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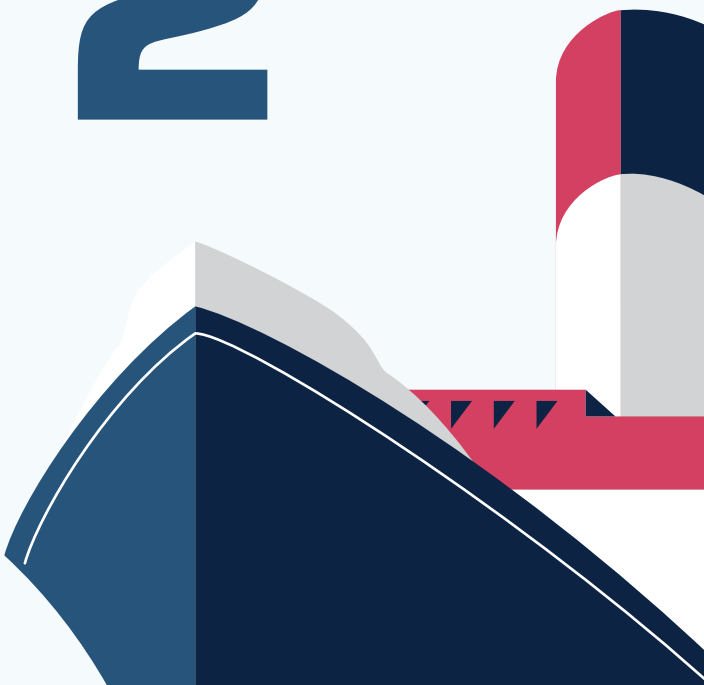


STRUCTURE, OWNERSHIP AND REGISTRATION OF THE WORLD FLEET

The world shipping fleet provides not only transport connectivity to global trade but also livelihoods to the people working in maritime businesses in developed and developing countries. At the beginning of 2017, the world fleet's commercial value amounted to $829 billion, with different countries benefiting from the building, owning, flagging, operation and scrapping of ships.

The top five shipowners in terms of cargo carrying capacity (dwt) are Greece, Japan, China, Germany and Singapore; together, these five countries have a market share of 49.5 per cent of dwt. Only one country from Latin America – Brazil – is among the top 35 shipowning countries; none are from Africa. The five largest flag registries are Panama, Liberia, the Marshall Islands, Hong Kong (China) and Singapore; together they have a market share of 57.8 per cent. Three countries – the Republic of Korea, China and Japan – constructed 91.8 per cent of world gross tonnage in 2016; among these, the Republic of Korea had the largest share, with 38.1 per cent. Four countries – India, Bangladesh, Pakistan and China – together accounted for 94.9 per cent of ship scrapping in 2016. UNCTAD data confirms a continued trend of industry consolidation, where different countries specialize in different maritime subsectors. It also confirms the growing participation of developing countries in many maritime sectors.

For the fifth year in a row, world fleet growth has been decelerating. The commercial shipping fleet grew by 3.15 per cent in 2016, compared with 3.5 per cent in 2015. Despite this further decline, the supply still increased faster than demand, leading to a continued situation of global overcapacity and downward pressure on freight rates.

The structure of the world fleet in terms of vessel types, tonnage, value and age are described in section A. Fleet ownership and registration are discussed in sections B and C, respectively, and data on shipbuilding, scrapping and the order book, in section D. Three issues considered relevant for the future development of the industry are explored in section E: cabotage traffic, gender aspects and developments in marine fuels. The overall outlook of the industry and policy implications are presented in section F.

WORLD CONTAINER CARRYING SHIP FLEET

Germany China Greece

Germany, China and Greece own

39%

of the world container-carrying ship fleet

TOP THREE FLAGS BY TONNAGE

Panama Liberia Marshall Islands

More than

70%

of the commercial fleet is registered under a flag which is different from the country of ownership

LEADERS IN SHIP BUILDING

China Republic of Korea Japan

China, the Republic of Korea and Japan were leaders in ship building, accounting for

92%

of global deliveries in 2016

SHIP-SCRAPPING COUNTRIES

Bangladesh India Pakistan China

Bangladesh, India, Pakistan and China accounted for

94%

of ship scrapping in 2016

GENDER SPLIT IN ON SHORE MARITIME POSITIONS

2016

While more women than men work in administrative and junior positions, the maritime industry has yet to succeed in tapping the leadership potential of its female co-workers

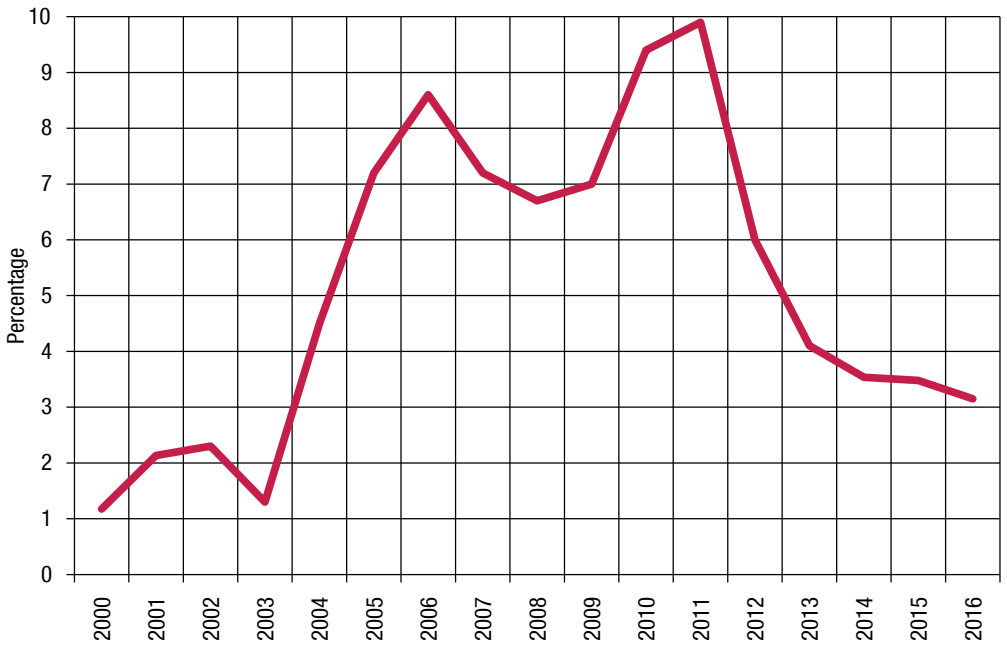
A. WORLD FLEET STRUCTURE

1. World fleet growth and principal types of vessel

Growing supply

For the fifth year in a row, world fleet growth[1] has been decelerating. The commercial shipping fleet grew by 3.15 per cent in the past 12 months to 1 January 2017 (figure 2.1). Despite this further decline in the annual growth rate, the supply increased faster than demand, at 2.6 per cent, leading to a continued situation of global overcapacity and downward pressure on freight rates. In terms of vessel numbers, the growth rate was 2.47 per cent – lower than tonnage – reflecting a further increase in average vessel sizes. In total, the world commercial fleet on 1 January 2017 consisted of 93,161 vessels, with a combined tonnage of 1.86 billion dwt.

Figure 2.1. Annual growth of world fleet, 2000–2016 (Percentage annual change)



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

Vessel types

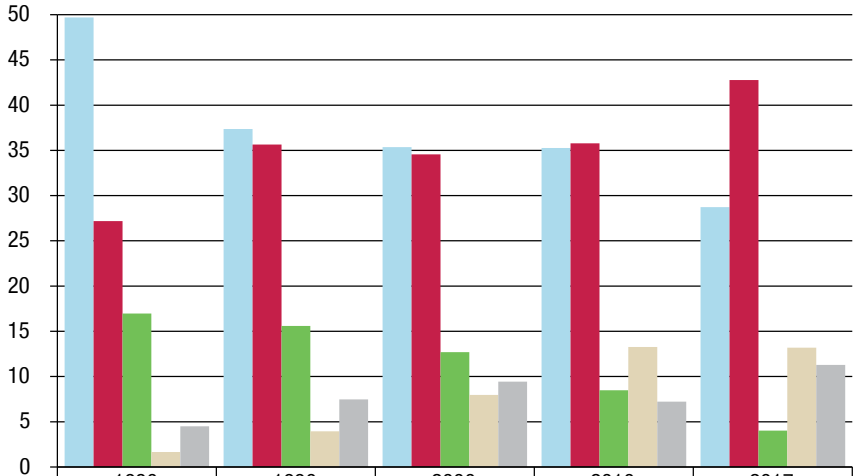
Carriers of liquefied natural gas and other gas recorded continued high growth (+9.7 per cent); growth was also recorded in the oil tanker (5.8 per cent) and chemical tanker (4.7 per cent) segments (table 2.1). In contrast, a long-term decline continued in the general cargo ship segment, which experienced negative growth (-0.2 per cent); its share of world's tonnage is currently 4 per cent, down from 17 per cent in 1980 (figure 2.2).

The further specialization of the world fleet poses challenges for smaller and weaker economies, as it is often more difficult for them to generate sufficient cargo volumes to fill specialized ships, and it is costly to provide the necessary specialized port facilities. While general cargo ships with their own gear have the advantage of flexibility and can call at small ports with no ship-to-shore cargo handling equipment, the ever-larger container ships require container cranes on the quays. Chemical tankers and offshore vessels for the oil and gas exploration industry also require higher investments in terminals and storage facilities.

Given the low growth in demand and low and volatile freight rates, seaports are reluctant to invest in new terminals. Current trends in vessel types and sizes, however, suggest that the pressure from the shipping industry will remain, and port and maritime authorities must carefully plan if and how to accommodate larger and specialized vessels.

Another trend that affects many developing countries, especially exporters of fruit, fish and meat, is the continued replacement of reefer ship capacity by reefer capacity on container ships. The reason behind this trend is not as much cost savings achieved on the maritime leg, but rather the improved door-to-door transport, reliability and intermodal connectivity of containers, as compared with bulk reefer ships (Arduino et al., 2015).

