Port performance and trade facilitation are integral to ensuring the efficiency of maritime transport. Recent port performance indicators and data indicate that world ports have, for the most part, fared well during the recent global supply chain crises and disruptions. They have embarked on a path of recovery, supported by policy reforms and digital innovations. In this context, facilitating maritime trade has been crucial for seamless and efficient maritime supply chains, including in ports and their hinterland connections. Trade facilitation generates efficiency gains and cost reductions in maritime trade procedures by streamlining and harmonizing regulatory procedures by border agencies involved in goods clearance at both ports and at hinterland borders.

4

PORT PERFORMANCE AND MARITIME TRADE AND TRANSPORT FACILITATION

A. PORT PERFORMANCE

1. Port calls and traffic recover from the pandemic crisis

Port calls over the last five years reflect the response of key shipping markets to the pandemic, the post-COVID-19 recovery, and the war in Ukraine. All shipping markets saw a steep decline during the first semester of 2020, and all have since recovered, albeit at different speeds.

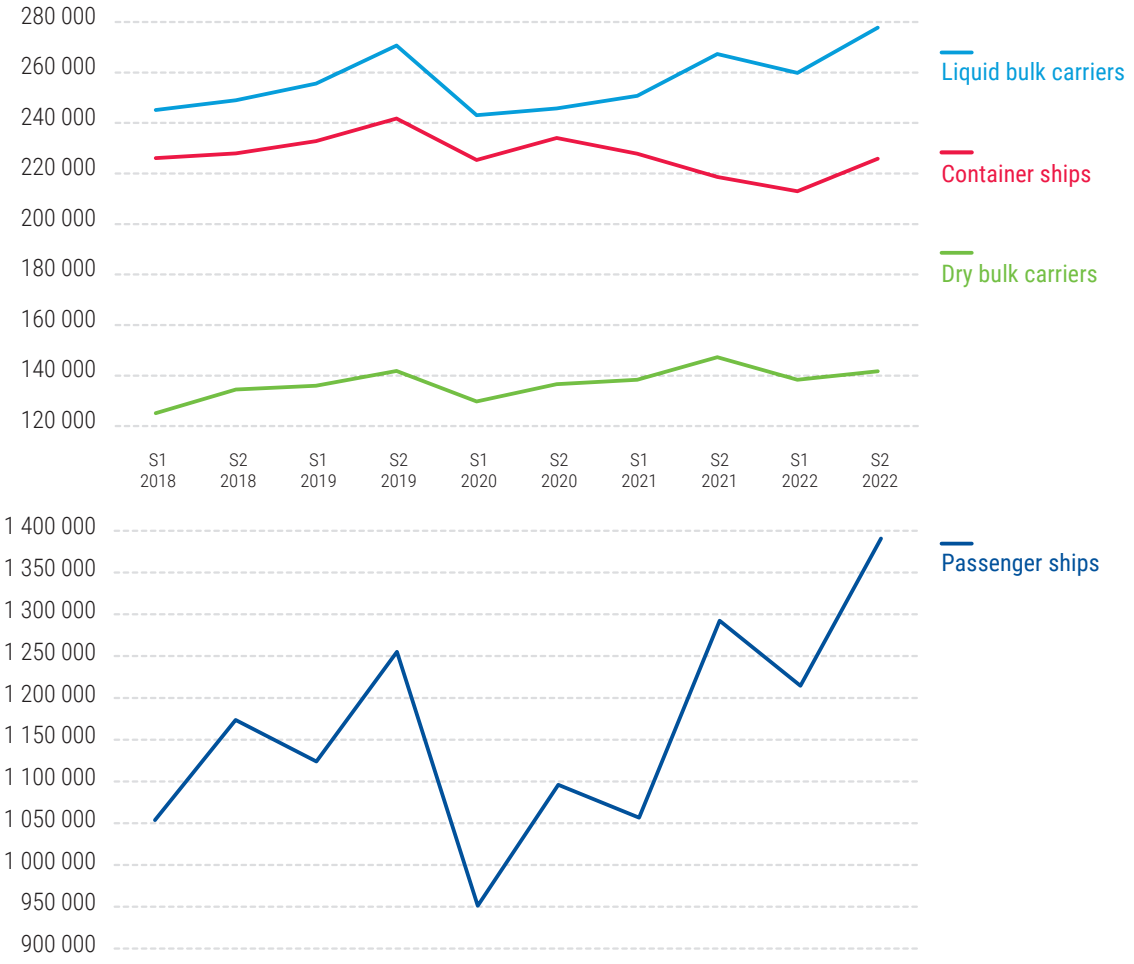
Recovery for container ships and bulk carriers was hampered, while tankers and passenger ship port calls surged beyond pre-COVID-19 levels

The number of port calls of container ships and dry bulk carriers, after observing a year-to-year drop in the first half of 2022, increased by 3.3 and 4.1 per cent respectively in the second half of 2022. However both segments were still below earlier peaks.

