	11.11	35.32	19.12	18.77
	Percentage of dead-weight tonnage	24.73	24.99	26.57	17.52	6.20	10.38	10.11
	Average vessel size (dead-weight tonnage)	93 311	72 952	71 391	86 251	9 924		
Other	Percentage of total ships	11.21	18.05	15.53	8.28	46.93	23.18	22.70
	Percentage of dead-weight tonnage	21.56	16.94	22.22	10.57	28.71	15.59	15.42
	Average vessel size (dead-weight tonnage)	11 613	6 267	8 682	8 034	4 304		
All ships	Percentage of total ships	11.64	20.11	17.42	8.98	41.85	21.29	20.83
	Percentage of dead-weight tonnage	23.14	33.04	21.85	11.72	10.25	10.76	10.43
	Average vessel size (dead-weight tonnage)	47 901	40 986	30 290	32 742	6 661		
Developing economies (all ships)								
	Percentage of total ships	11.26	21.72	17.31	8.49	41.21	20.38	19.90
	Percentage of dead-weight tonnage	21.75	33.21	18.22	11.62	15.21	11.56	11.15
	Average vessel size (dead-weight tonnage)	37 438	32 440	20 900	27 950	7 544		
Developed economies (all ships)								
	Percentage of total ships	13.33	20.35	19.82	10.67	35.84	19.95	19.54
	Percentage of dead-weight tonnage	24.52	33.42	24.42	11.68	5.97	9.96	9.71
	Average vessel size (dead-weight tonnage)	61 465	52 885	40 792	38 294	7 305		
Countries with economies in transition (all ships)								
	Percentage of total ships	6.38	8.19	8.63	4.34	72.47	30.33	29.82
	Percentage of dead-weight tonnage	8.94	20.19	27.46	15.58	27.83	16.99	16.39
	Average vessel size (dead-weight tonnage)	12 644	18 987	25 905	25 880	2 724		

Source: Clarksons Research.

Note: Propelled seagoing vessels of 100 gross tons and above; beginning-of-year figures.

Box 2.1 Reducing carbon dioxide emissions: The case of the Pacific islands

The average age of a vessel can be an indirect indication of its environmental performance. In most cases, younger vessels are more fuel-efficient and less polluting because of technological advances. Bringing down the carbon footprint of shipping is not only a function of the age of the fleet (which could be associated with the introduction of technical improvements) but could also be a function of operational measures, such as speed optimization, or of shifting to alternative fuels. Other factors that also come into play are maintenance schemes or fleet-renewal trends linked to scrapping patterns and financial incentives (either to scrap or to order newbuildings).

Recent studies were conducted in the Pacific to assess different carbon dioxide reduction pathways, as several of the islands in the region have launched regional and national initiatives to develop low-carbon coastal maritime transport. The age of the fleet was an important consideration to inform decision-making related to maritime transport strategies and objectives. According to recent estimates by the Pacific Community, 41 per cent of the vessels from Fiji, Kiribati, the Marshall Islands, Samoa, Solomon Islands and Vanuatu are less than 20 years old; 20 per cent, between 20 and 30 years old ; and 38 per cent, more than 30 years old. There is a large proportion of older vessels because many of them were donated or bought second-hand. These vessels have low carrying capacity (less than 5,000 tons) and entail economic costs due to increasing maintenance and survey costs.

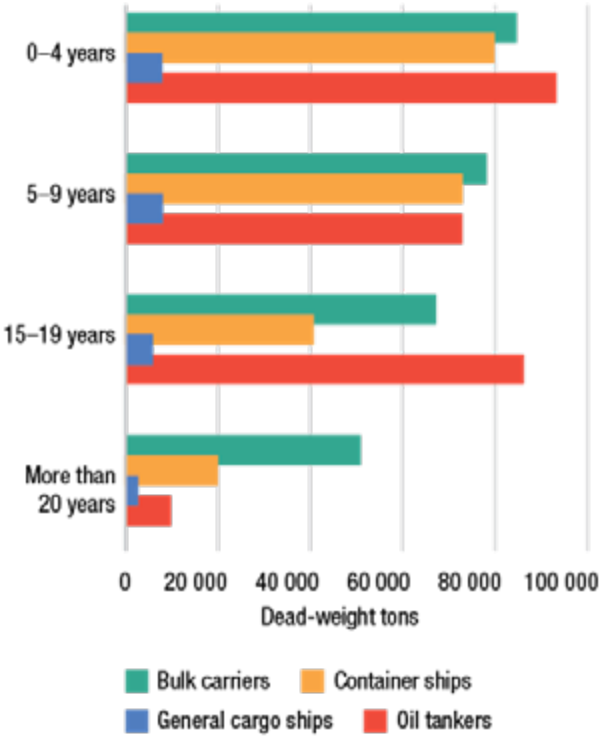
Although newbuildings would result in an 80–90 per cent improvement in operational efficiency, they would require significant investment to enable fleet replacement to meet the emission-reduction targets set in regional and national decarbonization strategies, highlighting the need for financing.

To abate emissions in the existing fleet, the Pacific islands are retrofitting vessels with wind propulsion and using wind and solar as auxiliary power supply. Such retrofits were found to be more suitable to the characteristics, financial capabilities, level of technological uptake and maritime heritage of the Pacific fleet than other options being considered in other countries, such as shifting to some alternative fuels and the use of onshore electrification. The studies found a potential to scale up such retrofits but acknowledged that retrofits could not achieve the same degree of savings and emission reduction as newbuilds.

Sources: Government of Fiji, 2018; Micronesian Centre for Sustainable Transport, 2019a, 2019b, 2020.

declined by 29.8 per cent, that of the Isle of Man by 13.5 per cent and Gibraltar, by 7.4 per cent. These developments could be linked to geopolitical tensions

Figure 2.2 Average vessel size and age distribution, selected vessel types, 2020
(Dead-weight tons)



Source: UNCTAD calculations, based on data from Clarksons Research.

Note: Propelled seagoing vessels of 100 gross tons and above; beginning-of-year figures.

with the Islamic Republic of Iran, which led to changes in ship registration (United Kingdom Department for Transport, 2020) but also to uncertainty related to the Brexit process (Lloyd's List, 2019a; Reuters, 2019b).

Plans for improving the competitiveness and attractiveness of the United Kingdom registry, particularly for low or zero-emission technology vessels and, in the long-term, for autonomous and semi-autonomous ships, include digitalization initiatives. These are aimed at reinforcing paperless maritime governance and e-registration and enhancing the quality of service through new standards and practices pertaining to inspections, certifications and business facilitation (United Kingdom Department for Transport, 2019).

3. Shipbuilding, new orders and ship recycling

Shipbuilding

China, the Republic of Korea and Japan maintained their traditional leadership in shipbuilding, representing 92.5 per cent of the newbuilding deliveries in 2019

Table 2.3 Ownership of world fleet, ranked by carrying capacity in dead-weight tons, 2020

	Country or territory of ownership	Number of vessels			Dead-weight tonnage				
		National flag	Foreign flag	Total	National flag	Foreign flag	Total	Foreign flag as a percentage of total	Total as a percentage of total
1	Greece	671	3 977	4 648	60 827 479	303 026 753	363 854 232	83.28	17.77
2	Japan	909	3 001	3 910	36 805 225	196 329 652	233 134 877	84.21	11.38
3	China	4 569	2 300	6 869	99 484 023	128 892 849	228 376 872	56.44	11.15
4	Singapore	1 493	1 368	2 861	74 754 209	62 545 517	137 299 726	45.55	6.70
5	Hong Kong, China	883	807	1 690	72 505 185	28 452 208	100 957 393	28.18	4.93
6	Germany	205	2 299	2 504	8 340 596	81 062 481	89 403 077	90.67	4.37
7	Republic of Korea	778	837	1 615	14 402 899	66 179 736	80 582 635	82.13	3.93
8	Norway	383	1 660	2 043	1 884 535	62 051 275	63 935 810	97.05	3.12
9	Bermuda	13	529	542	324 902	60 088 969	60 413 871	99.46	2.95
10	United States	799	1 131	1 930	10 237 585	46 979 245	57 216 830	82.11	2.79
11	United Kingdom	317	1 027	1 344	6 835 508	46 355 337	53 190 845	87.15	2.60
12	Taiwan Province of China	140	850	990	6 636 271	44 255 009	50 891 280	86.96	2.48
13	Monaco		473	473		43 831 888	43 831 888	100.00	2.14
14	Denmark	25	921	946	31 435	42 683 049	42 714 484	99.93	2.09
15	Belgium	113	188	301	10 040 106	20 658 108	30 698 214	67.29	1.50
16	Turkey	449	1 079	1 528	6 656 989	21 433 413	28 090 402	76.30	1.37
17	Switzerland	26	401	427	1 113 387	25 365 225	26 478 612	95.80	1.29
18	India	859	183	1 042	16 800 490	9 035 433	25 835 923	34.97	1.26
19	Indonesia	2 132	76	2 208	22 301 493	1 604 369	23 905 862	6.71	1.17
20	Russian Federation	1 403	339	1 742	8 292 932	14 812 631	23 105 563	64.11	1.13
21	United Arab Emirates	118	852	970	480 283	20 271 823	20 752 106	97.69	1.01
22	Islamic Republic of Iran	238	8	246	18 245 935	353 441	18 599 376	1.90	0.91
23	Netherlands	700	492	1 192	5 584 365	12 437 918	18 022 283	69.01	0.88
24	Saudi Arabia	137	132	269	13 303 057	4 126 462	17 429 519	23.68	0.85
25	Italy	499	179	678	11 005 343	6 400 010	17 405 353	36.77	0.85
26	Brazil	302	94	396	4 963 496	8 984 821	13 948 317	64.42	0.68
27	France	106	333	439	898 897	12 448 289	13 347 186	93.27	0.65
28	Cyprus	141	165	306	4 958 311	6 659 094	11 617 405	57.32	0.57
29	Viet Nam	910	150	1 060	8 390 791	2 357 014	10 747 805	21.93	0.52
30	Canada	222	159	381	2 723 583	7 247 389	9 970 972	72.68	0.49
31	Malaysia	464	156	620	6 378 887	2 164 848	8 543 735	25.34	0.42
32	Oman	5	51	56	5 704	8 069 314	8 075 018	99.93	0.39
33	Qatar	59	67	126	1 056 669	6 054 422	7 111 091	85.14	0.35
34	Sweden	88	213	301	929 401	5 580 520	6 509 921	85.72	0.32
35	Nigeria	182	74	256	3 227 668	3 031 686	6 259 354	48.43	0.31
	Subtotal, top 35 shipowners	**20 338**	**26 571**	**46 909**	**540 427 639**	**1 411 830 198**	**1 952 257 837**	**72.32**	**95.33**
	Rest of world and unknown	*3 037*	*3 015*	*6 052*	*36 513 130*	*59 204 480*	*95 717 610*	*61.85*	*4.67*
	World total	**23 375**	**29 586**	**52 961**	**576 940 769**	**1 471 034 678**	**2 047 975 447**	**71.8**	**100.0**

Source: UNCTAD calculations, based on data from Clarksons Research.

Notes: Propelled seagoing vessels of 1,000 gross tons and above, as at 1 January 2020. For the purposes of this table, second and international registries are recorded as foreign or international registries, whereby, for example, ships belonging to owners in the United Kingdom registered in Gibraltar or on the Isle of Man are recorded as being under a foreign or an international flag. In addition, ships belonging to owners in Denmark and registered in the Danish International Ship Register account for 45 per cent of the Denmark-owned fleet in dead-weight tonnage, and ships belonging to owners in Norway registered in the Norwegian International Ship Register account for 27.4 per cent of the Norway-owned fleet in dead-weight tonnage. For a complete listing of nationally owned fleets, see http://stats.unctad.org/fleetownership.