Figure 2.2. World fleet by principal vessel type, 1980–2017 (Percentage share of dead-weight tonnage)



	1980	1990	2000	2010	2017
Oil tankers	49.7	37.4	35.4	35.3	28.7
Dry bulk carriers	27.2	35.6	34.6	35.8	42.8
General cargo ships	17.0	15.6	12.7	8.5	4.0
Container ships	1.6	3.9	8.0	13.3	13.2
Other	4.5	7.5	9.4	7.2	11.3

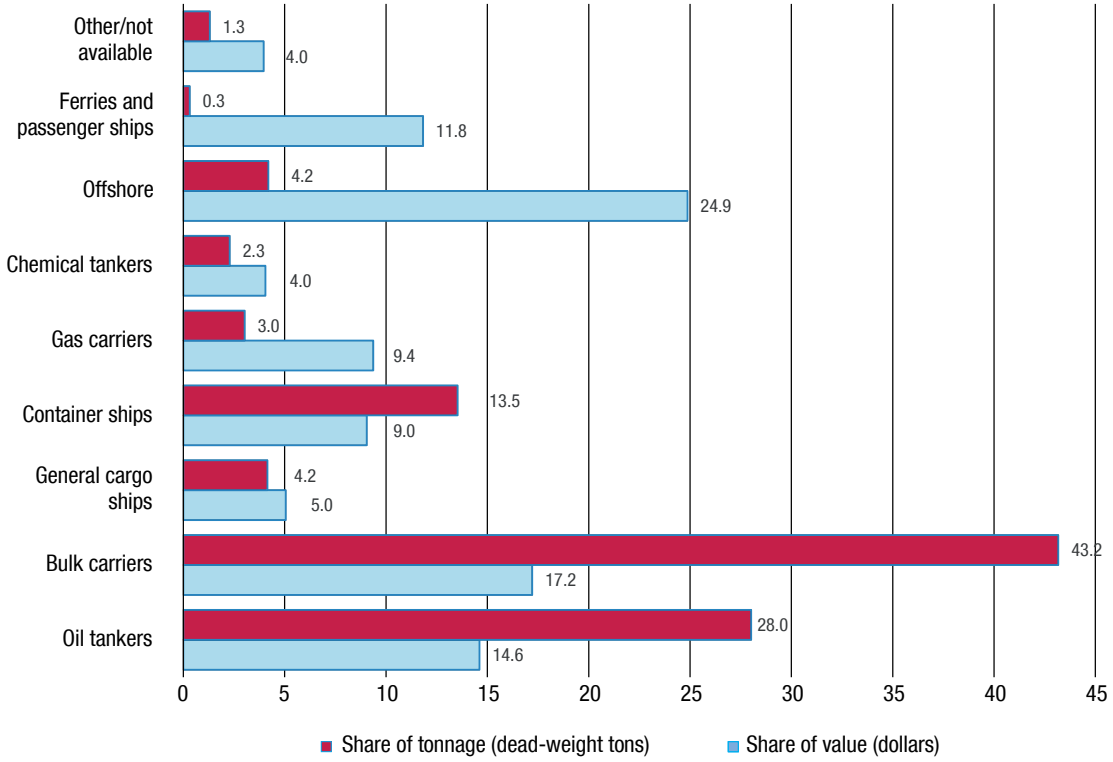
Sources: UNCTAD secretariat calculations, based on data from Clarksons Research and the *Review of Maritime Transport*, various issues.
Note: All propelled seagoing merchant vessels of 100 gross tons and above, not including inland waterway vessels, fishing vessels, military vessels, yachts and offshore fixed and mobile platforms and barges (with the exception of floating production, storage and offloading units, and drillships); beginning-of-year figures.

Table 2.1. World fleet by principal vessel type, 2016 and 2017 (Thousands of dead-weight tons and percentage share)

Principal types	2016	2017	Percentage change, 2016–2017
Oil tankers	505 736	534 855	5.76
	28.0	*28.7*	
Bulk carriers	779 289	796 581	2.22
	43.2	*42.8*	
General cargo ships	74 992	74 823	-0.23
	4.2	*4.0*	
Container ships	244 339	245 609	0.52
	13.5	*13.2*	
Other	200 923	209 984	4.55
	11.1	*11.3*	
Gas carriers	54 530	59 819	9.70
	3.0	*3.2*	
Chemical tankers	41 295	43 225	4.68
	2.3	*2.3*	
Offshore	75 696	77 490	2.48
	4.2	*4.2*	
Ferries and passenger ships	5 757	5 896	2.43
	0.3	*0.3*	
Other/not available	23 645	23 554	-0.08
	1.3	1.3	
World total	1 805 279	1 861 852	3.15

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

Figure 2.3. World fleet by principal vessel type, 2017
(Percentage of dead-weight tonnage and of dollar value)



Source: UNCTAD secretariat calculations, based on data from Clarksons Research.
Notes: Dwt share is calculated for all ships of 100 gross tons and above. The share of market value is estimated for all commercial ships of 1,000 gross tons and above.

Tonnage and value[2]

An analysis of the commercial value of the world fleet provides another perspective to the traditional market share in terms of cargo-carrying capacity (dwt). In general, dwt is considered the relevant indicator for shipping, because it represents the relevance of maritime transport for international trade volumes. In terms of dwt, the world fleet is dominated by dry bulk carriers, oil tankers and container ships transporting iron ore or coal.

If, however, the commercial value of the fleet is considered, offshore vessels, ferries and gas carriers gain in importance (figure 2.3.) These ships are costlier to build and the cargo they transport is often of higher unit value than the oil or iron ore transported by liquid and dry bulk carriers.

Container shipping

After years of overinvestment in container shipping, recent deliveries (figure 2.4) and the order book (figure 2.7) suggest that some improvements can be expected. In 2016, 127 new container ships were delivered, representing a reduction of 70 per cent from the 2008 peak of 436 ships. The combined TEU capacity amounted to less than 904 thousand TEUs, a reduction by almost half, compared with deliveries in 2015. The trend towards gearless ships continued: Only 4.1 per cent of delivered TEU capacity was on ships capable of calling in ports that did not have their own ship-to-shore container-handling equipment.

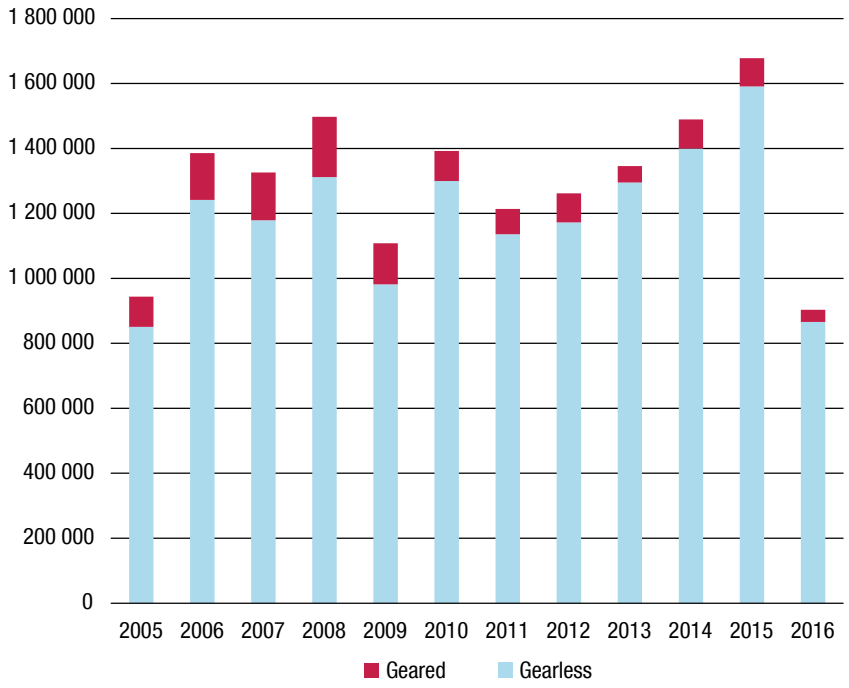
In 2016, there was some improvement regarding the average vessel size of newbuildings: TEU capacity per ship delivered was slightly below that of 2015. Yet the new ships are larger than the existing fleet, and there is continued pressure on ports to accommodate ever-larger vessels. This applies not only to the world's main hub ports in Eastern Asia and Europe, but just as much, if not more, to smaller ports in all regions, owing to the cascading effect.

Figure 2.5 depicts the difference in vessel sizes for geared and gearless ships. While the average container-carrying capacity of new gearless ships has doubled since 2005, the average capacity of geared newbuildings has remained practically unchanged.

2. World merchant fleet age distribution

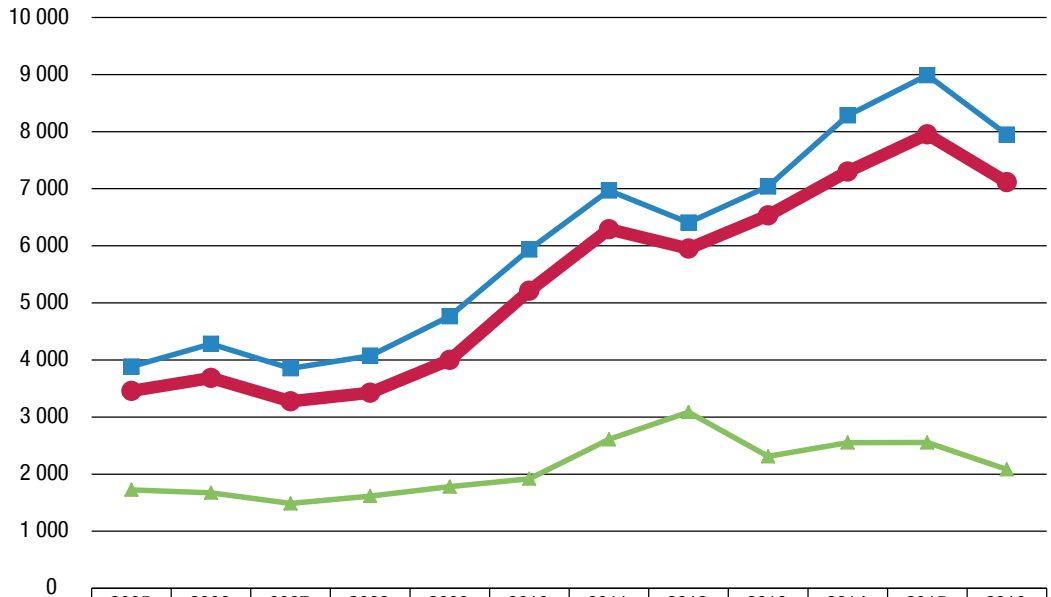
At the beginning of 2017, the average age of the commercial fleet was 20.6 years, representing a slight increase over the previous year (table 2.2). Fewer newbuildings than at the beginning of the decade, combined with similar scrapping levels, have led to an aging fleet. Compared with historical averages, however, the world fleet is still relatively young, especially in the bulker and container segments.

Figure 2.4. Container ship deliveries, 2005–2016 (Twenty-foot equivalent units)



Source: UNCTAD secretariat calculations, based on data from Clarksons Research.
Note: Propelled seagoing vessels of 100 gross tons and above.