Liquid bulk carriers recorded steady growth of 3.9 per cent year-to-year to the second semester of 2022 and reached a historical high of almost 280,000 port calls per semester.

Port calls by passenger ships saw the most volatility. With the relaxing of the COVID-19 pandemic restrictions, port calls jumped by 15.0 and 7.6 per cent during the first and second semesters of 2022, respectively (figure 4.1).

Figure 4.1 Port calls per half year, world total, 2018–2022



Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1,000 GT and above. For the underlying data see http://stats.unctad.org/maritime.

Dry and liquid bulk carriers port calls follow different regional patterns

Port calls by liquid bulk carriers increased in all regions in 2022, with Africa and Latin America and the Caribbean recording more than a 5 per cent increase, while the slowest growth of 2.3 per cent was in Europe. Oceania took longer to start recovering from pandemic-induced disruptions and saw a 4 per cent increase in 2022.

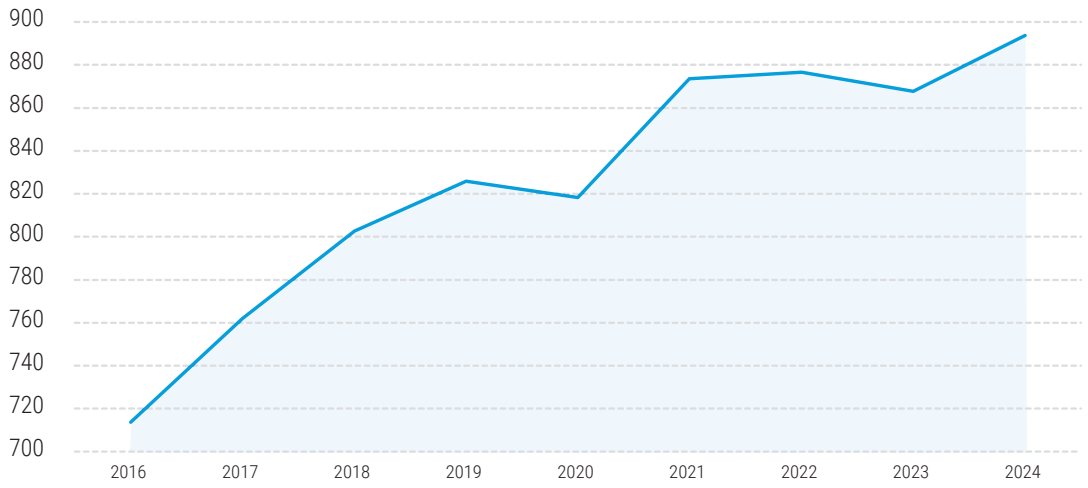
The situation was different for dry bulk carriers, with Africa being the only region to show an increase of 2.5 per cent in 2022. The highest drops of 2.8 and 1.9 per cent were observed in Asia and North America respectively.

Container throughput grows faster than port calls

Containership port calls continued a downward trend for most regions in 2022, with the highest annual drops in Europe (7.5 per cent), North America (5.4 per cent), and Latin America and the Caribbean (4.4 per cent). Oceania recorded growth of 2.4 per cent but is yet to recover from a steep decline in 2021.

As container ship and call sizes go up, in spite of a relatively stagnant trend in port calls (figure 4.1), the volume of containers loaded and unloaded saw a positive trend (figure 4.2). After a strong growth of 6.8 per cent in 2021 and a slight increase of 0.3 per cent in 2022, global container throughput is expected to decline by 1.0 per cent of container traffic in 2023. For 2024, the forecast is 3.0 per cent growth.

Figure 4.2 Container throughput, million 20-foot equivalent units, 2016–2024



Source: UNCTAD, based on Clarksons Research, Shipping Intelligence Network timeseries.

Note: Annual Clarksons Research estimates/projections. Data basis range of sources including World Bank, ports, and industry associations.