Table 2.4 Top 25 ship-owning economies, as at 1 January 2020
(Million dollars)

	Country or territory	Bulk carriers	Oil tankers	Offshore vessels	Ferries and passenger ships	Container ships	Gas carriers	General cargo ships	Chemical tankers	Other /not available	Total
1	Greece	34 426	37 873	187	2 404	7 936	12 238	189	1 064	468	96 785
2	Japan	34 027	9 981	4 713	3 030	11 805	15 173	3 482	4 937	9 150	96 298
3	China	30 108	13 278	10 189	5 089	17 243	4 267	5 244	3 126	3 008	91 553
4	United States	3 352	6 308	20 392	52 130	1 190	1 458	1 122	1 971	732	88 655
5	Norway	4 213	6 217	23 156	3 088	1 852	7 847	950	2 423	3 002	52 748
6	Singapore	12 860	13 975	5 189	25	6 845	4 428	1 043	4 695	566	49 626
7	Germany	5 857	2 121	630	9 630	17 211	1 966	3 429	791	360	41 996
8	United Kingdom	3 760	4 106	13 226	4 575	4 592	5 318	920	1 457	2 581	40 535
9	Hong Kong, China	10 209	7 239	601	2 723	10 082	1 173	898	282	1 027	34 234
10	Bermuda	4 826	5 895	5 779		2 079	8 431		375	62	27 447
11	Republic of Korea	7 319	5 999	264	366	2 400	4 914	710	1 595	2 816	26 383
12	Denmark	1 412	4 008	2 373	999	10 642	2 014	752	971	111	23 282
13	Switzerland	813	821	3 244	10 243	7 337	225	236	213	9	23 142
14	Netherlands	747	535	13 457	619	386	753	3 411	1 228	1 938	23 076
15	Italy	1 162	2 319	2 655	8 944	4	305	2 068	553	504	18 515
16	Brazil	145	1 029	15 345	69	298	131	35	84	1	17 138
17	Monaco	3 292	7 232		32	997	3 712		32	30	15 327
18	Taiwan Province of China	7 057	1 668	37	79	4 088	396	632	156	105	14 219
19	France	374	130	5 393	1 813	4 174	521	179	141	224	12 949
20	Turkey	3 208	1 433	691	346	1 290	145	1 892	1 121	42	10 168
21	Russian Federation	246	3 966	1 456	74	72	1 489	1 227	633	849	10 014
22	Malaysia	166	239	6 409	14	73	1 897	138	142	166	9 245
23	Belgium	1 515	4 070	88		262	1 221	811	167	529	8 663
24	Indonesia	838	2 091	849	1 942	790	517	1 105	348	47	8 528
25	United Arab Emirates	1 530	2 300	3 051	59	216	473	75	584	72	8 359
	Other	13 157	19 676	23 857	12 120	3 135	15 552	8 345	4 169	3 317	103 328
	World total	**186 622**	**164 511**	**163 232**	**120 413**	**116 998**	**96 568**	**38 894**	**33 258**	**31 718**	**952 213**

Source: UNCTAD calculations, based on data from Clarksons Research, as at 1 January 2020 (estimated current value).
Note: Value is estimated for all commercial ships of 1,000 gross tons and above.

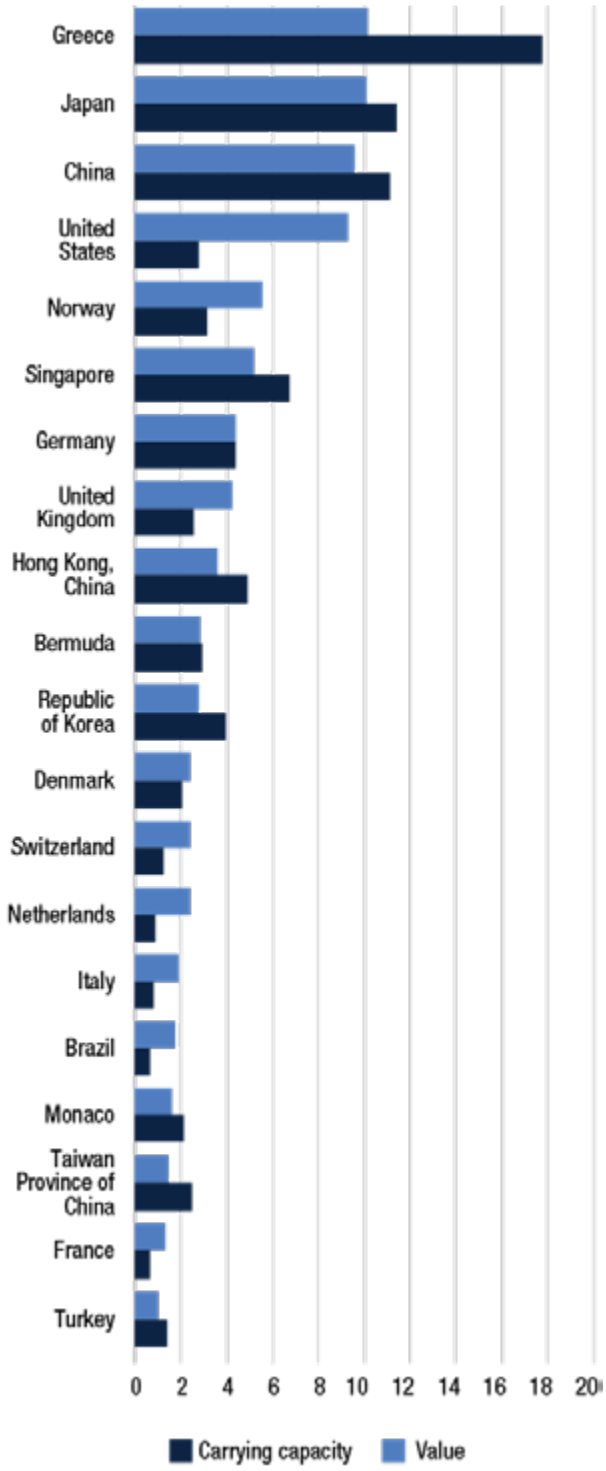
(table 2.7). Each country specializes in different shipping segments. China is the leading builder of bulk carriers (56.2 per cent), offshore vessels (58 per cent) and general cargo ships (34.6 per cent); the Republic of Korea, of gas carriers (62.8 per cent), oil tankers (59.4 per cent) and container ships (41.7 per cent); and Japan, chemical tankers (54.1 per cent).

Compared with 2019, the market share of the Republic of Korea increased by 7.7 percentage points, whereas that of China decreased by 5.1 percentage points. Bulk carrier and oil tanker newbuildings registered the largest increases (7.8 and 5.2 percentage points, respectively) whereas container ships and gas carriers registered the greatest decreases (-2 and -3.2 percentage points, respectively).

New orders

In early 2020, the world order book had declined with respect to dry bulk carriers, oil carriers, container ships and general cargo ships (figure 2.4). Orders for three of these shipping segments have been shrinking since 2017 (except for dry bulk carriers, which increased in 2019). Widening disparity between newbuilding prices and earnings, geopolitical instability, persistent financing challenges and broad uncertainty over fuel and technology choices explain this trend (Barry Rogliano Salles, 2020).

Figure 2.3 **Top 20 ship-owning economies in terms of value and carrying capacity of the global fleet, 2020** (Percentage)



Source: UNCTAD calculations, based on data from Clarksons Research.

Note: Value is estimated for all commercial ships of 1,000 gross tons and above.

Ship recycling

Bangladesh remains the country with the largest global share of recycled tonnage, accounting for more than half of the ships recycled in 2019. Together with India and Turkey, these three countries represented 90.3 per cent of the ship recycling activity in 2019. The same year, bulk carriers constituted most of the recycled tonnage (about one third), followed by container ships and oil tankers (table 2.8). Since 2016, global volumes of recycled tonnage have been on the wane. Volumes fell to 29,135 thousand gross tons in 2016, 23,138 thousand gross tons in 2017, 19,003 thousand gross tons in 2018 and 12,218 thousand gross tons in 2019. Steel price developments in scrapping destinations and expectations concerning the evolution of freight rates are factors underpinning these trends (Hellenic Shipping News Worldwide, 2019).

The only country among the top five scrapping destinations that increased its ship-recycling volumes in 2019 was Turkey (figure 2.5), linked reportedly to certification of Turkish shipyards by the European Union, enabling them to be on the list of approved facilities for the recycling of ships flying European Union flags (Hellenic Shipping News Worldwide, 2018). In 2019, Turkey also ratified the Hong Kong [China] International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 of IMO. Among the other countries, the reduction in the share of Pakistan was most significant, motivated by adverse conditions related to taxation and exchange rates (The Maritime Executive, 2019). In 2019, bulk carriers increased their percentage share in global recycling volumes by 172 per cent; container ships, by 145 per cent; and offshore vessels, by 88 per cent. By contrast, oil tankers and gas carriers registered significant decreases of 71 and 55 per cent, respectively.

Impacts of the coronavirus disease pandemic, responses and prospects: Labour shortages affect newbuilding and ship recycling and weak investor sentiment affects ordering

The pandemic led to reductions and delays in newbuilding delivery and to a standstill in ship recycling. This can be attributed to lockdown-induced labour shortages in the shipbuilding and ship recycling industries. In addition, other measures implemented to reduce the spread of the pandemic, such as travel restrictions, made it impossible for owners to arrange visits or obtain a crew for final delivery. Port closures also affected tonnage arrival into scrapping destinations on the Indian subcontinent (Hellenic Shipping News Worldwide, 2020b).

The pandemic also had a significant impact on the manufacturing segments of the maritime supply chain. In February 2020, deliveries from China fell to their lowest level in 15 years, with only four ships delivered. As lockdowns were gradually lifted, industrial activity resumed. China was reported to have returned to 50 per cent of its 2019 output average in March 2020

Table 2.5 Leading flags of registration by dead-weight tonnage, 2020

	Flag of registration	Number of vessels	Share of world vessel total (percentage)	Dead-weight tonnage (thousand dead-weight tons)	Share of total world dead-weight tonnage (percentage)	Cumulated share of dead-weight tonnage (percentage)	Average vessel size (dead-weight tonnage)	Growth in dead-weight tonnage 2020 over 2019 (percentage)
1	Panama	7 886	8	328 950	16	16.0	41 713	-1.3
2	Liberia	3 716	4	274 786	13	29.3	73 947	13.0
3	Marshall Islands	3 683	4	261 806	13	42.0	71 085	6.5
4	Hong Kong, China	2 694	3	201 361	10	51.7	74 744	1.3
5	Singapore	3 420	3	140 333	7	58.5	41 033	8.3
6	Malta	2 207	2	115 879	6	64.2	52 505	4.7
7	China	6 192	6	100 086	5	69.0	16 164	3.0
8	Bahamas	1 381	1	77 869	4	72.8	56 386	0.1
9	Greece	1 294	1	68 632	3	76.1	53 039	-0.7
10	Japan	5 041	5	40 323	2	78.1	7 999	3.4
11	Cyprus	1 065	1	34 533	2	79.8	32 425	-0.1
12	Indonesia	10 137	10	25 574	1	81.0	2 523	6.9
13	Isle of Man	356	0	24 129	1	82.2	67 779	-13.5
14	Danish International Register	575	1	23 044	1	83.3	40 077	3.0
15	Norwegian International Register	647	1	20 780	1	84.3	32 118	4.8
16	Madeira	526	1	20 698	1	85.3	39 351	6.0
17	Islamic Republic of Iran	877	1	19 700	1	86.3	22 463	362.3
18	India	1 768	2	17 339	1	87.1	9 807	-0.2
19	Republic of Korea	1 889	2	14 942	1	87.8	7 910	14.9
20	Saudi Arabia	376	0	13 554	1	88.5	36 047	3.2
21	United States	3 650	4	11 985	1	89.1	3 284	0.6
22	United Kingdom	945	1	11 962	1	89.6	12 658	-29.8
23	Italy	1 310	1	11 953	1	90.2	9 124	-10.8
24	Belgium	203	0	10 349	1	90.7	50 980	-1.1
25	Malaysia	1 772	2	10 260	0	91.2	5 790	-0.4
26	Russian Federation	2 808	3	9 797	0	91.7	3 489	6.9
27	Viet Nam	1 909	2	9 123	0	92.1	4 779	7.7
28	Germany	606	1	8 468	0	92.5	13 974	-0.9
29	Bermuda	138	0	7 662	0	92.9	55 525	-18.9
30	Turkey	1 216	1	6 993	0	93.3	5 751	-6.5
31	Netherlands	1 200	1	6 982	0	93.6	5 818	-1.4
32	Taiwan Province of China	407	0	6 739	0	93.9	16 557	16.0
33	Antigua and Barbuda	727	1	6 657	0	94.2	9 157	-11.1
34	Thailand	840	1	6 642	0	94.6	7 907	15.7
35	Cayman Islands	163	0	6 636	0	94.9	40 713	-1.1
	Top 35 total	**73 624**	**75**	**1 956 529**	**95**	**94.9**	**26 575**	
	World total	**98 140**	**100**	**2 061 944**	**100**	**100.00**	**21 010**	**4.1**

Source: UNCTAD calculations, based on data from Clarksons Research.

Notes: Propelled seagoing merchant vessels of 100 gross tons and above, as at 1 January 2020. For a complete listing of countries, see http://stats.unctad.org/fleet.

Table 2.6 Leading flags of registration, ranked by value of principal vessel type, 2020
(Dollars)

	Flag of registration	Bulk carriers	Oil tankers	Offshore vessels	Ferries and passenger ships	Container ships	Gas carriers	General cargo ships	Chemical tankers	Other/not applicable	Total
1	Panama	40 369	13 462	17 612	12 037	17 035	10 632	3 899	5 306	7 412	127 765
2	Marshall Islands	27 870	29 606	17 257	1 284	6 150	15 110	515	4 511	2 207	104 511
3	Liberia	23 729	22 944	12 662	150	17 217	5 756	1 010	2 590	1 488	87 544
4	Bahamas	4 950	7 759	23 781	31 330	606	13 295	73	106	2 566	84 466
5	Hong Kong, China	23 280	11 360	289	42	21 030	5 987	1 607	1 878	120	65 592
6	Malta	9 418	11 192	4 758	15 420	12 173	4 929	1 681	1 793	873	62 236
7	Singapore	12 226	14 540	8 748		11 673	7 473	1 066	3 541	1 458	60 725
8	China	14 910	7 012	7 914	4 412	3 456	678	2 880	1 451	2 887	45 599
9	Greece	2 831	10 710	1	1 561	272	5 587	47	77	90	21 176
10	Italy	671	1 064	501	14 235	77	244	2 106	388	504	19 791
	Subtotal top 10	**160 253**	**129 650**	**93 521**	**80 469**	**89 689**	**69 692**	**14 883**	**21 642**	**19 606**	**679 405**
	Other	***26 370***	***34 861***	***69 711***	***39 944***	***27 309***	***26 876***	***24 011***	***11 615***	***12 112***	***272 808***
	World total	**186 622**	**164 511**	**163 232**	**120 413**	**116 998**	**96 568**	**38 894**	**33 258**	**31 718**	**952 213**

Source: UNCTAD calculations, based on data from Clarksons Research, as at 1 January 2019 (estimated current value).
Note: Value is estimated for all commercial ships of 1,000 gross tons and above.