Figure 2.5. Average vessel size of container ship deliveries, 2005–2016 (Twenty-foot equivalent units)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gearless	3 885	4 282	3 853	4 074	4 766	5 937	6 969	6 406	7 040	8 284	8 989	7 947
All	3 457	3 686	3 275	3 427	4 001	5 214	6 291	5 952	6 534	7 301	7 952	7 115
Geared	1 725	1 673	1 486	1 616	1 781	1 919	2 609	3 087	2 311	2 553	2 554	2 082

Source: UNCTAD secretariat calculations, based on data from Clarksons Research.
Note: Propelled seagoing merchant container vessels of 100 gross tons and above.

Table 2.2. Age distribution of world merchant fleet, by vessel type, 2017

Economic grouping and vessel type		Years					Average age		Percentage change
		0–4	5–9	10–14	15–19	20+	2017	2016	2016–2017
World									
Bulk carriers	Percentage of total ships	35.77	33.80	12.05	9.33	9.05	8.80	8.80	0.00
	Percentage of dead weight tonnage	38.66	34.88	11.91	7.55	7.01	7.95	7.94	0.01
	Average vessel size (dwt)	79 099	75 525	72 283	59 244	56 673			
Container ships	Percentage of total ships	18.63	30.50	22.72	15.66	12.50	11.55	11.10	0.45
	Percentage of dead weight tonnage	31.51	32.57	20.82	10.17	4.92	8.72	8.39	0.33
	Average vessel size (dwt)	80 624	50 891	43 679	30 961	18 751			
General cargo	Percentage of total ships	7.68	16.50	10.20	7.54	58.08	25.21	24.44	0.76
	Percentage of dead weight tonnage	14.98	24.70	12.23	10.24	37.85	18.29	17.83	0.46
	Average vessel size (dwt)	8 118	6 081	5 086	5 630	2 561			
Oil tankers	Percentage of total ships	16.03	22.51	15.46	7.74	38.26	18.76	18.36	0.40
	Percentage of dead weight tonnage	22.07	34.74	24.44	12.67	6.09	9.90	9.54	0.36
	Average vessel size (dwt)	73 274	82 242	84 610	89 498	8 777			
Other	Percentage of total ships	14.37	18.65	10.60	8.43	47.96	22.73	22.25	0.48
	Percentage of dead weight tonnage	19.40	26.43	14.21	10.29	29.67	15.58	15.65	-0.07
	Average vessel size (dwt)	7 777	7 907	8 004	7 144	3 954			
All ships	Percentage of total ships	11.75	17.97	10.13	7.00	53.15	20.57	19.92	0.65
	Percentage of dead weight tonnage	29.80	33.16	16.95	9.78	10.31	9.90	9.55	0.34
	Average vessel size (dwt)	42 207	34 948	32 847	25 991	5 917			
Developing economies – all ships									
	Percentage of total ships	16.92	21.01	11.29	7.92	42.86	29.03	28.33	0.70
	Percentage of dead weight tonnage	31.40	30.60	12.74	9.75	15.50	16.72	15.91	0.81
	Average vessel size (dwt)	34 624	27 025	22 137	23 195	6 733			
Developed economies – all ships									
	Percentage of total ships	16.15	23.86	14.08	10.76	35.15	19.05	18.51	0.54
	Percentage of dead weight tonnage	29.25	35.13	19.73	9.76	6.12	9.15	9.04	0.11
	Average vessel size (dwt)	53 396	43 538	42 708	28 695	6 589			
Countries with economies in transition – all ships									
	Percentage of total ships	6.32	8.82	6.02	3.19	75.66	29.39	28.93	0.46
	Percentage of dead weight tonnage	12.58	28.76	21.23	11.20	26.22	15.59	16.03	-0.43
	Average vessel size (dwt)	14 835	24 533	26 714	25 028	2 447			

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

Ships flagged in the developing economies are on average 10 years older than those flagged in developed economies, and among the different vessel types, general cargo ships are the oldest (more than 25 years), and dry bulk carriers are the youngest (less than nine years).

The fleet's age structure also reflects growth in vessel size. In particular, container ships have increased their carrying capacity in recent decades. Container ships built 15 to 19 years ago were significantly smaller than dry- and liquid bulk carriers built at that time; today, container ships are the largest average size of vessel (dwt, delivered over the last four years).

If the past growth and levelling off of ship sizes in the dry bulk and tanker sectors is an indicator for the container segment, it can be assumed that container ship sizes have probably reached a peak and will not grow much further. Container ships have now reached similar dwt capacities as the largest dry and liquid bulk ships. Access channels and shipyards would need to expand capacity significantly if they are to accommodate ships beyond 20,000–22,000 TEUs. This conclusion is in line with the diseconomies of scale reached in seaports, which is discussed in chapter 4.

B. WORLD FLEET OWNERSHIP AND OPERATION

1. Shipowning countries

Greece continues to be the largest shipowning country in terms of cargo-carrying capacity (309 million dwt), followed by Japan, China, Germany and Singapore. Together, these five countries control almost half of the world's tonnage (table 2.3). Only one country from Latin America (Brazil) is among the top 35 shipowning countries; none are from Africa. In terms of vessel numbers, China is the leading shipowning country (5,206 ships of 1,000 gross tons and above), including many smaller ships deployed in coastal shipping.

The share of shipowning by the traditional maritime nations in Europe and North America has continued to decrease, while that of middle-income developing countries, especially from Asia, has increased. Shipowning is not a high-technology industry that would require the latest, most sophisticated technologies and thus provides opportunities for emerging economies. At the same time, shipowning is not a labour-intensive business, where low-wage countries could benefit from any cost advantage – as is the case for ship scrapping. It is for this reason that middle-income countries in particular have increased their market share over the last decades, while the least developed countries are not among the world's major shipowners.

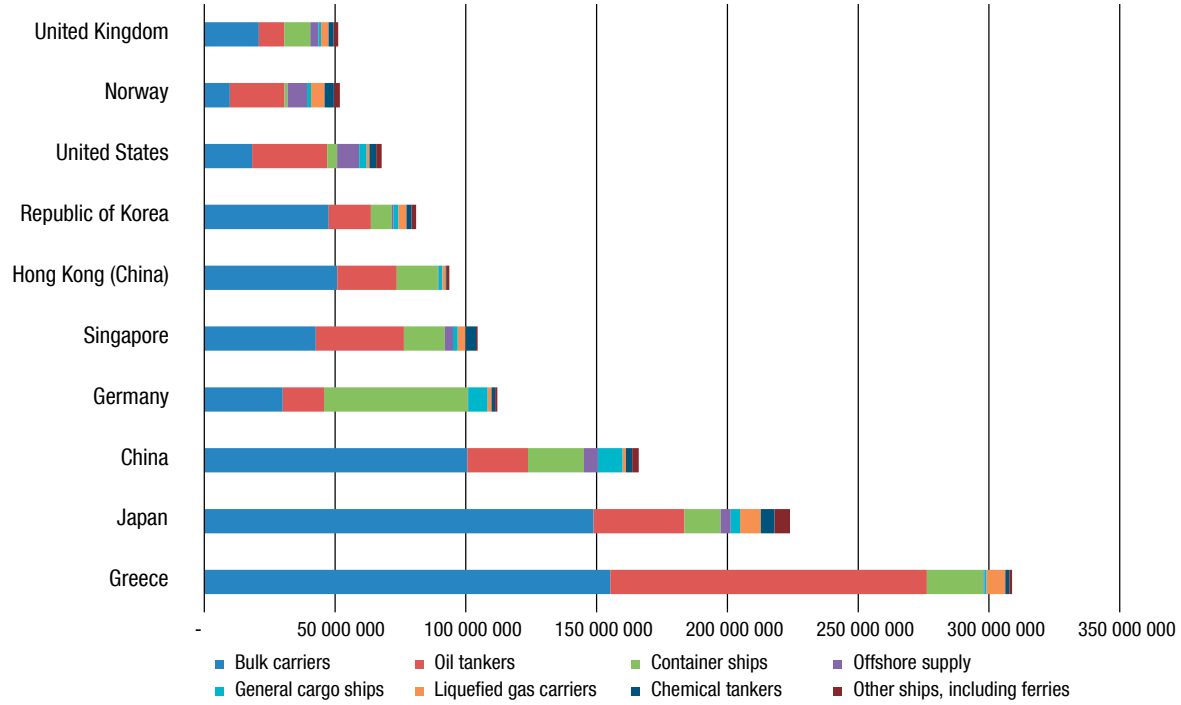
Table 2.3. Ownership of world fleet, 2017

Rank (dead-weight tonnage)	Country or territory	Number of vessels	Dead-weight tonnage	Foreign flag as a percentage of total (dwt)	Rank (dollars)	Total value (million dollars)	Average value per ship (million dollars)	Average value per dead-weight ton (dollars)
1	Greece	4 199	308 836 933	78.76	3	72 538	17.3	235
2	Japan	3 901	223 855 788	85.89	2	77 898	20.0	348
3	China	5 206	165 429 859	53.97	4	65 044	12.5	393
4	Germany	3 090	112 028 306	90.77	8	38 412	12.4	343
5	Singapore	2 599	104 414 424	39.02	7	39 193	15.1	375
6	Hong Kong (China)	1 532	93 629 750	23.98	9	25 769	16.8	275
7	Republic of Korea	1 656	80 976 874	81.98	11	20 928	12.6	258
8	United States	2 104	67 100 538	85.73	1	96 182	45.7	1 433
9	Norway	1 842	51 824 489	64.62	5	58 445	31.7	1 128
10	United Kingdom	1 360	51 150 767	80.55	6	40 671	29.9	795
11	Bermuda	440	48 059 392	98.93	13	19 691	44.8	410
12	Taiwan Province of China	926	46 864 949	90.62	17	10 857	11.7	232
13	Denmark	920	36 355 509	56.00	15	18 694	20.3	514
14	Monaco	338	31 629 834	100.00	23	7 903	23.4	250
15	Turkey	1 563	27 732 948	71.57	20	9 055	5.8	327
16	Switzerland	405	23 688 303	92.58	22	8 458	20.9	357
17	Belgium	263	23 550 024	67.81	27	6 505	24.7	276
18	India	986	22 665 452	27.35	25	6 938	7.0	306
19	Russian Federation	1 707	22 050 283	67.38	19	9 081	5.3	412
20	Italy	768	20 609 725	29.36	10	23 184	30.2	1 125
21	Islamic Republic of Iran	238	18 838 747	68.80	32	2 799	11.8	149
22	Indonesia	1 840	18 793 019	7.96	26	6 613	3.6	352
23	Malaysia	644	18 351 283	51.07	16	14 641	22.7	798
24	Netherlands	1 256	18 033 334	64.72	12	19 970	15.9	1 107
25	United Arab Emirates	883	17 876 272	97.30	24	7 406	8.4	414
26	Saudi Arabia	283	15 659 518	77.97	30	4 101	14.5	262
27	Brazil	394	14 189 164	72.25	14	19 676	49.9	1 387
28	France	452	11 931 397	69.93	18	10 616	23.5	890
29	Canada	376	10 235 954	75.48	28	5 231	13.9	511
30	Kuwait	86	10 208 147	49.92	31	3 749	43.6	367
31	Cyprus	277	9 257 094	63.95	33	2 711	9.8	293
32	Viet Nam	943	8 801 765	17.84	29	4 161	4.4	473
33	Oman	49	7 490 956	99.92	34	2 215	45.2	296
34	Thailand	393	7 022 484	27.84	35	1 949	5.0	278
35	Qatar	117	6 640 467	87.56	21	8 827	75.4	1 329
Subtotal, top 35 shipowners		**44 036**	**1 755 783 748**	**70.30**		**770 109**	**17.5**	**439**
Rest of world and unknown		*6 119*	*91 847 146*	*64.30*		*58 509*	*9.6*	*637*
World total		**50 155**	**1 847 630 894**	**70.01**		**828 618**	**16.5**	**448**

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

Notes: Propelled seagoing vessels of 1,000 gross tons and above, as at 1 January. For a complete listing of nationally owned fleets, see http://stats.unctad.org/fleetownership (accessed 9 September 2017).