2. Liner shipping connectivity back to a growth trend

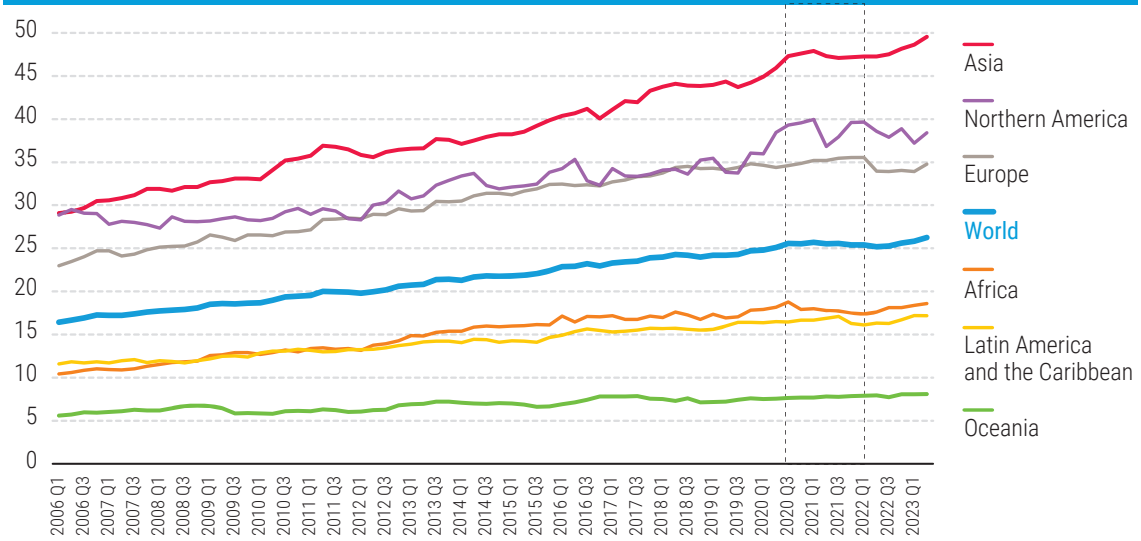
Positive global trends but a persistent connectivity divide

In the second quarter of 2023, the most-connected economies, as measured by the Liner Shipping Connectivity Index (LSCI) were in Asia, with China at the top, followed by the Republic of Korea, Singapore, and Malaysia (UNCTAD, 2023d). All these countries recorded a year-to-year increase in connectivity of between 3 and 5 per cent and reached record highs in their index values. The United States ranked fifth. Three of the four European countries featuring among the top 10 best connected countries, namely Spain, the Kingdom of the Netherlands, and Belgium, also showed an increase over this period, while the United Kingdom recorded a slight drop.

Most regions recovered well in terms of post-pandemic shipping connectivity and congestion-related disruptions. By the second quarter of 2023, regional averages for the LSCI in Asia, Latin America and the Caribbean, and Oceania reached record highs. Meanwhile, the average LSCI for Africa also increased, but remained below its pre-pandemic values. Contrarily, North America and Europe both recorded downward trends in their average LSCI in 2022, only recording a recovery in the second quarter of 2023 (figure 4.3).

These different trends in different regions reflect the shifts in demand and supply during and after the pandemic (see also chapter 1). Asia in particular has picked up container trade activity, including intraregional traffic. In Europe and North America on the other hand, there was a boom in demand and fleet deployment during the pandemic which was not sustained in the post-pandemic downturn. Africa lies in between, with neither a post-COVID-19 boom, nor a post-COVID-19 downturn.

Figure 4.3 Liner shipping connectivity index, world and regional average, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Index is based on 2006 Q1 = 100 in China as the highest value for this period. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages.

Small island developing states (SIDS), although showing some early signs of a rebound, are yet to return to pre-pandemic levels in terms of the LSCI. This is linked to a reduced number of direct calls. Starting from already low levels of connectivity, the LSCIs of African and Indian Ocean SIDS and Caribbean SIDS declined during the COVID-19 pandemic. Among the SIDS that had gained a position as a regional trans-shipment centre, Jamaica and the Dominican Republic have resumed long-term growth trajectories, while the Bahamas and Mauritius have not yet recovered from the decline experienced during the pandemic (figure 4.4).