Table 2.7 Deliveries of newbuildings by major vessel types and countries of construction, 2019
(Thousand gross tons)

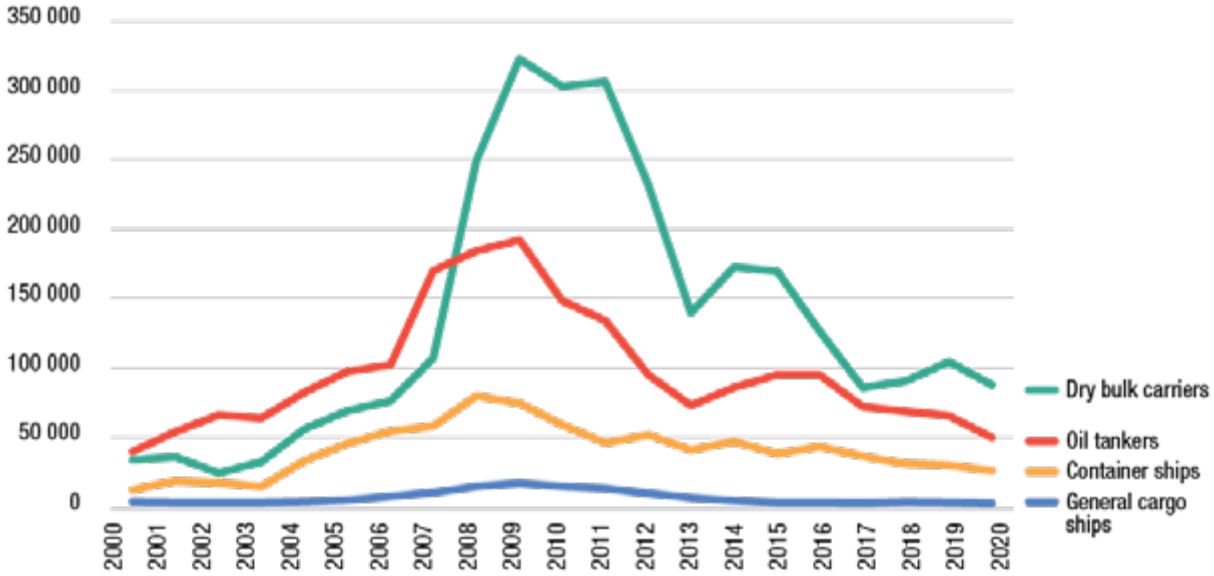
Vessel type	China	Republic of Korea	Japan	Philippines	Rest of world	Total	Percentage
Bulk carriers	12 773	1 010	7 942	652	338	**22 716**	34.5
Oil tankers	4 200	11 827	2 811	128	946	**9 912**	30.2
Container ships	3 712	4 545	2 521	19	94	**10 891**	16.5
Gas carriers	420	3 888	1 881		1	**6 189**	9.4
Ferries and passenger ships	214	3	59	3	1 903	**2 182**	3.3
General cargo ships	452	202	267		387	**1 307**	2.0
Offshore vessels	651	135	4		332	**1 121**	1.7
Chemical tankers	368	49	574		71	**1 063**	1.6
Other	285	12	182	0	50	**530**	0.8
Total	**23 074**	**21 670**	**16 242**	**802**	**4 122**	**65 911**	**100.0**
Percentage	35.0	32.9	24.6	1.2	6.3	**100.0**	

Source: UNCTAD calculations, based on data from Clarksons Research.
Notes: Propelled seagoing merchant vessels of 100 gross tons and above. For more data on other shipbuilding countries, see http://stats.unctad.org/shipbuilding.

and to 60 per cent in May. However, by May 2020 global shipbuilding output in dwt was down 14 per cent year over year (Clarksons Research, 2020a). In March, when the pandemic erupted in the Europe and the United States, lockdowns in Bangladesh, India and Pakistan gradually halted ship recycling (Vessels Value, 2020). In June 2020, Indian recycling yards were reported to be operating at just 30 to 40 per cent of full capacity (Clarksons Research, 2020b).

The COVID-19 pandemic has brought widespread uncertainty related to economic performance in 2020 and 2021 (see chapter 1). As a result, strategic investment decisions had to be reconsidered, for instance, newbuilding ordering and repairs were postponed. Ordering contracts were down 53 per cent year over year in July 2020 (Clarksons Research, 2020c). In addition, many companies decided to delay scrubber installation because of the impact of the pandemic

Figure 2.4 World tonnage on order, 2000–2020
(Thousand dead-weight tons)



Source: UNCTAD calculations, based on data from Clarksons Research.
Notes: Propelled seagoing merchant vessels of 100 gross tons and above; beginning-of-year figures.

Table 2.8 Reported tonnage sold for ship recycling by major vessel type and country of ship recycling, 2019
(Thousand gross tons)

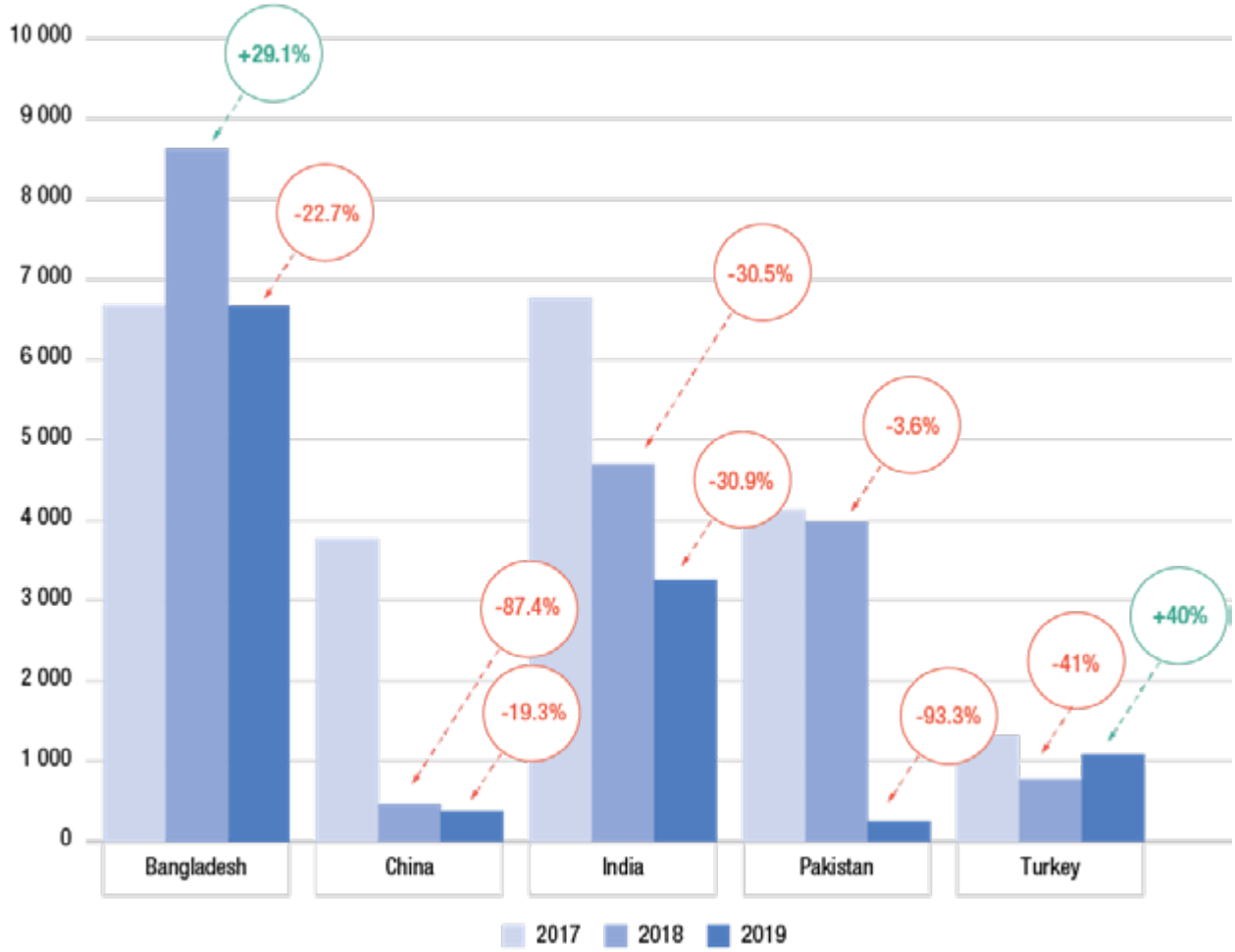
Vessel type	Bangladesh	China	India	Pakistan	Turkey	Rest of world	World total	Percentage
Bulk carriers	3 426	238	582	132	161	32	**4 570**	37.4
Chemical tankers	64	4	125	7	3	9	**211**	1.7
Container ships	1 015	24	964	12	10	86	**2 111**	17.3
Ferries and passenger ships	71	2	46	27	76	5	**226**	1.8
General cargo ships	140	62	150	12	174	36	**575**	4.7
Liquefied gas carriers	169		70		30	9	**279**	2.3
Offshore vessels	326	4	543	9	435	197	**1 514**	12.4
Oil tankers	1 271	14	387	56	119	153	**1 999**	16.4
Other	200	35	384	13	87	12	**732**	6.0
Total	**6 682**	**383**	**6 682**	**267**	**1 095**	**540**	**12 218**	**100.0**
Percentage	54.7	3.1	26.6	2.2	9.0	4.4	**100.0**	

Source: Clarksons Research.
Notes: Propelled seagoing vessels of 100 gross tons and above. Estimates for all countries available at http://stats.unctad.org/shipscrapping.

on financial cash flow (Clarksons Research, 2020d; *Manifold Times*, 2020). This is also linked to fuel price dynamics since January 2020, namely the narrowing of the price differential between high and low sulphur fuel, which increased the time to recover the investment cost of installing scrubbers (IHS Markit, 2020; *Seatrade Maritime News*, 2020a).

Before the pandemic, the shipbuilding sector had already been facing a challenging environment of fierce competition and declining orders. Increased consolidation and government finance helped to cope with this situation (UNCTAD, 2019a). Seeking to minimize costs and losses and restructuring their businesses to improve balance sheets, the world's

Figure 2.5 **Reported tonnage sold for ship recycling by major vessel type and country of ship recycling, 2017–2019**
(Thousand gross tons and percentage change)



Source: UNCTAD calculations, based on data from Clarksons Research.
Notes: Propelled seagoing vessels of 100 gross tons and above. Estimates for all countries available at http://stats.unctad.org/shipscrapping.

largest shipbuilder (Hyundai Heavy Industries Company of the Republic of Korea) signed in March 2020 a formal agreement with the State-run Korea [Republic of] Development Bank to buy Daewoo Shipbuilding and Marine Engineering. The merger will be completed upon approval by antitrust authorities in China, the European Union, Japan, Kazakhstan, the Republic of Korea and Singapore (*The Korea Times*, 2020). The European Union and Japan have voiced concerns about the potential of this merger to lead to an uneven trading playing field (WTO, 2020) and reduced competition in shipbuilding markets of large container ships, oil tankers, liquefied natural gas carriers and liquefied petroleum gas carriers (European Commission, 2019).

Against this background, the pandemic further accentuated challenges, reducing demand and affecting orders, production and delivery. Box 2.2 describes some of these challenges, from perspective of the European Union.

The slowdown in shipbuilding contributes to lower fleet growth. Fewer newbuilding deliveries during the April–September 2020 period could result in relatively lower fleet growth, bringing it to about 1.6 per cent for 2020 (Clarksons Research, 2020e). The extent to which this will improve supply–demand balance in 2021 will depend on how demand and economic activity will recover and on developments in ship recycling.

In comparison, ship recycling offers more positive prospects. In June 2020, container ship recycling volumes were nearly as high as levels reported from January to May 2020 (Hellenic Shipping News Worldwide, 2020c). By the end of that month, ship-recycling activity had partially recovered in the bulk carriers segment. In this segment, scrapped volumes for the first half of 2020 exceeded levels for the full year 2019 (Clarksons Research, 2020e). Ship recycling is expected to increase, as the shipping industry copes with idling fleets and plans to scrap older vessels (more than 15 years old) that are not fuel efficient (Lloyd's List, 2020b).

Box 2.2 Shipbuilding at a crossroads in the European Union

In the face of production halts, temporary layoffs and liquidity issues stemming from the COVID-19 pandemic, the European shipbuilding and maritime equipment manufacturing industries have sought additional support – beyond horizontal industrial policies and financial support – calling for sector-specific support measures.

By doing so, they aim to preserve the economic contribution of the sector but, more importantly, to prevent potential dependence on Asian foreign suppliers for maritime technology, a strategic element to generate value in the maritime supply chain. The European Shipbuilding and Maritime Equipment Association estimated that this scenario could mean losing about €120 billion of added value created by the maritime technology sector; 1 million jobs in maritime technology companies and Europe's innovation and technological global leadership in complex ship types.