Figure 2.6. Top 10 nationally owned fleets by principal vessel type, 2017 (Dead-weight tons)



Source: UNCTAD secretariat calculations, based on data from Clarksons Research.
Notes: Propelled seagoing merchant vessels of 1,000 gross tons and above; beginning-of-year figures.

A somewhat different picture emerges if the estimated commercial value of the fleet is considered. Here, the United States fleet leads with $96 billion, followed by Japan, Greece, China and Norway (table 2.3). The average value per ship of owners from Qatar is $75 million, reflecting its fleet of expensive liquefied natural gas tankers and other specialized tankers. In comparison, Indonesia, Thailand and Viet Nam own fleets with low unit values. Indonesian-owned fleets have an average commercial value of $3.6 million per vessel, reflecting the large number of smaller and older general cargo ships and ferries that are employed in interisland transport.

Figure 2.6 depicts the composition of the fleets of the top 10 shipowning countries (dwt). Greece has the largest share of oil tankers, while China has the largest share of general cargo ships, and Germany, container vessels. The United States and Norway have relatively large shares in offshore tonnage, which tends to be of high commercial value. This also explains the high unit values of ships owned by these two countries (table 2.3).

2. Container ship ownership and liner services

Container ships are the work horses of the global liner shipping network that connects and supports global value chains and trade in manufactured goods. Table 2.4 depicts the container ship fleet ownership in TEUs. Germany continues to be the largest owner, with a market share of 21.46 per cent, followed by China and Greece.

The largest container ships of 17,000 TEUs and above are owned by carriers from China, Hong Kong (China), Denmark, France and Kuwait. German and Greek shipowners, most of which are not liner shipping companies, do not own any container ships of this size. They are primarily charter-owners, namely companies that charter their ships out to liner companies that provide a particular shipping service.

Table 2.5 provides a ranking of the top 50 liner shipping companies. As of May 2017, Maersk (Denmark) continues to be the largest liner shipping company in terms of operated container ship capacity (3.2 million TEUs), followed by MSC (Switzerland) and CMA CGM (France). Most liner shipping companies own about half the ships they deploy on their services, while the other half is chartered in. This practice explains why the leading liner companies (table 2.5) are not necessarily from the same countries as the leading container shipowners (table 2.4).

The years 2016 and 2017 are characterized by a new wave of mergers among liner shipping companies, as well as significant changes in the composition of alliances among them. These developments will be discussed in the context of freight markets in chapter 3. Trends in the service patterns and vessel deployment will be analysed in detail in chapter 6 on maritime connectivity.

Table 2.4. Ownership of container-carrying world fleet, 2017 (Twenty-foot equivalent units)

	20-foot equivalent units	Market share (percentage)	Number of ships	Size of largest ship (20-foot equivalent units)	Average size per ship (20-foot equivalent units)
Germany	4 795 085	21.46	2 106	14 036	2 277
China	2 098 655	9.39	871	19 224	2 409
Greece	1 815 265	8.13	563	14 354	3 224
Denmark	1 548 865	6.93	300	18 270	5 163
Hong Kong (China)	1 383 720	6.19	288	17 859	4 805
Singapore	1 368 888	6.13	448	15 908	3 056
Japan	1 240 871	5.55	410	14 026	3 027
Switzerland	1 225 932	5.49	236	14 000	5 195
Taiwan Province of China	977 453	4.38	280	8 626	3 491
United Kingdom	873 348	3.91	337	15 908	2 592
Republic of Korea	667 571	2.99	254	13 100	2 628
France	592 738	2.65	95	17 722	6 239
Kuwait	457 918	2.05	42	18 800	10 903
United States	351 895	1.58	206	9 443	1 708
Netherlands	302 313	1.35	646	3 508	468
Turkey	262 955	1.18	512	9 010	514
Norway	229 220	1.03	365	13 102	628
Indonesia	183 479	0.82	410	2 702	448
Israel	178 623	0.80	42	10 062	4 253
Cyprus	174 513	0.78	123	6 969	1 419
Top 20 owners subtotal	20 729 307	92.79	8 534		2 429
Rest of world	1 610 491	7.21	2 616		
World total	**22 339 798**	**100.00**	**11 150**	**19 224**	**2 004**

Source: UNCTAD secretariat calculations, based on data from Clarksons Research. For a complete listing of nationally owned fleets in dwt, see http://stats.unctad.org/fleetownership (accessed 9 September 2017).

Notes: Propelled seagoing vessels of 1,000 gross tons and above; beginning-of-year figures. The table also includes ships other than specialized container ships, with some container-carrying capacity.

Table 2.5. World's top 50 liner shipping companies, 2017

Rank	Rank, company	End-2015		End-2016		May 2017			
		Number of ships	Capacity	Number of ships	Capacity	Number or ships	Capacity	Market share (percentage)	Average vessel size
1	Maersk	629	3 103 266	655	3 323 064	621	3 201 871	16.0	5 156
2	Mediterranean Shipping Company	487	2 734 409	458	2 802 830	469	2 935 464	14.6	6 259
3	CMA-CGM	553	2 449 350	460	2 227 600	441	2 220 474	11.1	5 035
4	China Ocean Shipping (Group) Company	285	1 616 462	254	1 508 207	277	1 603 341	8.0	5 788
5	Hapag-Lloyd	187	999 950	171	987 892	180	1 038 483	5.2	5 769
6	Evergreen	197	955 108	188	990 792	186	995 147	5.0	5 350
7	Orient Overseas Container Line	111	583 969	101	594 550	107	666 558	3.3	6 230
8	Hamburg-Süd	138	670 029	127	638 906	116	594 008	3.0	5 121
9	Yang Ming	101	543 772	101	584 839	100	588 389	2.9	5 884
10	United Arab Shipping Company	51	452 510	59	565 433	56	546 220	2.7	9 754
11	Nippon Yusen Kaisha	101	493 443	95	498 076	97	538 754	2.7	5 554
12	Mitsui Osaka Shosen Kaisha Lines	99	549 987	78	467 389	82	515 880	2.6	6 291
13	Hundai Merchant Marine	56	384 403	67	455 841	69	458 247	2.3	6 641
14	Kawasaki Kisen Kaisha Limited – K Line	71	397 557	63	351 890	64	363 019	1.8	5 672
15	Pacific International Lines	134	336 327	132	360 939	132	361 752	1.8	2 741

Table 2.5. World's top 50 liner shipping companies, 2017 *(continued)*

Rank, company		End-2015		End-2016		May 2017			
		Number of ships	Capacity	Number of ships	Capacity	Number or ships	Capacity	Market share (percentage)	Average vessel size
16	Zim Integrated Shipping Services	88	381 780	80	359 945	69	307 934	1.5	4 463
17	Wan Hai Lines	93	223 374	94	235 596	96	248 880	1.2	2 593
18	X-Press Feeders	78	122 504	102	160 184	92	145 454	0.7	1 581
19	Republic of Korea Marine Transport Company	67	114 833	75	150 386	72	140 365	0.7	1 950
20	Shandong International Transportation Corporation	76	98 572	75	92 043	75	100 195	0.5	1 336
21	Islamic Republic of Iran Shipping Lines	27	92 674	27	92 674	26	89 374	0.4	3 437
22	Arkas Container Transport	45	67 243	46	82 491	48	86 157	0.4	1 795
23	TS Lines	44	91 308	40	86 131	38	74 188	0.4	1 952
24	Simatech Shipping	20	55 984	22	62 816	25	70 602	0.4	2 824
25	Sinokor Merchant Marine	36	45 121	39	55 269	42	59 533	0.3	1 417
26	Transworld Group of Companies	24	40 256	31	52 856	33	57 588	0.3	1 745
27	Emirates Shipping Line	9	41 611	8	38 431	9	48 450	0.2	5 383
28	Regional Container Lines	30	54 771	26	51 631	24	47 782	0.2	1 991
29	China Merchants Group	29	37 238	27	32 208	34	46 181	0.2	1 358
30	Unifeeder	42	44 653	41	45 211	40	43 914	0.2	1 098
31	Heung-A Shipping	35	49 199	39	45 820	34	41 959	0.2	1 234
32	SM Line					11	41 406	0.2	3 764
33	Nile Dutch	16	48 867	10	32 071	11	40 957	0.2	3 723
34	Matson	20	40 952	19	39 806	19	39 806	0.2	2 095
35	Quanzhou Ansheng Shipping Company	8	21 721	9	24 121	12	37 261	0.2	3 105
36	Zhonggu Shipping	6	19 912	9	27 397	11	35 933	0.2	3 267
37	Samudera	26	31 486	26	31 929	26	32 038	0.2	1 232
38	Salam Pacific Indonesia Lines	29	23 260	30	26 258	31	29 576	0.1	954
39	Seaboard Marine	26	37 063	21	30 749	19	28 175	0.1	1 483
40	Temas Line	19	11 630	28	21 449	33	25 671	0.1	778
41	Namsung Shipping Company	28	26 095	26	24 900	26	24 900	0.1	958
42	Meratus Line	26	23 034	27	25 436	27	23 795	0.1	881
43	Tanto Intim Line	32	21 015	34	22 089	35	23 094	0.1	660
44	Shipping Corporation of India	7	23 252	6	22 517	5	20 648	0.1	4 130
45	Swire Group	9	10 542	10	14 144	13	20 318	0.1	1 563
46	National Transport and Overseas Services Company	6	6 600	12	15 122	14	18 622	0.1	1 330
47	Far Eastern Shipping Company	12	13 085	13	17 252	12	18 198	0.1	1 517
48	W.E.C. Lines	18	16 821	17	15 600	19	17 979	0.1	946
49	Log-in Logistica Intermodal	8	19 005	8	19 347	7	16 895	0.1	2 414
50	Far Shipping	14	20 185	9	13 361	10	14 436	0.1	1 444
	Top 50	**4 253**	**18 246 188**	**4 095**	**18 425 488**	**4 095**	**18 745 871**		**4 578**
	Top 50 per cent of total fleet		**92.4%**		**92.2%**		**93.5%**		
	Top 10	**2 739**	**14 108 825**	**2 574**	**14 224 113**	**2 553**	**14 389 955**		**5 636**
	Top 10 per cent of total fleet		**71.5%**		**71.2%**		**71.8**		

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

Notes: Number of ships and total shipboard capacity deployed ranked by TEUs; includes all container ships known to be operated by liner shipping companies as at 1 May 2017.