Bigger ships and fewer companies – two sides of the same coin

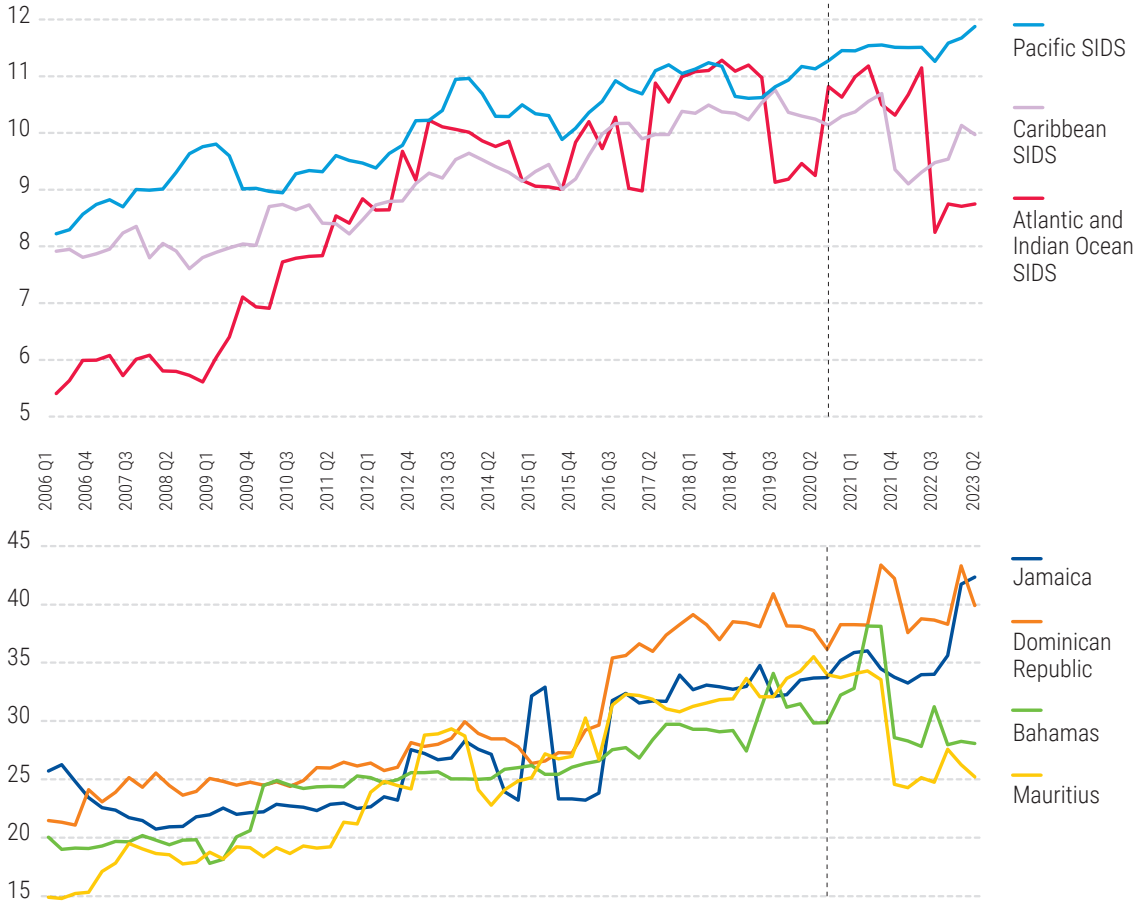
The LSCI is based on six components.[1] Figure 4.5 depicts the trend in two of them, notably the size of the largest ship (over all countries), and the number of companies providing services per country (average per country).

As container ships have increased in size, the number of companies providing services has trended downward. This trend seems to have been interrupted, or even reversed, over the past three years. Since the end of 2019, ship sizes have only minimally increased, and since mid-2022, liner shipping companies have been expanding into new markets with the average number of carriers providing services per country increasing.

With regards to ship sizes, the current maximum container ship sizes are comparable to the largest bulk carriers and tankers. Further increases in size would require significant investments in ports and channels, and in hinterland logistics. Further ship size increases may lead to dis-economies of scale. While there are container ships on the drawing board of around 28,000 20-foot equivalent units (TEU), it may well be that for the foreseeable future, ship sizes will not increase further.

As for the recent increase in the number of companies providing services to the average country, this is mostly linked to the expansion of networks within Asia. Soaring freight rates that prevailed in 2021 and early 2022 had encouraged smaller companies to enter or expand into new markets including trade to North America (see also chapter 2). However, although the number of carriers offering services from and to North America has since declined, it has surged in Asia (figure 4.6), notably in China, India, Qatar and Viet Nam.