Concerns also relate to the role played by the shipbuilding and equipment industries in achieving longer-term goals such as promoting technological development and innovation to ensure carbon neutral shipping by 2050, as foreseen in the European Green Deal. In this sense, losing European shipyards could mean becoming dependent on Asian nations to achieve such goals.

Sources: Safety4sea, 2020; SWZ|Maritime, 2020; World Maritime News, 2020.

4. Seafarers and the maritime workforce

Emerging challenges for the maritime workforce as a result of the changing nature of work due to technological change

Historically, innovation and technology have played a crucial role in increasing the economic efficiency of the shipping industry. More recently, they have also become drivers and enablers of improved environmental performance of this sector. From a social perspective, technological advances and automation represent both opportunities and challenges for the shipping industry. Many emerging technologies in the maritime industry aim to improve safety and efficiency on board. Technological change also entails challenges. Disruptions in the labour market are expected because the sets of skills in demand and work routines will change.

According to a recent report by the International Transport Workers' Federation (2019),[3] forecast scenarios suggest that, although technology has the potential to reduce labour requirements, expanding international trade will counterbalance this reduction. For example, the demand for seafarers is expected to continue mounting up to 2040, albeit not at the same rate.[4] In some cases, a decrease in jobs in transport is offset by an increase in other parts of the transport system. Thus, more transport workers will be needed in the future.

The impact of technology and automation on the global maritime workforce, from 2020 until 2040, will vary, depending on the skills and tasks performed and workers' demographic groups. Low and middle-skilled jobs (that is to say, support activities for deep-sea transport workers such as cargo handlers in ports, dockers, crane operators, and maintenance and repair workers) and ageing or higher-wage workforces face a greater risk of redundancy. By contrast, high-skilled occupations, such as ship captains and officers, are less prone to automation, with automation and technological applications being introduced to assist them in their work. Younger and lower-wage workforces are likely to witness a delay in the introduction of automation and new technologies.

The impact on labour markets will also depend on the level of readiness of countries to adopt new technologies and automation. Such readiness is defined as the capability to capitalize on the future, mitigate risks and challenges, and be resilient and agile in responding to unknown future shocks. A country's level of readiness for automation is measured against five factors: innovation and technology, infrastructure quality, regulation and governance, human capital and skills, and business and investment. According to the above-mentioned report, there is a readiness gap in the maritime sector between developed and developing countries. A higher level of readiness is observed in Australia, East Asia, Europe and the United States, whereas countries in Africa and South America are positioned at the other end, due to insufficient technological advancement and investment, as well as to regulation and infrastructure gaps and weaknesses in terms of business models.

This means that most developing countries will witness a slower adoption rate of technology and automation, although low and middle-skilled jobs in industrialized countries face a more substantial risk of disappearing due to automation probability. This is likely to be accompanied by lower capital investments and research and development expenditures, leading to smaller productivity increases and the risk of falling behind in terms of maritime sector capabilities and competitiveness.

In all likelihood, the future of work in the maritime sector will look very different from what it is today, and there will be less jobs onboard ships and more

[3] The report analyses several modes of transport and explores readiness based on 17 country case studies (Australia, Brazil, China, Denmark, France, Ghana, Japan, Nigeria, Norway, Panama, Peru, the Philippines, the Republic of Korea, South Africa, Sweden, Turkey and the United States).

[4] For complete statistics on the supply of seafarers, see http://stats.unctad.org/seafarersupply.

onshore jobs, requiring a more adaptable workforce. Re-skilling and retraining will be crucial in preparing workers for the transformations that will arise as result of advanced technologies and automation. However, most countries have not elaborated long-term plans for automation in the maritime sector (International Transport Workers' Federation, 2019).

To support the successful transition of workers, the report of the Federation recommends the following actions:

- Raising awareness of the implications of further introduction of automation and technology into transport systems.
- Facilitating dialogues between stakeholders in global transport for a better understanding of the different positions of all parties concerned.
- Establishing national strategies and policies to address the ramifications of further automation and technology in transport.
- Supporting developing countries in dealing with the effects of introducing more automation and technology in transport.
- Identifying essential skills needed to work effectively in a world of advanced automation and technology in transport, implementing them in education and training.

Impacts, responses and prospects in relation to the COVID-19 pandemic: Sailors stranded at sea

Each month about 150,000 seafarers need to be changed over to and from the ships they operate to ensure compliance with international maritime regulations for ensuring safety, crew health and welfare, and the prevention of fatigue. The pandemic has led to restrictions in the cross-border movement of persons, closures of consulates affecting visa processing, port closures, disembarkation restrictions and lack of air services, which have impaired the ability to repatriate or resupply crews.

To mobilize action towards addressing this problem, several international organizations, maritime industry and labour organizations approached the relevant authorities and issued guidance documents to facilitate crew changes and repatriation of seafarers while, at the same time, taking steps to minimize the risk of contagion of the coronavirus disease (see chapter 5 for a detailed description of guidance documents).

In May 2020, some Governments started allowing crew changes at port under strict protocols. Despite all efforts, crew changes advanced slowly. In June, many seafarers were working beyond their contractual terms, could not disembark or be replaced. In mid-June 2020, IMO estimated that as many as 300,000 seafarers each month required international flights to enable crew changeovers. About half of them needed to be repatriated home by aircraft, while the other half needed to join ships. Additionally, about 70,000 cruise ship staff were waiting for repatriation (IMO, 2020).

Countries have faced several challenges at the local level to enact crew changes. These include difficulty to engage through a systematic approach the wide range of domestic agencies that need to be involved in the process. Countries have also faced difficulties related to the lack of infrastructure or of protective equipment and to unclear procedures on how to mitigate risks, while enabling the logistics of crew change amid restrictions and lockdown protocols and shortages of staff involved in the process (Lloyd's List, 2020c).

The pandemic has brought visibility to seafarers with the recognition that they provide an essential service because they ensure trade in essential goods, such as medical supplies and food, and they keep supply chains running. However, the slow pace of concrete actions highlights the challenges of balancing the safety and well-being of workers with operational continuity, which raises the question as to whether practices and procedures regarding crew changeover, disease management, health care and welfare need to evolve to enhance support for seafarers.

Further, the pandemic has provided an opportunity to raise awareness of the importance of gender in the maritime sector, including seafarers. Today, women represent only 2 per cent of the world's 1.2 million seafarers; 94 per cent of women seafarers are working in the cruise industry (www.imo.org/en/OurWork/TechnicalCooperation/Pages/WomenInMaritime.aspx#.) It is important to move forward and promote a safe and attractive sector that supports greater engagement for women (see box 2.3).

B. SHIPPING COMPANIES, EARNINGS AND REVENUES AND OPERATIONS DURING AND BEYOND THE PANDEMIC CRISIS

1. Impact of the pandemic on freight rates and earnings

This section describes the impact of the COVID-19 pandemic and relevant developments in maritime freight markets, namely containerized trade, dry bulk and tankers, during the first half of 2020. With the coronavirus taking a toll on the global economy and seaborne trade in early 2020, freight rates in shipping were strongly affected and continued to be determined by the way supply capacity was handled. This was the case of the container ships segment, which practised blank sailing and applied other capacity-management measures to adapt supply capacity to reduced demand for seaborne trade and allow freight rates to remain strong. Tanker freight rates were also affected not

Box 2.3 Promoting diversity and inclusion in the maritime sector

On 27 January 2020, the Women's International Shipping and Trading Association and IMO signed a memorandum of understanding under which they agreed to enhance technical cooperation activities in the maritime field to build opportunities for diversity and inclusion, professional development and skill competency.

In particular, the parties agreed to the following:

- To look for opportunities to partner on maritime issues, which could include organizing workshops or speaking on panels at annual conferences or other events held by the parties, with a focus on panel diversity.
- To promote greater engagement for women in maritime occupations, among their members, the broader ocean business community, ocean stakeholders and the public.
- To develop and participate in relevant training, workshops, among other business related to their areas of mutual interest.
- To support the implementation of IMO Assembly resolution 1147(31) of 4 December 2019 on preserving the legacy of the world maritime theme for 2019 and achieving a barrier-free working environment for women in the maritime sector.

UNCTAD has also been collaborating with the Association and is currently discussing further collaboration in terms data collection and dedicated capacity-building activities.

Sources: See also: www.imo.org/en/OurWork/TechnicalCooperation/Pages/WomenInMaritime.aspx#; Women's International Shipping and Trading Association, 2020.

only by repercussions of the lockdowns relating to the pandemic, but also by geopolitical events, oil price fluctuations and the increased use of vessels for storage floating, which led to a rise in freight rates, mainly in March–April 2020. Dry bulk freight rates, pulled down by an oversupplied market, were further affected by the shock of negative demand, namely from China, owing to the outbreak of the coronavirus disease.

Container freight rates and earnings: Strong freight rates despite abrupt drop in seaborne trade

The container segment of the shipping industry was already struggling with an oversupplied market and slow demand growth before the pandemic, which had kept the level of container freight rates generally low over the past few years. As the pandemic brought economies to a halt and took a toll on trade, this industry segment experienced a major setback. The start of 2020 had witnessed some recovery in demand and freight rates before the pandemic but with the outbreak of the pandemic, prospects for demand not only decreased, but fleet development was affected as well. With lockdowns having come into force in March 2020, reducing demand for containerized goods, shipping companies engaged in strategies to manage supply capacity and reduce costs to cope and to keep freight rates from falling.

As shown in table 2.9, 2020 began with better freight rates compared with average rates in 2019 for most routes, driven mainly by the surcharge applied by carriers to compensate for higher bunker costs and reduced supply capacity due to scrubber retrofits in compliance with IMO 2020 sulphur cap regulations. With the spread of the coronavirus pandemic in early 2020, which led to a sudden drop in demand for seaborne transport, carriers applied strategies such as increased blank sailing and idling of vessels, and re-routing (MDS Transmodal, 2020) as a way of adjusting supply to low demand (see also chapter 1). This allowed freight rates to remain stable at a time of lower demand for ocean shipping. Although blank sailings, accompanied by low oil bunker prices, helped shipping lines to manage supply capacity and reduce costs, blank sailings still cost carriers about 40 per cent of the operating cost of a vessel (Drewry, 2020a) and have an impact on revenue due to capacity withdrawals.

From the perspective of shippers, these strategies meant severe space limitations to transport goods and delays in delivery dates, which had an impact on supply chains and the proper functioning of ports.

With regard to idling, 11 per cent of the container fleet was estimated to be idle during the first half of 2020. The vessel types showing a higher proportion of idle fleet – between 7 and 9 per cent – included containers, tankers and car carriers (Clarksons Research, 2020c). Those showing the highest increases in the idle fleet compared with January 2020 were car carriers – which more than tripled – liquefied natural gas carriers and liquefied petroleum gas carriers.

With regard to the charter market, declining demand and an increase in idling and blank sailings applied by carriers to reduce supply it after capacity had a negative impact on all segments of container charter rates, particularly the larger vessels within that segment. The ConTex charter rate decreased to an average of 368 points during the first six months of 2020, compared with an annual average of 407 points in 2019 (figure 2.6). However, rates did not reach the low level witnessed in 2016, when earnings for most segments fell beneath operating costs due to an oversupplied market. Some improvements were witnessed in July 2020, as the volume of activity picked up slightly, namely with regard to large and medium-sized vessels. It remains unclear whether these improvements will persist.