C. SHIP REGISTRATION

More than 70 per cent of the commercial fleet is registered under a flag that is different from the country of ownership (table 2.3). This system of open registries can provide opportunities for developing countries, notably small island developing States, such as the Marshall Islands, and the least developed countries, such as Liberia, which are both among the top three registries.

Tables 2.6 and 2.7 provide different insights into nationally flagged fleets. Table 2.6 focuses on the tonnage and vessel numbers, while table 2.7 considers different vessel types and their value. Under both criteria (tonnage and value), Panama continues to be the leading flag of registration. Liberia ranks second in terms of tonnage, and the Marshall Islands ranks second in terms of value. The Marshall Islands has one of the youngest fleets, with many high-value liquefied natural gas tankers, offshore drill ships and other specialized vessels registered under its flag.

Table 2.6. Leading flags of registration by tonnage, 2017

Flag of registration	Number of vessels	Vessel share of world total (percentage)	Dead-weight tonnage	Share of world total dead-weight tonnage (percentage)	Cumulated share of dead-weight tonnage (percentage)	Average vessel size (dead-weight tons)	Dead-weight tonnage growth, 2016–2017 (percentage)
Panama	8 052	8.64	343 397 556	18.44	18.44	45 237	2.75
Liberia	3 296	3.54	219 397 222	11.78	30.23	66 706	5.66
Marshall Islands	3 199	3.43	216 616 351	11.63	41.86	67 968	7.76
Hong Kong (China)	2 576	2.77	173 318 337	9.31	51.17	68 695	6.23
Singapore	3 558	3.82	124 237 959	6.67	57.84	36 942	0.21
Malta	2 170	2.33	99 216 495	5.33	63.17	46 297	5.14
Bahamas	1 440	1.55	79 842 485	4.29	67.46	56 625	0.79
China	4 287	4.60	78 400 273	4.21	71.67	20 555	2.12
Greece	1 364	1.46	74 637 988	4.01	75.68	66 999	1.60
United Kingdom	1 551	1.66	40 985 692	2.20	77.88	30 495	10.42
Japan	5 289	5.68	34 529 405	1.85	79.74	8 574	6.60
Cyprus	1 022	1.10	33 764 669	1.81	81.55	33 798	1.82
Norway	1 585	1.70	21 900 458	1.18	82.73	16 319	6.89
Indonesia	8 782	9.43	20 143 854	1.08	83.81	4 269	7.58
India	1 674	1.80	17 253 564	0.93	84.74	10 899	5.34
Denmark	654	0.70	16 893 333	0.91	85.64	28 344	-1.73
Italy	1 430	1.53	15 944 268	0.86	86.50	13 477	-2.32
Republic of Korea	1 907	2.05	15 171 035	0.81	87.31	9 008	-10.80
Portugal	466	0.50	13 752 758	0.74	88.05	32 744	54.97
United States	3 611	3.88	11 798 309	0.63	88.69	6 329	0.75
Bermuda	160	0.17	10 957 895	0.59	89.27	69 795	2.44
Germany	614	0.66	10 443 699	0.56	89.84	20 084	-6.15
Antigua and Barbuda	964	1.03	10 153 044	0.55	90.38	10 609	-9.68
Malaysia	1 690	1.81	10 058 653	0.54	90.92	7 412	4.70
Russian Federation	2 572	2.76	8 277 175	0.44	91.37	3 292	-2.95
Turkey	1 285	1.38	8 200 982	0.44	91.81	8 055	-3.83
Belgium	185	0.20	8 039 665	0.43	92.24	50 883	-3.57
Viet Nam	1 818	1.95	7 991 039	0.43	92.67	4 745	2.96
Netherlands	1 244	1.34	7 619 143	0.41	93.08	7 263	-5.31
France	547	0.59	6 966 582	0.37	93.45	17 033	0.90
Islamic Republic of Iran	739	0.79	6 583 064	0.35	93.80	11 253	34.49
Philippines	1 508	1.62	6 135 144	0.33	94.13	5 203	-3.63
Cayman Islands	161	0.17	5 549 056	0.30	94.43	36 268	28.52
Thailand	781	0.84	5 374 875	0.29	94.72	8 269	0.13
Kuwait	161	0.17	5 155 256	0.28	95.00	38 761	-3.85
Top 35 flags total	**72 342**	**77.65**	**1 768 707 283**	**95.00**	**95.00**	**24 449**	**4.02**
Rest of world	**20 819**	**22.35**	**94 530 523**	**5.07**	**5.07**	**4 541**	**-12.80**
World total	**93 161**	**100.00**	**1 861 851 750**	**100.00**	**100.00**	**24 062**	**2.94**

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

Notes: Propelled seagoing merchant vessels of 100 gross tons and above, ranked by dead-weight tonnage; beginning-of-year figures. For a complete list of all countries, see http://stats.unctad.org/fleet (accessed 9 September 2017).

Table 2.7. Leading flags of registration by value, 2017 (Millions of dollars)

Flag of registration	Oil tankers	Bulk carriers	General cargo ships	Container ships	Other	Total
Panama	11 942	36 464	3 867	10 669	53 909	116 850
Marshall Islands	20 130	18 434	662	4 567	50 713	94 505
Bahamas	7 697	3 856	214	301	66 997	79 065
Liberia	16 172	13 647	869	12 615	20 391	63 694
Singapore	10 072	9 863	1 445	7 743	20 658	49 780
Hong Kong (China)	8 669	17 364	2 034	11 513	5 310	44 890
Malta	6 787	8 874	1 733	6 344	18 034	41 771
China	4 614	10 543	2 398	1 274	18 078	36 907
Norway	1 825	1 678	290		24 403	28 196
United Kingdom	2 818	2 026	1 394	3 759	17 485	27 482
Italy	1 572	817	2 726	66	13 869	19 051
Bermuda	410	245	10	33	17 027	17 725
Greece	8 524	3 000	82	239	5 676	17 520
Japan	2 240	2 255	1 594	289	7 129	13 507
Cyprus	877	3 765	776	1 175	4 953	11 545
Netherlands	109	127	3 844	163	7 089	11 332
United States	1 136	21	501	383	8 190	10 231
Malaysia	742	96	89	57	9 209	10 193
Denmark	1 102	51	524	4 192	3 919	9 787
Indonesia	1 445	352	1 336	431	4 379	7 943
Brazil	582	114	38	159	4 982	5 875
Vanuatu		311	13	1	5 179	5 504
Nigeria	123		3		5 264	5 391
India	1 513	721	452	65	2 549	5 301
France	633		320	765	3 475	5 193
Top 25 flags subtotal	**111 733**	**134 622**	**27 214**	**66 801**	**398 870**	**739 240**
Others	**9 349**	**8 005**	**14 617**	**8 174**	**49 232**	**89 378**
World total	**121 083**	**142 628**	**41 831**	**74 975**	**448 102**	**828 618**

Source: UNCTAD secretariat calculations, based on data from Clarksons Research.
Notes: Propelled seagoing merchant vessels of 1,000 gross tons and above, ranked by fleet value; beginning-of-year figures.

Table 2.8. Distribution of dead-weight tonnage capacity of vessel types by country group of registration, 2017 (Percentage)

	Total fleet	Oil tankers	Bulk carriers	General cargo	Container ships	Other
World total	100.00	100.00	100.00	100.00	100.00	100.00
Developed countries	22.84	24.48	18.88	27.82	27.94	25.91
	0.17	*-0.32*	*0.22*	*-0.08*	*0.84*	*0.39*
Countries with economies	0.68	0.91	0.20	5.38	0.05	1.02
in transition	*-0.03*	*-0.04*	*0.00*	*0.06*	*0.01*	*-0.23*
Developing countries	76.24	74.52	80.88	65.57	71.95	71.85
	-0.09	*0.36*	*-0.21*	*0.10*	*-0.79*	*0.06*
Of which:						
Africa	12.66	15.20	10.37	6.45	19.39	9.19
	-0.43	*-2.04*	*0.29*	*0.42*	*-0.01*	*-0.07*
America	24.84	20.94	28.88	20.79	17.90	28.97
	-0.15	*1.51*	*-0.81*	*-0.19*	*-0.87*	*-0.86*
Asia	26.66	23.19	28.95	34.89	29.23	20.89
	-0.19	*0.39*	*-0.74*	*-0.37*	*0.29*	*0.56*
Oceania	12.09	15.19	12.69	3.44	5.44	12.80
	0.68	*0.50*	*1.05*	*0.24*	*-0.20*	*0.43*
Unknown and other	0.24	0.09	0.04	1.23	0.06	1.22
	-0.04	*0.00*	*-0.02*	*-0.08*	*-0.06*	*-0.22*

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

Table 2.9. Deliveries of newbuildings, major vessel types and countries where built, 2016 (Thousands of gross tons)

	China	Japan	Republic of Korea	Philippines	Rest of world	Total
Oil tankers	4 407	1 094	10 500		917	16 918
Bulk carriers	12 346	9 418	2 940	691	540	25 934
General cargo	764	205			169	1 138
Container ships	2 231	599	5 541	397	695	9 464
Gas carriers	553	759	4 887	78	24	6 302
Chemical tankers	561	566	306		39	1 472
Offshore	651	204	603	2	686	2 146
Ferries and passenger ships	105	184			1 148	1 437
Other	561	319	490		76	1 445
Total	**22 179**	**13 349**	**25 266**	**1 168**	**4 295**	**66 257**

Source: UNCTAD secretariat calculations, based on data from Clarksons Research.
Note: Propelled seagoing merchant vessels of 100 gross tons and above. For more detailed data on other shipbuilding countries, see http://stats.unctad.org/shipbuilding (accessed 9 September 2017).