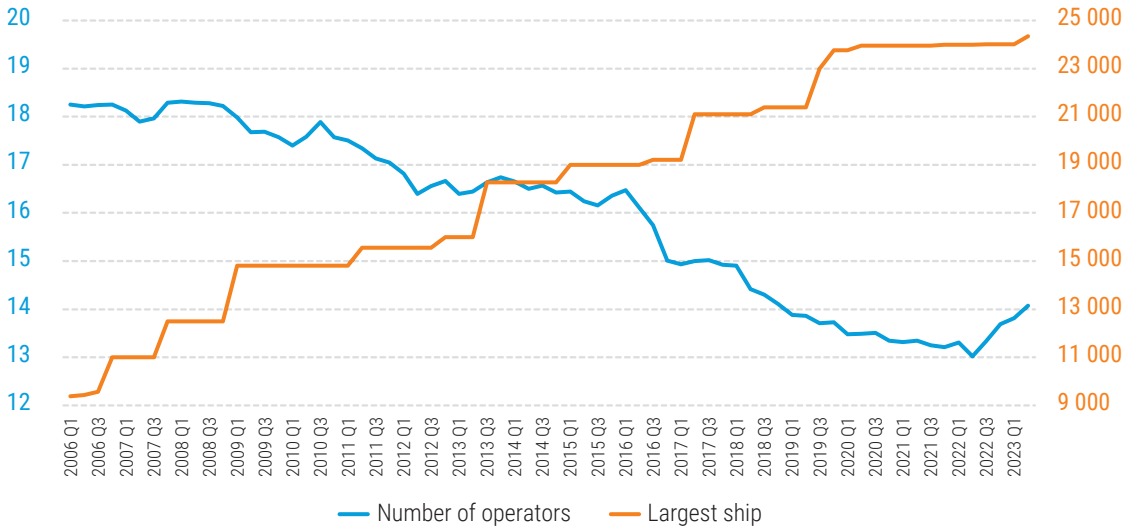
Figure 4.4 Liner shipping connectivity index, selected countries and groupings averages, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Index is based on 2006 Q1 = 100 in China as the highest value for this period. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages. "AIO SIDS" stands for African and Indian Ocean small island developing States.

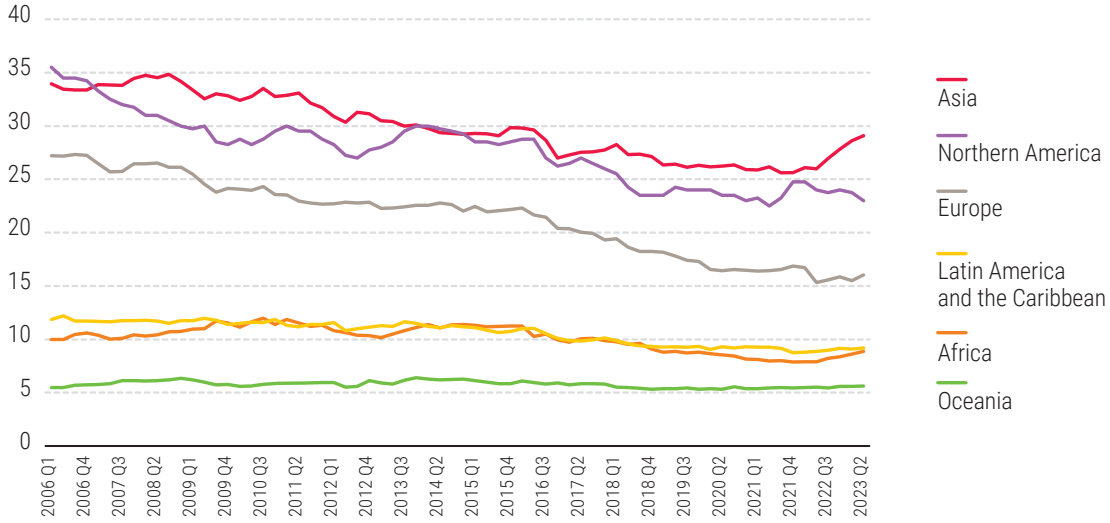
Figure 4.5 Number of operators and largest ships, average per country, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Average number of operators is calculated from the country data. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages. Largest ship reflects the largest ship being serviced globally.