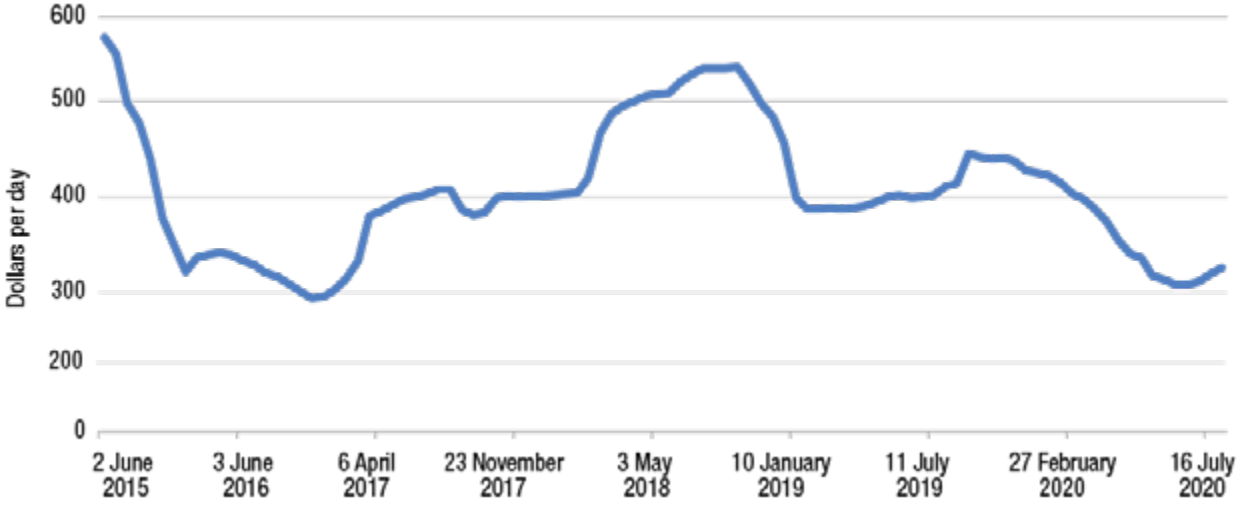
During the third quarter of 2020 container ships continued extending capacity-reduction programmes,

Table 2.9 Container freight market rates, 2010–2020

Freight market	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020 (average January–April)	January 2020	February 2020	March 2020	April 2020	2019 (April January–April)	Percentage change
Trans-Pacific	(Dollars per 40-foot equivalent unit)																
Shanghai–United States West Coast	2 308	1 667	2 287	2 033	1 970	1 506	1 272	1 485	1 736	1 525	1 521	1 572	1 395	1 509	1 608	1 711	-11.10
Percentage change	68.22	-27.77	37.19	-11.11	-3.1	-23.6	-15.5	16.7	16.9	-12.2							
Shanghai– United States East Coast	3 499	3 008	3 416	3 290	3 720	3 182	2 094	2 457	2 806	2 634	2 775.5	2 898	2 714	2 784	2 706	2 807.25	-1.13
Percentage change	47.82	-14.03	13.56	-3.69	13.07	-14.5	-34.2	17.3	14.2	-6.1							
Far East–Europe		(Dollars per 20-foot equivalent unit)															
Shanghai–Northern Europe	1 789	881	1 353	1 084	1 161	629	690	876	822	760	85.5	1 040	829	805	740	814.5	4.79
Percentage change	28.24	-50.75	53.58	-19.88	7.10	-45.8	9.7	27.0	-6.2	-7.5							
Shanghai–Mediterranean	1 739	973	1 336	1 151	1 253	739	684	817	797	811	976.75	1 181	979	898	849	841.5	16.07
Percentage change	24.48	-44.05	37.31	-13.85	8.9	-41,0	-7.4	19.4	-2.4	1.8							
North–South	(Dollars per 20-foot equivalent unit)																
Shanghai–South America (Santos)	2 236	1 483	1 771	1 380	1 103	455	1 647	2 679	1 703	1 673	1 551	2 069	1 714	1 426	995	1 387	11.82
Percentage change	-7.95	-33.68	19.4	-22.08	-20.1	-58.7	262.0	62.7	-36.4	-1.8							
Shanghai–Australia/New Zealand (Melbourne)	1 189	772	925	818	678	492	526	677	827	596	884.75	944	868	815	912	441	100.62
Percentage change	-20.73	-35.07	19.82	-11.6	-17.1	-27.4	6.9	28.7	22.2	-27.9							
Shanghai–West Africa (Lagos)	2 305	1 908	2 092	1 927	1 838	1 449	1 181	1 770	1 920	2 474	2 857.75	2 856	2 930	2 891	2 754	2 603.5	9.77
Percentage change	2.58	-17.22	9.64	-7.89	-4.6	-21.2	-18.5	49.9	8.5	28.9							
Shanghai–South Africa (Durban)	1 481	991	1047	805	760	693	584	1 155	888	802	986.5	1 120	1 032	969	825	753.75	30.88
Percentage change	-0.94	-33.09	5.65	-23.11	-5.6	-8.8	-15.7	97.8	-23.1	-9.7							
Intra-Asian	(Dollars per 20-foot equivalent unit)																
Shanghai–South-East Asia (Singapore)	318	210	256	231	233	187	70	148	146	138	193.25	189	187	201	196	149.75	29.05
Percentage change		-33.96	21.90	-9.77	0.9	-19.7	-62.6	111.4	-1.4	-5.5							
Shanghai–East Japan	316	337	345	346	273	146	185	215	223	233	239.75	241	236	240	242	228.5	4.92
Percentage change		6.65	2.37	0.29	-21.1	-46.5	26.7	16.2	3.7	4.5							
Shanghai–West Japan								215	223	229	227	226	221	227	234	227.5	-0.22
Percentage change								..	3.7	2.7							
Shanghai–Republic of Korea	193	198	183	197	187	160	104	141	163	128	119	120	118	118	120	144.25	-17.50
Percentage change		2.59	-7.6	7.65	-5.1	-14.4	-35.0	35.6	15.6	-215							
Shanghai–Mediterranean Gulf/Red Sea	922	838	981	771	820	525	399	618	463	735	983.25	1 161	1 034	997	741	704.25	39.62
Percentage change		-9.11	17.06	-21.41	6.4	-36.0	-24.0	54.9	-25.1	58.7							

Source: Shanghai containerized freight index; Shanghai Shipping Exchange; and data from Clarksons Research, *Container Intelligence Monthly*, various issues.

Figure 2.6 New ConTex index, 2015–2020
(Index base: October 2007 – 1,000 points)



Source: UNCTAD calculations, based on data from the New ConTex index produced by the Hamburg Shipbrokers Association (www.vhss.de).

Notes: The New ConTex index is based on assessments of current day charter rates of six selected container ship types, which are representative of their size categories: Types 1,100 TEUs and 1,700 TEUs (charter period of one year); Types 2,500, 2,700, 3,500 and 4,250 TEUs (charter period of two years).

although demand was picking up, keeping freight rates on the rise. This may be a signal that shipping lines are expecting a slow recovery from the effects of the crisis caused by the pandemic. However, the persisting application of reduced capacity measures appears to be causing severe problems. For example, carriers are offering sailings with delays of two to three weeks, and containers (empty and filled) are building up at ports because sailings are not taking place as scheduled. Filled containers are arriving at ports booked for a particular sailing but have to wait for a longer period of time until the arrival of the next vessel, resulting in port delays (Hellenic Shipping News Worldwide, 2020d).

The situation is exacerbated when vessels are being given only a limited window at ports due to labour shortages (as is the case in India, where the pandemic was still spreading in July 2020).

Another example is empty containers piling up in ports. Ports in the United Kingdom, for example, reported being overwhelmed with empty containers stacking up and causing congestion in limited port storage yards (Hellenic Shipping News Worldwide, 2020d) (See also Box 2.6).

Tankers freight rates and earnings: Sharp freight rate fluctuations and surge in demand for tankers to be used as floating storage

Lockdowns induced by the pandemic, geopolitical events and oil price fluctuations had an impact on developments in the oil tanker freight market, maintaining freight rates high during the first quarter of 2020. During this period, the freight rates market experienced highly volatile trends, despite a weak market balance due to an oversupplied fleet market and low demand.

In March and April 2020, tanker rates rose sharply, as demand for these vessels increased, despite global demand for crude oil and petroleum products falling dramatically due to the pandemic (see chapter 1). This is explained by the hiring of many vessels as floating storage, following the lack of agreement within the Organization of the Petroleum Exporting Countries and its wider group regarding further production cuts that had led to a temporary increase in output from Saudi Arabia at a time when there was no such need on the consumption side (see chapter 1). The oil market was in a state of super contango where front-month prices were much lower than they would be in future months, making the storage of oil for future sales profitable. Traders rushed to charter large tankers for floating storage so they could sell the oil at higher prices later, thus reducing the availability of vessels in the market and triggering a sharp rise in tanker rates.

As shown in table 2.10, time-charter equivalent earnings also picked up in all tanker segments during March and April 2020, with huge peaks in the very large crude carrier segment. A case in point is the Arabian Gulf–Japan single voyage route. This route saw a surge from an average 48 Worldscale points in February to an average 137 Worldscale points in March and 174 Worldscale points in April 2020. This worked out to an average daily time-charter equivalent of $124,000 in March and $170,900 in April, spiking by almost 10 times compared with average earnings in February 2020.

Table 2.10 Crude oil and product tanker spot rates and time-charter equivalent earnings
(Worldscale and dollars per day)

			2020						2019
			2020	January	February	March	April	May	June	December
Crude oil tankers										
Very large crude carriers	Arabian Gulf–Japan	Worldscale	100	48	137	174	66	57	105
		Dollars per day	63 500	16 500	124 000	170 900	51 700	38 800	87 800
		Change in earnings (percentage)	-28	-74	652	38	-70	-25	
	Arabian Gulf–China	Worldscale	94	44	125	159	60	52	109
		Dollars per day	70 000	18 300	128 200	176 000	53 800	40 600	83 400
		Change in earnings (percentage)	-16	-74	601	37	-69	-25	
	Arabian Gulf–north-western Europe	Worldscale	127	33	127	104	38	106	61
		Dollars per day	63 200	20 900	205 600	169 200	169 400	167 000	66 100
		Change in earnings (percentage)	-4	-67	884	-18	0	-1	
Suezmax crude tankers	West Africa–north-western Europe	Worldscale	136	82	126	146	82	49	
		Dollars per day	54 800	26 400	59 700	77 400	37 600	14 400	57 800
		Change in earnings (percentage)	-5,19	-51,82	126,14	29,65	-51,42	-61,70	
	West Africa–Caribbean/east coast of North America	Worldscale	103	79	121	141	78	54	
		Dollars per day	35 900	24 800	59 600	76 800	36 200	18 200	41 500
		Change in earnings (percentage)	-13	-31	140	29	-53	-50	
	Black Sea–Mediterranean	Worldscale	147	90	134	151	86	54	
		Dollars per day	62 900	24 700	65 700	82 700	33 400	6 200	61 200
		Change in earnings (percentage)		-60,73	165,99	25,88	-59,61	-81,44	
Aframax crude tankers	Mediterranean–Mediterranean	Worldscale	149	81	143	157	107	63	193
		Dollars per day	34 200	5 700	42 000	50 800	26 500	3 400	55 400
		Change in earnings (percentage)	-38	-83	637	21	-48	-87	
	North-western Europe–North-western Europe	Worldscale	147	118	136	170	109	74	209
		Dollars per day	41 500	25 200	42 900	69 100	28 300	2 200	83 200
		Change in earnings (percentage)	-50	-39	70	61	-59	-92	
	Caribbean–east coast of North America	Worldscale	324	169	161	155	122	68	225
		Dollars per day	91 600	36 900	39 700	41 300	28 000	5 300	53 800
		Change in earnings (percentage)	70	-60	8	4	-32	-81	
	South-East Asia–east coast of Australia	Worldscale	151	99	121	156	132	73	178
		Dollars per day	30 100	15 000	31 000	50 500	39 400	12 900	44 300
		Change in earnings (percentage)	-32	-50	107	63	-22	-67	
Product tankers									
Medium-range tankers 1	Baltic–United Kingdom or continental Europe	Worldscale	190	195	187	247	160	103	205
		Dollars per day	18 400	21 400	22 800	36 400	19 300	6 900	22 300
		Change in earnings (percentage)	-17	16	7	60	-47	-64	
Medium-range tankers 2	United States Gulf-north-western Europe	Worldscale	161	97	120	150	108	76	122
		Dollars per day	16 100	5 200	13 600	22 100	13 000	5 200	10 700
		Change in earnings (percentage)	50	-68	162	63	-41	-60	
Long-range tankers 1	Arabian Gulf-Japan	Worldscale	127	100	153	304	254	82	157
		Dollars per day	12 300	9 900	28 600	70 400	56 700	10 800	23 000
		Change in earnings (percentage)	-47	-20	189	146	-19	-81	
Long-range tankers 2	Arabian Gulf-Japan	Worldscale	121	93	155	319	263	87	156
		Dollars per day	15 800	11 600	40 400	102 200	81 400	17 000	31 600
		Change in earnings (percentage)	-50	-27	248	153	-20	-79	

Source: UNCTAD calculations, based on *Drewry Shipping Insight*, various issues.

As noted in table 2.10, the product tanker market also witnessed a surge in earnings supported by increased floating storage demand, particularly for large vessels. However, after peaking in March–April, freight rates and vessel earnings in both segments declined sharply in May, as about a third of total vessels locked in floating storage returned to active trade, inflating supply. The tonnage locked in floating storage dropped from about 45 million dwt at the end of April to 30 million dwt at the end of May (Drewry, 2020b). The number of very large crude carriers storing crude oil dropped sharply from 83 vessels to 56 vessels over this period. This, nevertheless, remains a historically high number.

Tanker rates in the crude oil and product tankers market continued to decrease in June 2020, although many countries were easing up the lockdowns measures. Demand for oil remained significantly lower in the second quarter of 2020 compared with 2019. At the same time, continued cuts in output by the Organization of the Petroleum Exporting Countries and its wider group led to a return of vessels locked in floating storage, increasing supply capacity.

With regard to the outlook, freight rates might remain low, as the tanker market fundamentals appear highly uncertain. Recession projections in the global economy would obviously reduce the demand for oil and oil products. Oil price development and geopolitics will also have an impact. Consequently, tanker supply will remain high for some time. The management of vessel order books and recycling will therefore be crucial to improve market imbalances and reduce freight volatility.

Dry bulk freight rates and earnings: Weakened fundamentals due to the COVID-19 pandemic and increased freight rate volatility

During the first six months of 2020, the market for dry bulk freight rates continued to be shaped by imbalances in supply and demand, which was aggravated by the impact of the pandemic and resulted in high fluctuations, namely among larger vessels during this period. As discussed earlier, overcapacity was already affecting the dry bulk market, as supply growth had been outstripping demand for many years. This was further exacerbated by the negative demand shock caused by the pandemic, which added downward pressure on shipping freight rates.