More than 76.2 percent of the world fleet tonnage is registered in the developing countries (table 2.8). This includes many open registries, such Panama, Liberia and the Marshall Islands. However, some of the nationally flagged fleets are also nationally owned, often because of cargo reservation regimes that limit the options for shipowners to flag out. Many of the ships flying the flags of China, India, Indonesia and the United States are deployed on domestic transport (cabotage) services, which are reserved for nationally registered ships. The implications of such cargo reservation regimes for international maritime connectivity will be discussed in chapter 6.

D. SHIPBUILDING, DEMOLITION AND NEW ORDERS

1. Deliveries of newbuildings

In 2016, 91.8 per cent of shipbuilding (gross tons) took place in three countries: the Republic of Korea, China and Japan. This represents a further increase over 2015, in line with the concentration process observed in many maritime sectors. China continued to have its largest shares in dry bulk carriers and general cargo ships; the Republic of Korea was strongest in container ships, gas carriers and oil tankers; and Japan mostly built oil tankers and dry bulk carriers. The Philippines maintained a 4.2 per cent market share in container ships. All other countries combined constructed 6.5 per cent of gross tonnage in 2016, mostly specializing in ferries, cruise and other passenger ships, as well as some offshore vessels (table 2.9).

2. Ship demolition

Four countries – India, Bangladesh, Pakistan and China – accounted for 94.9 per cent of known ship scrapping in 2016. Turkey maintained a market niche for scrapping some gas carriers, as well as some ferries and passenger ships. All other countries combined accounted for 1.6 per cent of the world total. Key demolition figures are provided in table 2.10.

Table 2.10. Reported tonnage sold for demolition, major vessel types and countries where demolished, 2016 (Thousands of gross tons)

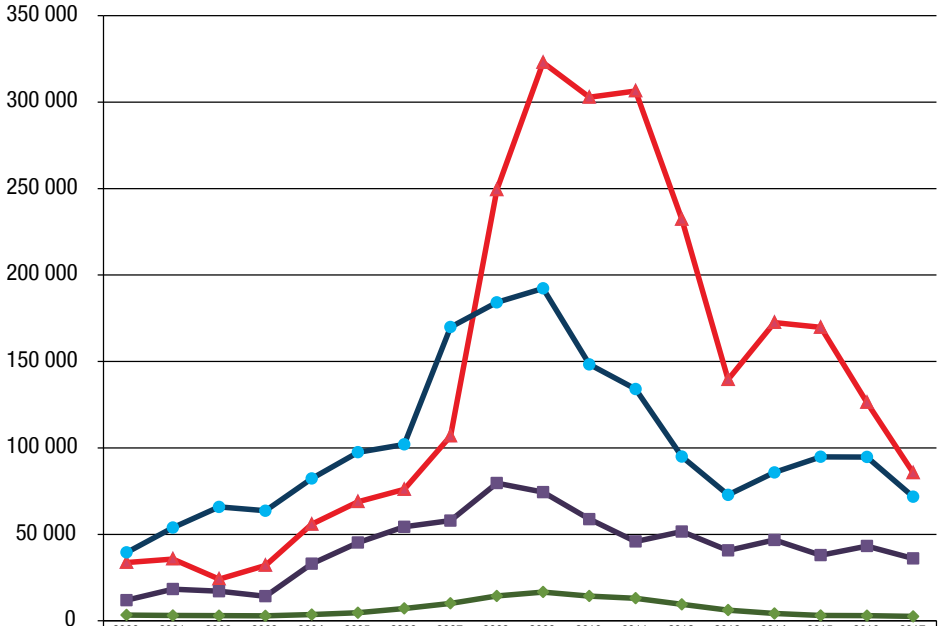
	China	India	Bangladesh	Pakistan	Unknown – Indian subcontinent	Turkey	Others/ unknown	World total
Oil tankers	266	142	224	448	103	7	63	1 253
Bulk carriers	1 823	3 269	5 756	3 742	1 049	121	58	15 818
General cargo	44	519	152	66	37	192	36	1 046
Container ships	569	3 922	1 675	119	1 056	104	110	7 556
Gas carriers	3	147	25	48		171	3	397
Chemical tankers	1	168			28	28	1	226
Offshore	24	340	64	249	218	46	122	1 064
Ferries and passenger ships		51				77	39	166
Other	356	375	344		81	252	33	1 442
Total	**3 086**	**8 934**	**8 240**	**4 672**	**2 572**	**999**	**466**	**28 968**

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

3. Tonnage on order

In 2016, shipbuilding activity contracted by 1.7 per cent, while ship scrapping went up by 25.7 per cent. The higher growth of demolition led to a slowdown in world fleet growth (figure 2.1). Given the order book, this trend can be expected to continue – there is less tonnage on order of all major vessel types in early 2017 than one year before (figure 2.7). For example, the current order book for general cargo ships is below levels recorded during the 2000–2016 period. In addition, the order book for dry bulk carriers finally returned to the levels last seen before the boom and bust period of 2007–2012.

Figure 2.7. World tonnage on order, 2000–2017 (Thousands of dead-weight tons)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Dry bulk carriers	33 721	35 757	24 144	32 066	55 850	68 878	75 988	106 89	249 28	322 90	302 79	306 45	232 13	139 51	172 53	169 73	126 28	85 573
Oil tankers	39 546	53 919	65 896	63 678	82 258	97 474	102 01	169 88	184 19	192 25	148 30	134 04	94 936	72 843	85 844	94 851	94 716	71 743
Container ships	11 922	18 348	17 121	14 225	33 004	45 241	54 351	57 938	79 665	74 408	58 821	45 860	51 614	40 685	46 795	37 977	43 259	36 062
General cargo ships	3 325	3 053	2 984	2 881	3 587	4 638	7 139	10 070	14 389	16 657	14 315	13 051	9 526	6 172	4 226	3 058	2 979	2 553

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

E. FUTURE TRENDS IN MARITIME TRANSPORT SUPPLY AND RELEVANT REQUIREMENTS

1. Supply of maritime cabotage services

Cabotage is defined as sea transport of passengers, goods and materials between two ports located in the same country, irrespective of the country in which the seagoing vessel is registered. Cabotage encompasses domestic shipping operations; these include domestic trade, as well as operations related to transhipment. Cabotage may involve tramp or liner operations and a variety of cargo-handling techniques.

In many countries, cabotage is limited to nationally flagged ships for various reasons, including the following: to promote shipping and national transport capacity, reduce the adverse impact of freight expenditures on the balance of payments, facilitate international trade in a predictable and stable environment and ensure strategic deliveries and shipments. The box below provides a summary of how these limitations are expressed in commitments contained in schedules derived from trade negotiations and agreements and in applied regimes. Commitments are usually worded in a manner that contains an overall prohibition to provide cabotage services, although in some conditions the provision of such services is allowed.

In practice, cabotage restrictions are not always rigidly applied in developing countries. Services are often operated by foreign companies, subject to complying with authorizations and other requirements and flagging in the country concerned. In some cases, this way of operating can cause serious disruptions in providing door-to-door services, suggesting that restrictions may be more burdensome than necessary to achieve an efficient maritime industry.

Different regimes for cabotage may have different implications for a country's shipping connectivity, as they may facilitate the combination of national, regional and intercontinental shipping services. This will be discussed in more detail in chapter 6.

Box 2.1. Cabotage in trade agreements: Scenarios, conditions and examples

Overall prohibition: Foreign services providers cannot provide cabotage services

- Cabotage is limited to nationally flagged vessels.
- Cabotage is open solely to national carriers.
- Vessels providing cabotage services must be owned by nationals or companies legally established in the country concerned and registered as shipowners in the national shipowners registry.
- National vessels that operate cabotage services must meet the following conditions: if the owners are natural persons, they must prove they have (local) nationality and domicile; if the owner is a company, it must provide evidence that half plus one of its shareholders are (local) nationals domiciled in the country, that at least 51 per cent of the registered voting shares are owned by nationals, that the company is controlled and managed by nationals and that it is up to date in meeting its social and tax obligations.

Exceptions: Cabotage services can be provided under certain conditions

Allowed for some (trading) partners; subject to reciprocity or in case of regional integration	Allowed for trading partners, in case of bilateral or multilateral agreements that grant cabotage rights to trading partners on a reciprocal basis, to encourage trade and promote regional economic integration
Allowed for some operations or under certain conditions (subject to authorizations and other requirements)	After undergoing registration, foreign shipping companies may transport self-owned or leased empty containers between certain designated coastal ports. National and foreign maritime (cabotage) transport companies must have authorization and an operating permit. These are granted for an indefinite term, provided that the company respects the conditions originally required for their granting. To obtain such a permit, foreign shipping companies must have a shipping agent in the country concerned. Cabotage may be allowed if reciprocal treatment is offered, if the activity is for the purpose of scientific research or environmental protection or if it is in the interest of the State concerned. Foreign ships may perform (cabotage) activities where a non-nationally registered duty-paid ship is available or suitable. There are no limits on the number of waivers for foreign ships to engage in cabotage. A waiver application for a temporary coasting trade licence involves a search for a (national) suitable ship and a labour market test if a company seeks to crew its vessels with foreigners.

Source: UNCTAD secretariat, based on information from the Integrated Trade Intelligence Portal Services database (World Trade Organization and World Bank).

2. Gender issues: Assessing gender aspects in shipping

In shipping, men make up the majority of the workforce. In 2015, out of the estimated 1,647,500 seafarers in marine operation roles employed in the global merchant fleet, about 16,500 seafarers, or 1 per cent, were women (Baltic and International Maritime Council, 2015). In particular, 0.4 per cent of ratings and rating trainees, 0.7 per cent of officers and 6.9 per cent of officer trainees were women. The latter number suggests a likely increase in the number of women seafarers.

A survey conducted in 2016 by the Maritime HR Association indicates that the share of women in global onshore maritime employment strongly depends on the level of hierarchy. The share is largest in administrative positions (74 per cent of the provided data) and balanced in junior positions (55 per cent). The share decreases with regard to senior positions: Women occupy 37 per cent of professional-level positions and 17 per cent of manager-level positions. At the director level, 12 per cent of positions are filled by women, compared with 9 per cent at the executive level.

Women were most likely to be found in corporate support roles such as in human resources and finance. They were least likely to hold positions in ship management (9 per cent) (HR Consulting, 2016). A similar trend can be seen in national shipowner associations. For example, the International Chamber of Shipping found that only 6 per cent of national board members were women, 30 per cent at director or policymaking level and 86 per cent at support level (Orsel and Vaughan, 2015).