At the beginning of 2020, dry bulk shipping industry freight rates and earnings were severely affected, namely the Capesize market. This was mainly due to the combination of a drop in seasonal dry bulk demand and the outbreak of the coronavirus disease in China, which imports the majority of globally shipped dry bulk cargo volumes, including iron ore, coal, and major grains and oilseeds. The outbreak of the pandemic in early 2020 disrupted industrial activities in China, which resulted in reduced demand for dry bulk vessels, particularly for Capesize vessels that carry industrial raw materials to China. At the same time, low exports of iron and ores out of Brazil (see chapter 1) added pressure to dry bulk volumes, further exacerbating freight rate volatility and leading to unprecedented low and negative levels in Capsize market freight rates. The Baltic Exchange Capesize index became negative in February and March, dropping to -243 and -221 points because of a sudden massive drop in globally shipped dry bulk cargo volumes due to the shutdown in China (figure 2.7). In June 2020, the index increased to high levels of 2,267 points boosted by a higher demand for iron ore in China following the easing of the COVID-19-related restrictions.

Although freight rates for smaller vessel sizes did not experience such a decline, they remained highly volatile and very low. Demand for Panamax and Supramax vessels, mainly used for global shipping of grain and oil seeds, was higher, as trade volumes remained relatively stronger (see chapter 1).

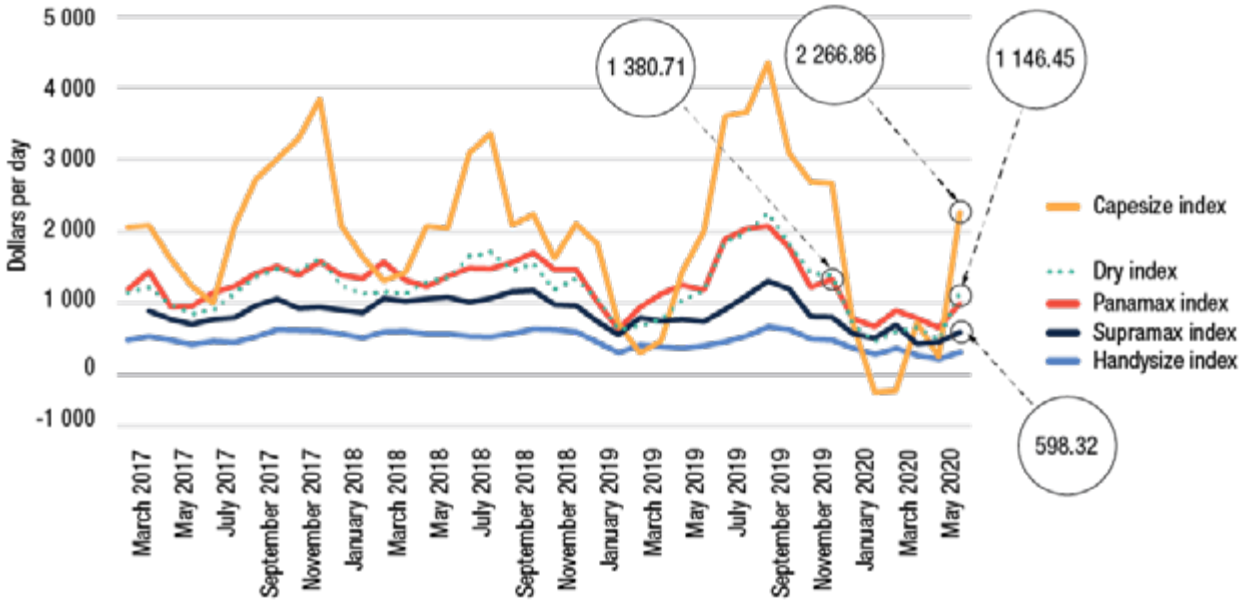
Time-charter rates across all segments were also affected by the pandemic that weakened market fundamentals, already plagued by an oversupply of vessels. In June 2020, the average of one-year time-charter rates for Capesize bulk carriers was $11,050 per day, $9,785 per day for Panamax bulk carriers, $8,513 per day for Handysize bulk carriers and $8,150 per day for Supramax bulk carriers (figure 2.8).

Sector recovery will depend on global economic growth. However, with the prospect of global recession and uncertainties concerning the impact of the pandemic across developed and developing economies, the development of freight rates remains uncertain. A key feature is development in China, which would be the biggest driver for the recovery of the dry bulk industry. At the same time, overcapacity remains a threat to industry market fundamentals and an increase in the market arising from additional supply could offset any growth in demand.

2. Government-backed financial support for the shipping industry in times of pandemic: The case of the container segment

With the abrupt and significant drop in seaborne trade and uncertainties about the future caused by the pandemic, the financial viability of the container segment of the shipping industry was at risk, having already been confronted with freight rates volatility and low profits for more than a decade. Financial support by Governments to ensure the proper functioning of maritime transport services became a global necessity. Unlike the airline industry, such financial assistance was not a common practice in the shipping industry, except in Asia (namely East-Asian and South-Asian countries such as China, the Republic of Korea, Singapore and Taiwan Province of China) where the sector could rely on bailout funds or financial relief from Governments (Drewry, 2020b).

Figure 2.7 Baltic Exchange dry index, 2017–2020



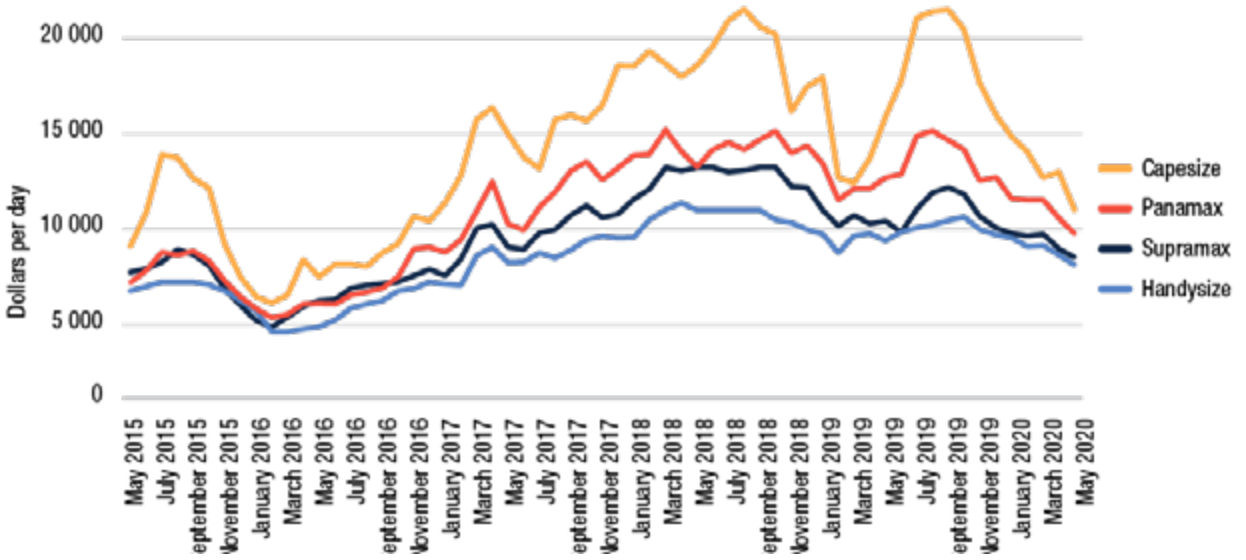
Source: Baltic Exchange; data derived from Clarksons Research, Shipping Intelligence Network Time Series.

Notes: Panamax index: basis – 82,500-dwt vessel from start 2020, 74,000-dwt vessel prior. Handysize index: basis – 38,200-dwt vessel from start 2020, 28,000-dwt vessel prior.

However, government intervention and support are not always well perceived by the industry, as it disrupts its equilibrium and impedes market reform.

Nonetheless, given the pandemic crisis and growing uncertainties on when and how demand will recover, several carriers applied for State-backed financial support in various regions, including Europe. For example, in May 2020, CMA CGM secured $1.14 billion (€1.05 billion) of State-guaranteed syndicated loans from the Government of France (JOC.com, 2020a) to strengthen the company's cash position to confront uncertainties in the global economy resulting from the pandemic. In addition, the Republic of Korea launched a $33 billion rescue fund to protect seven of its mainstay sectors (Hellenic Shipping News Worldwide, 2020e), including the

Figure 2.8 One-year time-charter rates for bulk carriers, 2015–2020
(Dollars per day)



Source: Baltic Exchange; data derived from Clarksons Research, Shipping Intelligence Network Time Series

Note: Long-run historical series.

shipping and shipbuilding sectors, which were allocated about $1 billion[5], of which HMM, formerly known as Hyundai Merchant Marine, received about $400 million (Pulse, 2020).[6] Evergreen and Yang Ming Marine Transport Corporation will receive State-backed loans totalling about $568 million as part of the plan of Taiwan Province of China to alleviate the financial pressure facing the local shipping sector (Lloyd's List, 2020d). Under the plan, the Government has pledged to provide guarantees for at least 80 per cent of the approved loans plus subsidies for interest, which would allow local shipping companies and ports to have access to additional financing. The four above-mentioned carriers are among the world's top 10 deep-sea container shipping lines (figure 2.9).

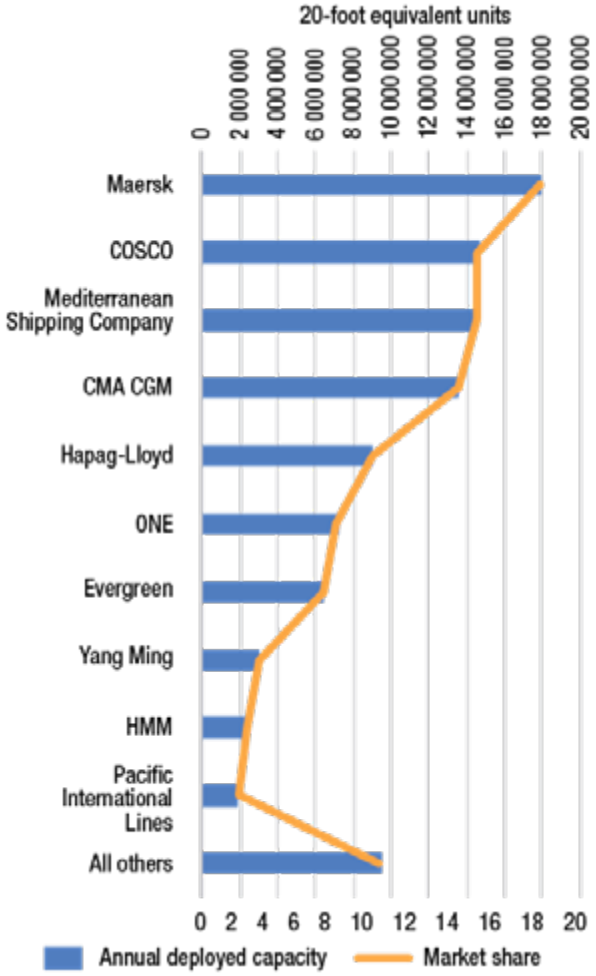
Moreover, in addition to industry involvement in recovery, reliable governmental policies and support for new sustainable business models are fundamental to building the resilience of the sector.

3. Industry prospects in times of pandemic and beyond: Supply discipline and collaboration, accelerated digitalization and prioritization of environmental sustainability

Disciplinary and collaborative approach to the container ship segment in the face of the pandemic

With regard to the measures applied during the pandemic crisis and how the container ship segment of the industry handled the crisis compared with the financial crisis in 2009, the industry has taken a more disciplined and collaborative approach to protect the industry and ensure its long-term recovery and viability. There have been some lessons learned from the downturn in global trade that followed the financial crisis, where competition among carriers to dominate market through scale. Vessels were sailing at freight rates that could barely cover operational costs, resulting in losses in the container segment of the shipping industry of about $20 billion in 2009 (JOC.com, 2020b) and a number of operators going out of business. In the current context of the pandemic, the container ship segment did not look into gaining market share. Instead, it concentrated on maintaining a positive level of freight rates by managing capacity supply in line with demand while reducing costs and ensuring sector viability.

Figure 2.9 **Top 10 deep-sea container shipping lines, ranked by deployed capacity and market share, May 2020**
(20-foot equivalent units and percentage)



Source: UNCTAD calculations, based on data from MDS Transmodal Container Ship Databank, May 2020.

Note: Data refer to fully cellular container ship tonnage and do not include intraregional services.

The effect of the pandemic crisis on container shipping was obvious, reflected by a decreasing demand for seaborne trade and a reduction in fleet deployment. In an effort to address future uncertainty regarding the prospects for demand growth (see box 2.5), carriers may continue exercising flexibility in managing maritime networks and matching supply capacity to demand to support freight cost and rates. It is true that freight rates should be kept at level that ensures the economic viability of the sector. However, if supply-reduction measures applied by shipping lines are sustained for a long period during the recovery in volumes, this may lead to dysfunctionalities in the sector, including ports, undermining performance of shippers and global supply chains.

[5] Other industries include airlines, automotive manufacturing, machinery manufacturing, power generation and telecommunications.

[6] In addition, the State agency Korea [Republic of] Ocean Business Corporation planned to buy 100 billion won worth of subordinated bonds from shippers by accepting the shippers' loan-to-value ratio of up to a maximum of 95 per cent from the current average of 60 to 80 per cent. The agency will also directly buy 100 billion won worth of debts of small- and mid-sized shippers (https://pulsenews.co.kr/view.php?year=2020andno=423920 and www.seatrade-maritime.com/finance-insurance/south-korea-pledges-1bn-support-ailing-shipping-sector).

Box 2.4 Policies to support shipping for a sustainable recovery beyond the pandemic crisis

The global shipping industry will be at the forefront of the recovery as a vital enabler of smooth functioning of international supply chains. As countries turned to consider economic stimulus packages to promote recovery, many of them asked themselves how they could leverage this support to build economies that could drive sustainable economic prosperity. Such a reflection requires going beyond short-term priorities (job creation and boosting economic activity) and thinking about long-term objectives.

Long-term objectives refer to support for growth potential, resilience to future shocks and a sustainable growth trajectory, including decarbonization. An important consideration in this respect is climate-proofing infrastructure investments to avoid future disruption to transport operations. Following this line of thinking, several countries have considered strategic for diverse reasons to include some of these elements in policies related to their maritime transport strategies as part of their recovery plans beyond the pandemic crisis, as follows:

- To avoid having stranded assets (that is, assets that lose economic value well ahead of their anticipated useful life) and investing in declining technology by supporting investment in emerging technologies that can bring simultaneous economic and environmental benefits instead. For example, the British Ports Association proposed a plan to utilize ports and maritime industries to stimulate future growth, which involved a maritime green fund to invest in green equipment and vessels, and a study to identify barriers to increase the uptake of onshore electricity, which could bring financial savings to ports and contribute to reduce air pollution.
- To build resilience to future shocks, for instance by promoting digitalization. This is the case of an initiative launched by the Maritime and Port Authority of Singapore, Singapore Shipping Association and Infocomm Media Development Authority to support maritime companies in digital transformation, which includes support to formulate their digitalization road maps, guide execution and benefit from maritime digital platforms covering port clearances and services, trade documentation, and trade operations and financing.
- To develop new export markets, create domestic value chains, generate jobs and be prepared for a future without fossil fuels. An example of this is the national hydrogen strategy of Germany, aimed at promoting use of this alternative fuel across several industries, including shipping. It offers market incentives to make green hydrogen competitive and investments of at least €9 billion of onshore electricity, which could bring financial savings to ports and contribute to reduce air pollution.

Sources: Chambers, 2020; Elgie and McNally, 2020; Greenport, 2020; Hammer and Hallegatte, 2020; *Seatrade Maritime News*, 2020b.

Box 2.5 The changing landscape of international production, the COVID-19 pandemic, resilience-building and maritime transport fleet deployment

International production patterns have been changing since the financial crisis of 2008–2009. The slowdown in overall trade and in global value chain trade is linked to a shift in the trade and investment policy environment, which is trending towards greater interventionism, rising protectionism and a shift to regional and bilateral frameworks. Other drivers for changes in the landscape of international production include technological advancements and sustainability trends. UNCTAD analysis suggests that changes are taking place in the degree of fragmentation and length of value chains and in the geographical spread of value added, pointing towards shorter value chains and more concentrated value added.

The COVID-19 crisis brought to the spotlight the exposure of international production to systemic risks, particularly from the perspective of securing continuity of supply. As such, building resilience in the supply chain can translate into diversifying sources of inputs. Thus, the crisis accentuated pre-existing trends related to changes in the length and fragmentation of value chains. Depending on the starting configuration of different industries, possible trajectories that the system of international production could follow include reshoring, diversification, regionalization and replication.

Although it may be too early to fully grasp supply-chain redesign patterns in a post-pandemic recovery scenario, it is inevitable that the shipping industry will be fundamentally affected, regardless of the specific trajectories that different industries follow. For instance, a reshoring trajectory, leading to shorter and less fragmented value chains, could have an impact on deep-sea cargo volumes and the capacity to generate economies of scale through mega-sized vessels, which also provide less flexibility than smaller ships to adapt to sharp fluctuations between supply and demand. On the other hand, a regionalization trajectory, leading to short physical supply chains that are not less fragmented, could increase the attractiveness of short sea networks between countries, opening up opportunities for regional cooperation and cabotage services:

Sources: Sánchez, forthcoming; The Loadstar, 2020a; UNCTAD, 2020a.

Accelerated digitalization and prioritization of environmental sustainability

The current context has accentuated the industry trend towards digitalization. Companies have leveraged digitalization to adapt to the new circumstances,

increasingly favouring online tools to simplify processes and cut costs. For example, in June 2020, the Mediterranean Shipping Company introduced the instant-quote tool to provide easy access to its rates for ocean shipping, to make its customers' supply chain easier to manage and improve end-to-end efficiency (Port Technology, 2020).

Companies have also sought to improve data accessibility and transparency, to adapt to evolving consumer expectations in an environment characterized by supply-chain disruption, remote working and increased engagement through business-to-consumer e-commerce. For instance, in mid-April 2020, Maersk's online application, which features cargo release, the calculation of fees and online payment for immediate release functionalities, registered an 85 per cent increase in transactions as customers started ordering more remotely and sought to track cargo more efficiently (Maersk, 2020a).

The current context has also accelerated the interest for data-driven services to support decision-making and the emergence of new services and business opportunities. For example, Cubex Global is a digital marketplace built on collaborative blockchain principles, which enables the buying and selling of cubic metres of container space, enabling capacity management through a digital platform. The platform promises gains in operational efficiency ranging between 25 and 40 per cent in less than container load state and 100 per cent in full container load state and empties (Khalid and Tariq, 2020). In conclusion, collaborative innovation, accelerated though digital solutions to cope with the impacts of the pandemic and respond to changing consumer needs, is likely to remain in the long term, confirming the need to embark on digital transformation and customer-centric service development.

The long-term goal of shipping decarbonization is linked to the Initial IMO Strategy on reduction of greenhouse gas emissions from ships, which is aimed at cutting annual emissions by at least 50 per cent by 2050 and the carbon intensity of emissions by 40 per cent by 2030 and 70 per cent by 2050, compared with 2008 levels. Maintaining the commitment to reach this goal will require significant resources and investment.

Notwithstanding the impacts of the pandemic, this long-term goal remains a priority for the industry (Shell International, 2020). This is due to the increased awareness that technical progress to improve sustainability of operations can help unlock savings and generate new commercial opportunities and that there is a need to adapt to a changing regulatory environment as a result of the Initial IMO Strategy.

During the first semester of 2020, several companies announced that they were maintaining, and even initiating, investment plans related to developing carbon-neutral fuels and new technologies, and setting new ambitious company targets to reduce carbon-dioxide emission (Maersk, 2020b; S and P Global, 2020).

C. PORT SERVICES AND INFRASTRUCTURE SUPPLY

Ports play an essential role in facilitating the movements of goods across supply chains. They are a key node in the transport system as gateways connecting countries through maritime transport networks, and maritime transport with domestic and regional markets though multimodal transport connections in the hinterland.

Past editions of the *Review of Maritime Transport* discussed the heightened pressure ports had experienced in recent years, in view of larger and more powerful alliances seeking to raise network efficiency. This led ports to enhance productivity to adapt space, infrastructure and equipment to increased vessel size and competitive pressure among ports seeking to attract investment and diversify sources of income to other activities. Like other maritime transport activities, this sector is subject to pressure to incorporate sustainable criteria in port development and to a wave of horizontal and vertical consolidation, affecting mainly container terminals.

1. Vertical integration between shipping companies, terminal operators and inland logistics intensifies

From 2010–2020, container shipping companies sought to expand their services offer to include shipping, terminal operations and inland logistics to reduce exposure to volatile freight rates and generate alternative revenue streams providing end-to-end logistic solutions.

Table 2.11 identifies the 21 main global players that control 80 per cent of global terminal operations. Several of these companies are part of or are closely linked to shipping lines (APM Terminals/Maersk; Terminal Investment Limited/Mediterranean Shipping Company; Mitsui Osaka Shosen Kaisha Lines; Yang Ming Marine Transport Corporation; HMM and COSCO).

Similarly, terminal operators are engaging in vertical integration by taking greater control of inland logistics and aiming to provide integrated service offerings and generate more value. Examples of these developments in 2020 include Maersk's acquisition of a customs brokerage firm and a warehousing and distribution services provider (JOC.com, 2020c), CMA CGM's partnership with an online platform that links couriers to online retailers (Lloyd's List, 2019b) and DP World's acquisitions in the global feeder network,

Table 2.11 Top 21 global terminal operators, throughput and capacity, 2019
(Million 20-foot equivalent units)

Ranking	Operator	Throughput				Capacity	
		Total port handling (million TEUs)	Share of world throughput (percentage)	Growth or decline (million TEUs)	Growth or decline (percentage)	Total capacity (million TEUs)	Growth or decline (percentage)
1	COSCO	109.8	13.7	4.0	3.8	141.6	8.9
2	PSA International	84.8	10.6	4.8	5.9	117.0	3.9
3	APM Terminals	84.2	10.5	5.5	7.0	107.6	7.9
4	Hutchison Ports	82.6	10.3	0.1	0.1	113.0	0.9
5	DP World	69.4	8.7	-0.6	-0.9	91.0	1.5
6	Terminal Investment Limited	50.8	6.3	3.1	6.4	72.8	16.8
7	China Merchants Ports	35.6	4.4	1.1	3.1	44.2	3.1
8	CMA CGM	26.1	3.3	0.5	2.0	43.1	12.3
9	SSA Marine	13.0	1.6	0.4	3.3	20.5	1.4
10	ICTSI	11.8	1.5	2.0	20.9	20.0	11.7
11	Eurogate	11.7	1.5	-1.9	-14.2	20.6	-9.1
12	Evergreen	10.1	1.3	-0.3	-3.0	17.0	-0.9
13	Hyundai	9.5	1.2	2.0	25.8	12.1	-2.1
14	NYK Lines (Nippon Yusen Kabushiki Kaisha)	8.2	1.0	-2.4	-22.4	22.5	-5.3
15	MOL (Mitsui Osaka Shosen Kaisha Lines)	7.8	1.0	0.5	6.7	10.7	6.6
16	HHLA ((Hamburger Hafen und Logistik)	7.7	1.0	0.2	3.2	10.5	1.5
17	Yildirim/Yilport	6.1	0.8	-0.3	-4.4	11.9	16.8
18	Bollore	6.0	0.7	0.7	12.7	9.8	4.5
19	Yang Ming Marine Transport Corporation	4.3	0.5	0.0	-1.1	8.4	0.0
20	SAAM Puertos (Sudamericana Agencia Aéreas y Marítimas)	3.1	0.4	0.0	-0.3	5.6	8.2
21	"K" Line (Kawasaki Kisen Kaisha)	3.1	0.4	-0.2	-4.6	5.7	0.0
	Global operators total	**645.8**		**19.1**	**3.1**	**905.6**	**5.2**

Source: Drewry, 2019, Global *Container Terminal Operators Annual Review and Forecast: Annual Report 2020/21*.

Note: World throughput refers to data estimated by Drewry, not to container port throughput data reported in table 1.11 of chapter 1 of this report.

as well and freight forwarding services providers (The Loadstar, 2020b).

A recent study of a representative group of ports in Latin American and Caribbean countries (Argentina, the Bahamas, Brazil, Colombia, Jamaica, Mexico, Panama and Peru) suggests that a significant proportion of container volumes in the region (see table 2.12) is handled at port terminals controlled by shipping companies that are part of the three major alliances (2M, Ocean Alliance and THE Alliance) (Sánchez, forthcoming).

From the perspective of port development, terminal investments by shipping lines can have a positive impact. For example, these investments can make it possible to secure more capital investment to upgrade port facilities to serve ever-larger vessels, increase efficiency and service reliability, and reduce costs and operating times (Zhu et al., 2019). Yet, increased vertical integration between shipping and port services could also discourage other lines from calling at ports, limit choices available to shippers and influence approaches to terminal concessions (UNCTAD, 2018).

2. Impact of the pandemic and responses thereto

Worker shortages at ports and port closures resulting from the pandemic affected the ability of ports and terminal operators to complete vessel-related operations in a timely fashion and to provide key services associated with the port–hinterland interface. This situation led to interrupted cargo movement in and out of ports, inducing port congestion, additional costs for shippers and container shortages. Reduced port calls (see chapter 3) also caused a decline in port stock prices and revenues. To mitigate the impact of congestion and the economic impacts on carriers and

Table 2.12 Share of integrated port terminals in container volumes handled, selected countries of Latin America and the Caribbean
(Percentage)

Country	Ports	Share of integrated terminals in these ports (percentage)	Share of integrated terminals in country total throughput (percentage)
Argentina	Buenos Aires	67.7	56.8
Bahamas	Freeport	100.0	89.8
Brazil	Itapoa, Itajaí, Paranaguá, Pecém, Rio de Janeiro, Santos	67.2	48.6
Colombia	Buenaventura, Cartagena	11.1	10.3
Jamaica	Kingston	81.9	81.9
Mexico	Lázaro Cardenas, Progreso	72.9	15.1
Panama	Balboa, Cristobal, Rodman	10.8	10.7
Peru	Callao	41.2	34.6
	Total	**37.3**	**32.36**

Source: Sánchez, forthcoming, Latin America: Concerns about the evolution of shipping markets in the post-pandemic era.

shippers, many ports cut or deferred fees and charges, which further accentuated their diminishing revenues, increasing debt and insolvency risks. Box 2.6 expands the discussion to consider the case of ports in India.