Combined with other factors, the lack of women in senior positions translates into a gender pay gap. While no global data are available, in the United Kingdom, there is a national average gender pay gap of 19 per cent. In comparison, the difference between the mean hourly rate of men and women employees in the maritime sector is significantly higher and translates to 39 per cent across the 26,000 employees covered by a survey of the Maritime HR Association (HR Consulting, 2017). When comparing pay by gender within job levels, the pay gap was at 8 per cent at the junior or professional level, increasing with seniority (Spinnaker Global, 2017).

Another dimension to be considered in this area are health-related issues. Owing to concerns that medical handbooks aimed at women seafarers might not take a gendered approach to health or might be outdated, the International Maritime Health Association and its partners conducted a survey on the health and welfare needs of women seafarers. According to the survey, the main health challenges were joint and back pain (particularly on passenger ships in catering and room services, less so on cargo ships), stress, depression, anxiety, obesity and heavy or painful menstrual periods. Some 55 per cent of the respondents linked their health problems to working conditions. About 40 per cent did not have access to a sanitary bin and 17 per cent considered sexual harassment to be a current challenge. In an earlier pilot survey when the question was not restricted to current experiences, 50 per cent stated that sexual harassment was a problem (International Maritime Health Association et al., 2015).

Based on a shortage in the supply of officers and the need to guarantee equal opportunity for all genders, Governments and industry should take measures to facilitate the uptake of women in shipping, ensure equal pay and improve retention rates. It is expected that the estimated shortage of 16,500 officers in 2015 will grow to 147,500 by 2025 (Baltic and International Maritime Council, 2015). Public and private sector initiatives can include targeted recruitment, support for employees with caring responsibilities (such as work arrangements to switch between vessel-based and shore-based positions), unconscious bias awareness training, mentoring, internal networks, talent pipelines and consistency in salary decisions (HR Consulting, 2017). Given the scarce data available on the topic, further research should be conducted to tailor instruments to the needs as fittingly as possible (Women's International Shipping and Trading Association, 2015). Organizations working on the issue should exchange information and collaborate to use resources as effectively as possible and raise awareness in industry and politics.

To improve the working and living conditions of women aboard shipping vessels, simple and low-cost interventions can help substantially. The production and distribution of gender-specific information on the aforementioned health problems can support their mitigation. A diversity charter signed by shipping companies and seafarer organizations can support the change of corporate cultures. Prevention and investigation of cases of sexual harassment and bullying aboard should be standard policy. Solutions for the disposal of sanitary waste on all ships and availability of women-specific products in port shops and welfare centres should be ensured (ILO, 2016; International Maritime Health Association et al., 2015; Orsel and Vaughan, 2015). Furthermore, gender-blind measures such as rejoining and long-service incentives, an open-door policy in company culture, better accommodation aboard and facilitated communication between seafarers and their families can help improve retention rates (Women's International Shipping and Trading Association, 2015).

3. The future of liquefied natural gas fuel

Liquefied natural gas carriers are the vessel type with the highest growth rate in deadweight tonnage (table 2.1), and liquefied natural gas as shipping fuel is experiencing growth as well. This trend is developing in a context of tightening environmental policies. For example, at the seventieth session of the Marine Environment Protection Committee, IMO members decided in its resolution MEPC.280(70) of 28 October 2016 that a 0.5 per cent mass/mass limit on sulphur fuel content in global marine traffic would go into effect in 2020.

Since 2015, even stricter regulations have been in place in the emission control areas encompassing the North American coasts and the United States Caribbean: The sulphur fuel content is limited to 0.1 per cent; comparatively low limits apply as well for the emission of nitrogen oxides (NO_x) and fine particulate matter (United States Environmental Protection Agency, 2010). The 0.1 per cent sulphur cap also exists in the North Sea and Baltic Sea sulphur emission control areas, and their regulatory scope will be extended to nitrous oxides as of 2021, in line with the decision of the seventy-first session of the Marine Environment Protection Committee in July 2017 (Danish Maritime Authority, 2017). Also, greenhouse gas emission regulation is gaining support in the maritime sector: the Committee at its seventy-first session adopted a mandatory data collection system for fuel consumption of ships, which will provide the basis for the comprehensive IMO strategy on greenhouse gas emission reduction scheduled for adoption in 2018 (European Commission, 2016). Other steps are being taken in that direction; for example, the European Union announced that maritime transport would be included in the European Union Emission Trading System as of 2023 if the IMO has not implemented a greenhouse gas reduction scheme by 2021 (*Täglicher Hafenbericht*, 2017). National administrations and ports are offering additional incentives to reduce emissions (European Commission, 2017). An example is the Swedish system for fairway dues, which calculates the fee according to the sulphur content of the fuel used by ships calling in Swedish ports (Swedish Maritime Administration, 2010).

In this context, local emissions can be reduced by using liquefied natural gas as a fuel, or, alternatively, a combination of other measures. For example, low-sulphur oil-based fuels, catalysts, particulate filters, scrubbers or exhaust gas recycling can also be used to this end. Depending on the circumstances, liquefied natural gas can be the more cost-efficient option and potentially reduce greenhouse gas emissions as well, contingent on the applicable well-to-wake pathway (Bureau Veritas, 2017; European Union, 2016). In addition, factors such as new regulatory requirements, an increasingly buyer-dominated liquefied natural gas market (*Shipping and Finance*, 2016; Lloyd's List, 2017) and technological progress, the fleet of vessels capable of using liquefied natural gas as fuel has increased.

While the percentage of liquefied natural gas-capable[3] newbuildings (measured in gross tons) was relatively steady at about 2 per cent from 2002 to 2013, it rose to 5.8 per cent in 2014, 4.3 per cent in 2015 and 5.3 per cent in 2016. The trend becomes particularly evident when considering the order book. While a slight increase is expected in 2017 (to 5.7 per cent), 13.5 per cent of the gross tonnage currently on order for delivery in 2018 onwards are from liquefied natural gas-capable ships (table 2.11 and figure 2.8).

As of 1 January 2017, gross tonnage had been distributed over a total of 325 liquefied natural gas-capable vessels delivered. Of these, 229 were liquefied natural gas carriers, 46 were offshore service and other cargo vessels, 39 were passenger vessels and 11 were other types of vessel. There were 110 liquefied natural gas-capable ships on order. In the category of liquefied-natural-gas-ready vessels – ships that are prepared for future liquefied natural gas retrofit – an additional 1,467,805 gross tons were in the fleet, and 3,708,483 gross tons were on order.

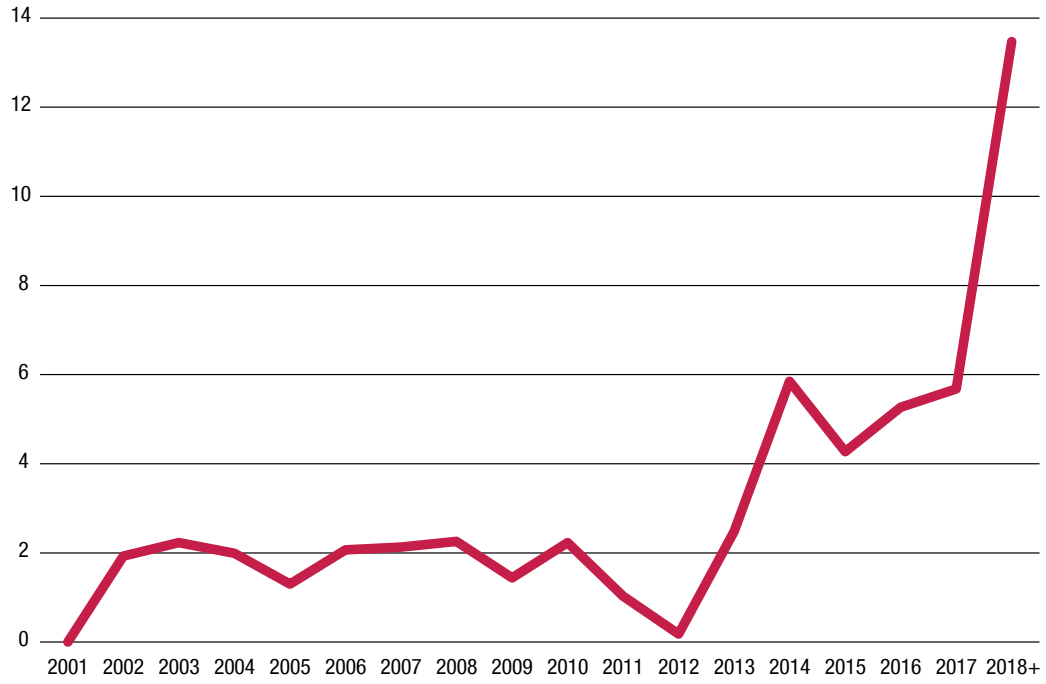
Table 2.11. Liquefied-natural-gas-capable newbuildings (Thousands of gross tons)

	Deliveries 2001–2016																Scheduled orderbook 2017–2018+	
Principal vessel type	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018+**
Oil tankers																	47	
Bulk carriers																		31
General cargo ships			131								4	3			23	30	57	
Container ships											11				34	34	17	149
Liquefied gas carriers		657	674	726	622	1 090	1 100	1 543	1 126	2 182	1 033	114	1 658	3 589	2 788	3 139	4 877	7 551
Chemical tankers						12	22									34	11	79
Offshore supply			10	94			87	6	6		5	31	5	120	19	9	18	169
Ferries and passenger ships						7	23		6	12	13	23	104	32	28	143	248	830
Other/not available																95	20	13
Subtotal built or on order		657	814	820	622	1 109	1 231	1 549	1 138	2 194	1 066	170	1 767	3 740	2 893	3 484	5 295	8 821
All other ships	31 267	33 412	35 662	40 395	47 059	52 454	56 623	67 060	77 878	96 298	102 684	96 444	69 414	60 178	64 862	62 598	87 936	56 669
Total gross tonnage built or on order	31 267	34 068	36 477	41 214	47 681	53 563	57 854	68 610	79 016	98 492	103 750	96 615	71 181	63 918	67 755	66 082	93 232	65 490
Share of liquefied natural gas-capable vessels (percentage)	0.00	1.93	2.23	1.99	1.30	2.07	2.13	2.26	1.44	2.23	1.03	0.18	2.48	5.85	4.27	5.27	5.68	13.47

Sources: UNCTAD secretariat calculations, based on data from Clarksons Research. Data on newbuildings are derived from the existing fleet and order book as of 1 January 2017.

Notes: Propelled seagoing vessels of 1,000 gross tons and above. For the period 2001–2016, information on the fuel type is not available for 6 per cent of the gross tonnage delivered. For 2017 and beyond, information on the fuel type is not available for 20 per cent of the gross tonnage on order.

Figure 2.8. Share of liquefied-natural-gas-capable newbuildings, as of 2001 (Percentage of gross tonnage)



Sources: UNCTAD secretariat calculations, based on data from Clarksons Research. Data on newbuildings are derived from the existing fleet and order book as of 1 January 2017.

Notes: Propelled seagoing vessels of 1,000 gross tons and above. For the period 2001–2016, information on the fuel type is not available for 6 per cent of the gross tonnage delivered. For 2017 and beyond, information on the fuel type is not available for 20 per cent of the gross tonnage on order.

The routing possibilities for liquefied natural gas-powered vessels are limited by the relatively small number of ports providing liquefied natural gas bunkering facilities. However, this number is increasing, particularly along the main shipping lanes (European Union, 2016; DNV GL, 2014). Within the European Union, the Alternative Fuels Infrastructure Directive (2014/94/EU) requires all maritime ports of the core Trans-European Transport Network to provide liquefied natural gas bunkering until 2025 and all inland ports of the Network until 2030 (European Union, 2014).

From a government perspective, besides the environmental advantages, liquefied natural gas helps to broaden the fuel and energy supply and thus reduce oil dependency. Liquefied natural gas and oil exporters are mostly not congruent (International Energy Agency and Organization for Economic Cooperation and Development, 2016; International Gas Union, 2016), which allows for risk diversification. For countries with sustainably available biomass, replacing natural gas to the desired extent with domestic biomethane is an additional possibility – there is no blend wall as is the case with oil-based fuels.

In their approach to market development, Governments should introduce liquefied natural gas bunkering demand and infrastructure supply in a coordinated initiative to overcome the dilemma of one party's unwillingness to invest without an investment commitment from the other parties concerned. Coordination between industries can thus be an effective key to unlocking private sector investment, which is particularly relevant for developing countries, given the high upfront investment cost for liquefied natural gas infrastructure.

A further component of liquefied natural gas market development policy can be the linkage to port operations, hinterland road and inland waterway traffic, where vehicles could be operated using liquefied natural gas or compressed natural gas (German Energy Agency, 2014). To make the use of liquefied natural gas a success, high standards in bunkering and ship operations are required to avoid methane slip and ensure safety. The new mandatory IMO International Code of Safety for Ships using Gases or Other Low-flashpoint Fuels, commonly known as the IGF Code, came into force on 1 January 2017. It details the specific operational requirements for liquefied natural gas as a fuel to minimize risks to ships, crews and the environment. It is accompanied by training requirements for seafarers and the new ISO standard 20519 for the safe bunkering of liquefied natural gas-fuelled ships (IMO, 2017; ISO, 2017).

F. OUTLOOK AND POLICY CONSIDERATIONS

After years of oversupply, the lower growth rates of the world fleet and the declining order book suggest that demand and supply will be more balanced in the medium term. The composition of the fleet is adjusting, albeit slowly, to market demands with newbuildings and ship scrapping of different vessel types.

Given that different countries participate in different maritime sectors, policymakers need to identify their countries' possible niches. Earlier issues of the *Review of Maritime Transport* discussed this topic and options for policymakers in more detail (UNCTAD, 2011). The latest data presented in this 2017 edition of the Review confirm continued concentration and specialization. At times, policymakers will need to make choices between either protecting jobs in national shipping businesses or striving to increase trade competitiveness by improving connectivity and reducing trade costs, as the latter may imply opening up markets to foreign shipping service providers. As discussed above, one way to enhance efficiency may be to make maritime cabotage regimes more flexible.

To meet not only the requirements of importers and exporters, but also the demands and expectations of society and political commitments, maritime businesses should constantly revise and adjust their ways of doing business. Shipping – both onshore and offshore – is traditionally a male-dominated sector. By promoting the employment of women, maritime businesses may not only help to overcome shortages in labour supply, but may also contribute to achieving key Sustainable Development Goals.

Achieving environmental sustainability, including in maritime transport, is an imperative of the 2030 Agenda for Sustainable Development. An important development worth highlighting in this respect is the growing importance of liquefied natural gas as an alternative fossil fuel. In 2016, liquefied natural gas carriers and other gas carriers recorded the highest growth in deadweight tonnage, reflecting growing liquefied natural gas trade flows. Promoting liquefied natural gas-powered ships can reduce costs and promote clean energy, and hence address climate-related Goals.

REFERENCES

Arduino G, Carrillo Murillo D and Parola F (2015). Refrigerated container versus bulk: Evidence from the banana cold chain, *Maritime Policy and Management*. 42(3):228–245. Available at http://www.tandfonline.com/doi/abs/10.1080/03088839.2013.851421 (accessed 14 September 2017).

Baltic and International Maritime Council (2015). *Manpower Report: The Global Supply and Demand for Seafarers in 2015*. Baltic and International Maritime Council and International Chamber of Shipping. London.

Bureau Veritas (2017). Will the new IMO regulations lead to other propulsion systems? Presentation by Gätjens HJ at the Propeller Club. Geneva. 27 April.

Danish Maritime Authority (2017). Summary of the seventy-first session of the Maritime Environment Protection Committee. 3–7 July. Available at http://bit.ly/2ulCPio (accessed 14 September 2017).

DNV GL (2014). Alternative fuels for shipping. DNV GL Strategic Research and Innovation Position Paper 1-2014.

European Commission (2016). 70th session of the Marine Environment Protection Committee (MEPC 70) at the International Maritime Organization (IMO). 28 October. Available at https://ec.europa.eu/transport/media/media-corner/70th-session-marine- environment-protection-committee-mepc-70-international_en (accessed 19 September 2017).

European Commission (2017). Study on differentiated port infrastructure charges to promote environmentally friendly maritime transport activities and sustainable transportation. Final report. Available at https://ec.europa.eu/transport/sites/transport/files/2017-06-differentiated-port-infrastructure-charges-report.pdf (accessed 14 September 2017).

European Union (2014). Directive 2014/94/EU of 22 October 2014 on the deployment of alternative fuels infrastructure.

European Union (2016). Alternative fuels for marine and inland waterways: An exploratory study. Joint Research Centre technical report EUR 27770 EN.

German Energy Agency (Deutsche Energie-Agentur) (2014). Liquefied Natural Gas and Renewable Methane in Heavy-Duty Road Transport: What It Can Deliver and How the Policy Framework Should Be Geared towards Market Entry. Druckerei Mahnert, Aschersleben.

HR Consulting (2016). Maritime HR Association – Gender Fact Sheet. Updated data provided by HR Consulting from Spinnaker Global on 30 August 2017.

HR Consulting (2017). Maritime HR Association – Gender Pay Breakfast. Presentation by S Hutley and H Watson, London. 21 February.

International Energy Agency and Organization for Economic Cooperation and Development (2016). *Key World Energy Statistics 2016*. Paris.

International Gas Union (2016). *2016 World Liquefied Natural Gas Report*. Fornebu, Norway.

ILO (2016). Overwhelming ILO support for the protection against harassment and bullying onboard ships, improved procedures concerning the maritime labour certificate and an electronic seafarer identity document. Maritime Labour Convention, 2006. News. 13 June.

International Maritime Health Association, International Seafarers' Welfare and Assistance Network, International Transport Workers' Federation and Seafarers Hospital Society (2015). Women Seafarers' Health and Welfare Survey. Available at http://seafarerswelfare.org/images/docs/women-seafarers-health-and-welfare-survey-.pdf (accessed 14 September).

IMO (2017). *IMO News Magazine*. Spring 2017. Available at https://issuu.com/imo-news/docs/imo_news_-_spring_issue_-_2017 (accessed 14 September 2107).

ISO (2017). New ISO standard for the safe bunkering of LNG [liquefied natural gas]-fuelled ships. 13 February 2017. Available at https://www.iso.org/news/2017/02/Ref2161.html (accessed 14 September 2017).

Lloyd's List (2017). Is this the tipping point for LNG [liquefied natural gas] fuel? The Intelligence. 2 May.

Orsel K and Vaughan C (2015). Employment of Women in the Maritime Industry. Presented at the International Shipping Conference of the International Chamber of Shipping. London. 9 September.

Shipping and Finance (2016). LNG [liquefied natural gas] supply glut to trigger delays and losses until 2020? April.

Spinnaker Global (2017). The gender pay gap in maritime. 28 February. Available at https://spinnaker-global.com/blog/1571_28-02-2017_the-gender-pay-gap-in-maritime (accessed 14 September 2017).

Swedish Maritime Administration (2010). The environmental differentiated fairway dues system. 20 May. Available at http://www.sjofartsverket.se/pages/1615/Fairway%20dues.pdf (accessed 14 September 2017).

Täglicher Hafenbericht (2017). Schifffahrt setzt auf Gruen. 28 April.

UNCTAD (2011). *Review of Maritime Transport 2011* (United Nations publication, Sales No. E.11.II.D.4, New York and Geneva).

United States Environmental Protection Agency (2010). Designation of North American emission control area to reduce emissions from ships. Regulatory announcement EPA-420-F-10-015. March.

Women's International Shipping and Trading Association (2015). Female Cadets Committee. Final report.

World Trade Organization and World Bank (2017). Integrated Trade Intelligence Portal Services database. Available at http://i-tip.wto.org/services/default.aspx (accessed 15 September 2017).

ENDNOTES

1. Data in this chapter concerning tonnage and number of ships in the world fleet was provided by Clarksons Research, London. Unless stated otherwise, the vessels covered in the UNCTAD analysis include all propelled seagoing merchant vessels of 100 gross tons and above, including offshore drillships and floating production, storage and offloading units. Military vessels, yachts, waterway vessels, fishing vessels and offshore fixed and mobile platforms and barges are not included. Data on fleet ownership only cover ships of 1,000 gross tons and above, as information on the true ownership of smaller ships is often not available. For more detailed data on the world fleet (registration, ownership, building and demolition), as well as other maritime statistics, see http://stats.unctad.org/Maritime (accessed 11 September 2017).
2. The aggregate fleet values published by Clarksons Research are calculated from estimates of the value of each vessel based on type, size and age. Values are estimated for all oil/product tankers, bulk carriers, combined carriers, container ships and gas carriers with reference to matrices based on representative newbuilding, second-hand and demolition values provided by Clarksons Platou brokers. For other vessel types, values are estimated with reference to individual valuations, recently reported sales and residual values calculated from reported newbuilding prices. As coverage concerning specialized and non-cargo vessels may not be complete, figures might not accurately represent the total value of the world merchant fleet above 100 gross tons. Desktop estimates are made on the basis of prompt charter-free delivery, as between a willing buyer and a willing seller for cash payment under normal commercial terms. For the purposes of this exercise, all vessels are assumed to be in good and seaworthy condition.
3. In accordance with Clarksons Research, the definition of liquefied-natural-gas-capable vessels used in this report are ships that can use liquefied natural gas either as a dedicated or supplementary fuel for the main engines.