Ports have been central in keeping supply chains open and allowing maritime trade to continue. They became the first line of defence in stopping the spread of the pandemic and protecting essential staff in their daily tasks, while letting goods flow. To respond to this challenge, ports had to introduce significant changes in procedures and operations. To help them in this endeavour, a large set of documentation was collected from port members of the UNCTAD TrainForTrade Port Management Programme and other relevant entities to help build generic guidelines and share best practices (box 2.7). Further, a crisis protocol for port entities was drawn up outlining immediate response measures, based on four colour-coded levels of intervention ranging from green, yellow and orange to red, indicating worst case scenarios with confirmed COVID-19 cases in the port area.

3. Prospects and lessons learned: Building supply-chain resilience from the perspective of supply of port services and infrastructure

Trade facilitation: Remote documentary processes to ensure continuity of cross-border trade

During the COVID-19 crisis, the role of information and communications technologies (ICTs) in promoting trade facilitation has become increasingly prominent. Digital trade facilitation commonly refers to making full use of ICTs and going paperless for all stages of the cross-border trade process. Digital trade facilitation means higher efficiency, more convenience and cost savings for cross-border trade operations, and it also means that the entire process can be completed with significantly less – or even without – in-person physical contact and interaction. It proved crucial during the COVID-19 crisis for ensuring the continuity of cross-border trade, while reducing direct physical contact among people through remote operations.

International agreements enabled the mainstreaming of digital trade facilitation. For example, the IMO Convention on Facilitation of International Maritime Traffic, 1965 requires national Governments to facilitate electronic information exchange between ship and ports, recommending the use of maritime single windows. Several initiatives are seeking to transpose physical documentation of maritime cargo to digital working methods (see chapter 5). Another international legal instrument, the WTO Agreement on Trade Facilitation, makes several references to ICT tools as a means to make cross-border trade regulations more transparent and predictable and to expedite the movement, release and clearance of goods.

During the COVID-19 crisis, several developing countries launched or expanded initiatives to allow traders to present documents remotely and enable border officials to undertake remote verification and clearance processes in a more transparent manner. For example, in Morocco, the National Single Window of Foreign Trade (Portnet) shifted to 100 per cent online tools allowing the completion of import-export formalities and access to related

Box 2.6 Challenges faced by ports in India as a result of the COVID-19 pandemic

Attempting to minimize the spread of the pandemic, India implemented lockdown measures from 24 March 2020, which led to acute workforce shortages in its ports. This was due to widespread migrant labour in many of the country's industrial and port hubs: workers returned to their home towns after the announcement of lockdown, sometimes despite offers of additional remuneration and facilities.

Labour shortages had an impact on the emptying of import containers, reducing daily outward moves. Shortages of drivers severely restricted the movement of cargo out of the ports until June 2020, affecting inland logistics.

Worker shortages also had an impact on the ability of ports to undertake cargo-clearance activities. Customs clearance procedures were also affected by other operational issues such as the decision on 22 June 2020 to conduct 100 per cent physical verification of import consignments from China at ports.

Limited cargo movements in and out of ports led to port congestion. By end April 2020, 100,000 TEUs were reported to have remained uncollected from container freight stations near Jawaharlal Nehru port, and about 50,000 TEUs remained uncleared at Chennai port. In some instances, such as in the case of Hazira port, this situation forced ports to close their gates to imports and exports.

Uncleared cargo also blocked carriers' equipment. By mid-May 2020, Indian ports reported a 50–60 per cent shortage in cargo containers for export. As a result, carriers began imposing an equipment imbalance surcharge, citing additional inventory repositioning costs. For instance, the Mediterranean Shipping Company was reported to be asking for $300 per container on cargo shipped from the ports of Jawaharlal Nehru, Mundra and Hazira to ports in eastern and southern Africa. Different media sources suggest an increase of freight of containers in India of between 25 and 32 per cent.

Authorities in India introduced several measures aimed at coping with these challenges. These include an allotment of additional land for storage to accommodate the needs of port users who faced issues related to cargo movement and a waiver of penalty charges to port users for delays due to late loading, unloading or evacuation of cargo. Other measures include deferment of payment of vessel-related charges by shipping lines, as well as waivers on some lease rentals and licence fees.

In view of labour scarcity and other factors beyond their control that affected the ability of ports to meet shippers' expectations, several ports in India declared force majeure as of end March 2020.

Sources: Grainmart News, 2020; Hellenic Shipping News Worldwide, 2020f; *Hindustan Times*, 2020; JOC.com, 2020d; Reuters, 2020; *Seatrade Maritime News*, 2020c; Standard Club, 2020; *The Economic Times*, 2020; The Loadstar, 2020c.

Box 2.7 Measures to protect staff working in port communities and to ensure continuity of port operations: Generic guidelines

Based on information from the Port Management Programme of UNCTAD and other entities, the following guidelines on protecting staff working in port communities and to ensure continuity of port operations were drawn up:

- Constantly promote and enforce preventive hygiene measures (handwashing).
- Limit physical interaction between onboard and onshore staff. Ship crew should communicate with quayside staff by radio or telephone.
- Respect physical distancing rules: stay two metres apart.
- Expand the use of digital documentation to limit human contact to the minimum
- Provide adequate and sufficient protective equipment to staff (face masks, gloves, hand sanitizers, protective eyewear).
- Increase the sanitation of surfaces that come in contact with hands.
- Establish a point of control in the perimeter of the port area to monitor temperature and related symptoms (automated temperature screening) and equip it with antibacterial solutions and sanitizers.
- Establish a waste disposal policy for suspicious cases.
- Fumigate and disinfect all passenger terminals and areas.
- Disinfect and monitor cargo.
- Set up a passenger information system for easy contact tracing and an isolated holding and testing area for port users displaying symptoms of the coronavirus disease.
- Institute a protocol for disembarking passengers and crew requiring immediate medical care in coordination with national health authorities
- Identify decontamination areas in port buildings.

Source: UNCTAD, 2020b.

governmental services 24 hours a day, 7 days a week (Morocco World News, 2020). Oman capitalized on electronic procedures that were put in place before the pandemic, which made possible the virtual clearance of officers in trade processes and online submission of cargo manifests 48 hours before vessel arrival and expanded e-services to exchange documents, payments and data (Global Alliance for Trade Facilitation, 2020).

Leveraging automation and digitalization to develop port resilience

The pandemic has brought to the fore the concept of building the resilience of supply chains. From the perspective of trade logistics, and more specifically of the supply of port services and infrastructure, this means improving risk management to developing capabilities to avoid severe threats to operators. Technology appears to hold the key to achieving these objectives.

Workforce shortages during the pandemic and resulting lockdowns severely disrupted maritime cargo operations and multimodal transport connections, highlighting the extent to which the movement of goods to keep supply chains running depends on human labour. From this perspective, increased automation could be a useful strategy to protect the workforce, ensure business continuity in port and terminal operation processes and vessel visits, and reduce processing times. Potential applications include remote piloting, alternative communications with ship navigation systems to assist increasingly autonomous ship navigation, automated cranes, automated rubber-tyre port vehicles and automated intermodal connections (The Maritime Executive, 2020b).

Digitalization can enhance port resilience by enabling better collaboration and decision-making. Port-call optimization is an example of how enhanced digital data exchange across actors involved in the port-call process can contribute to proper planning and predictable timings to achieve more efficient operations while offering opportunities for more environmentally sustainable transport, reducing emissions with just-in-time sailing (UNCTAD, 2019b).

In addition, digitalization can play a key role in diversifying business opportunities for ports, going beyond charging fees for the use of space, towards providing services that add value but do not lead to unnecessary costs. For example, digital solutions enabling shared warehouses with shared logistics assets and transport-capacity sharing could allow service providers to raise asset and capacity utilization rates and cut logistics costs (Economist Intelligence Unit, 2020; World Ports Sustainability Programme, 2020).

Leveraging digitalization to enhance port resilience will require increased investment in technological innovations and strengthened cybersecurity to protect digital infrastructure (see analysis of cyberrisks, chapter 5). As many ports are lagging behind in terms of electronic commerce and data exchange, it will be necessary to boost Internet capabilities and accessibility inside and outside port areas for port workers and users alike and engage in innovative training approaches to scale up the use of and maximize benefits from technological innovations. Advancing towards data standardization and interoperability to enable improved data sharing among different actors of the supply chain will also be necessary.

D. CONCLUSIONS AND POLICY CONSIDERATIONS

Past editions of the *Review of Maritime Transport* have identified low profitability – underpinned by oversupply – and more stringent environmental standards as the main drivers shaping the supply of maritime transport, leading to heightened pressure to increase cost-cutting efficiencies and improve sustainability in operations. Hence the growing size of vessels, the diversification of business activities combining the supply of maritime and land-side logistic services, and company partnerships to share assets, combine operations and improve fleet utilization. In this context, digitalization becomes an enabler of change, providing solutions to optimize costs and to improve efficiency and sustainability in operations.

Managing capacity to cope with oversupply

During 2019, fleets experienced the highest growth rate since 2014, with vessel sizes continuing to increase. At the beginning of 2020, the contraction of cargo volumes caused by the pandemic brought an additional challenge to structural market imbalance. To avoid low profitability and declining freight rates, carriers exercised more discipline to manage capacity and cut costs, particularly through blank sailings.

In an effort to address future uncertainty regarding the prospects for demand growth (see box 2.5), carriers may continue exercising flexibility in managing maritime networks and matching supply capacity to demand to support freight cost and rates. It is true that freight rates should be kept at a level ensuring the economic viability of the sector. However, if supply-reduction measures applied by shipping lines are sustained for a long period during the recovery in volumes, this may lead to dysfunctionalities in the sector, including ports, undermining performance of shippers and global supply chains.

Leveraging technology to cope with disruption

Workforce shortages during the pandemic and resulting lockdowns seriously disrupted manufacturing segments of the maritime supply chain and port services, highlighting the extent to which maritime transport supply and particularly, the movement of goods involved in keeping supply chain running depends on human labour. In this context, the pandemic gave new impetus to digitalization because it emerged as a vehicle to overcome an important challenge during the pandemic, that is, maintaining continuity in transport operations and trade processes while reducing the risk of contagion. Quick deployment of technological solutions made it possible to ensure continuity of business activities and government processes linked to cross-border trade and to respond to new consumer expectations in an environment characterized by supply-chain disruption, remote working and increased engagement through

business-to-consumer e-commerce for business operations.

Therefore, technological solutions featuring digital trade facilitation and digitalized processes at ports are likely to become an important element of a toolbox designed to build resilience to potential disruption that could have an impact on the performance of maritime transport in supply chains. The use of automation in maritime cargo operations and multimodal transport connections at ports could also become increasingly used to introduce improvements to ensure business continuity and workforce safety in case of disruptions, as well as to optimize efficiency. Expanding the supply of port services through digital technology and developing services that enable better collaboration across port actors and improved visibility across the supply chain could also contribute to enhancing resilience and diversifying business opportunities for ports.

Supply-chain redesign patterns can have an impact on future ship-deployment patterns

The pandemic has put a spotlight on the exposure of international production to systemic risks, particularly from the perspective of securing continuity of supply. Thus, the crisis has accentuated pre-existing trends related to changes in the length and fragmentation of value chains. Although it may be too early to fully grasp supply-chain redesign patterns in a post-pandemic recovery scenario, the shipping industry will be affected, regardless of the specific trajectories that different industries will follow, potentially influencing patterns in ship deployment.

Priority action areas in preparation for a post-COVID-19 world

The COVID-19 crisis has revealed the importance of maritime transport as an essential service ensuring the continuity of trade and supply of critical supplies and the global flow of goods during the pandemic. Ensuring the proper functioning of maritime transport services is a precondition for economic recovery. Policies that consider long-term objectives for the sector will be crucial to "build back better" in a future beyond the pandemic crisis. This means considering climate change as a global challenge that poses a threat of increased disruption to transport operations. It also means prioritizing investments that can bring simultaneous economic and environmental benefits, for example by expediting the adaptation of alternative fuels, as well as the use of wind and solar energy for ships. Reducing the carbon footprint of the fleet, either through fleet renewal or retrofits, represents a significant challenge (UNCTAD, 2020c). Given the characteristics of shipping markets and age of the fleet in many small island developing States and least developed countries, additional investment and capacity-building will be required.

To meet the challenges of post-pandemic recovery, including the need to acknowledge asymmetric capabilities across countries, the following priorities should be considered:

- Promote the use of technological tools, including through digital trade facilitation reforms, to enhance sectoral resilience to future disruptions in transport and supply-chain operations.
- Increase the accessibility of ICT tools.
- Develop data infrastructure capabilities.
- Build local capacities on ICT tools and solutions.
- Develop skills to work effectively in a world of advanced automation and technology.
- Mitigate cybersecurity risks.
- Make use of available international technical support for digital trade facilitation reforms.

In conclusion, it is also important to enhance collaboration across port States and among different actors within countries to improve crew-changeover processes and to ensure standards of procedure and risk-management protocols at the national level so as to achieve a better balance between the safety and well-being of workers and the imperatives of operational continuity.

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