Figure 4.6 Average number of operators, regional average, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

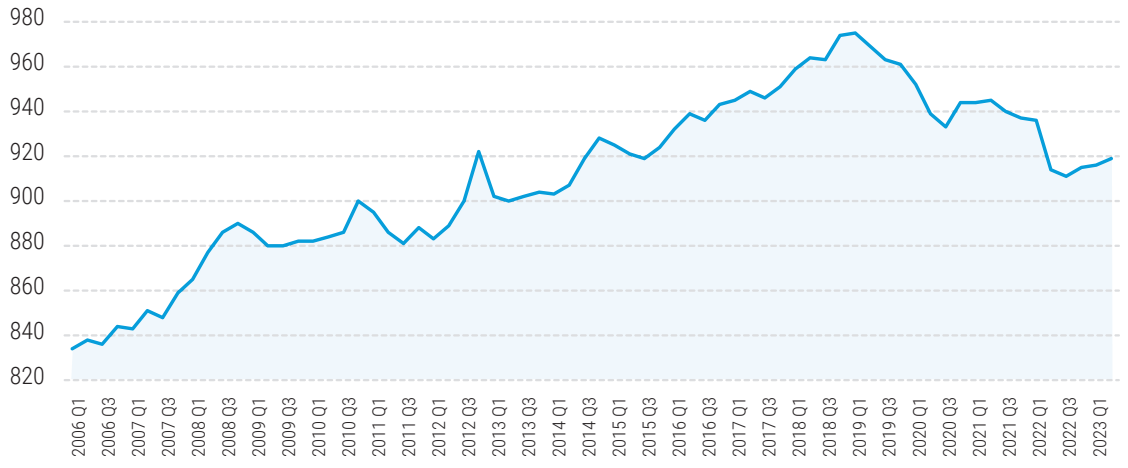
Note: Average number of operators is calculated from the country data. For countries with no liner shipping connections, their values are assumed to be zero. Countries with no liner shipping connections for the entire period are excluded from the averages.

Possible return to global liner shipping network growth

After decades of growth, the number of active container ports in the global liner shipping network had been decreasing since early 2019, with significant drops recorded in the second quarter of 2020, including in response to pandemic restrictions. The second quarter of 2022 also saw decreases, linked to the war in Ukraine.

Most recently, however, the number of container ports included in the global network has increased again, from 911 to 919 between the second quarters of 2022 and 2023. When looking at the number of active container ports in different regions, Asia has recorded the strongest growth over the last years, while Europe and North America have seen declines (figures 4.7 and 4.8).

Figure 4.7 Number of active container ports, world total, 2006 Q1–2023 Q2



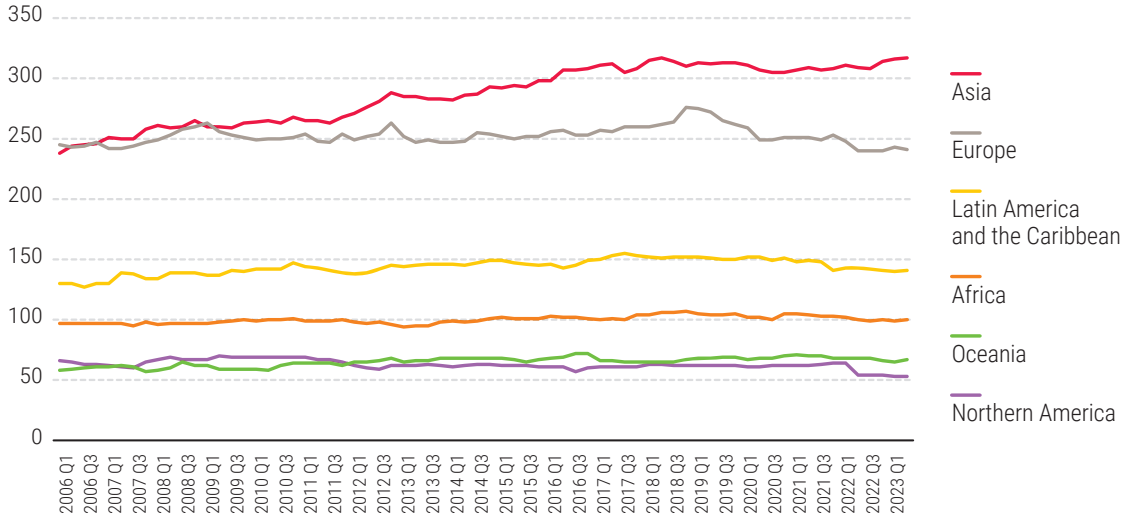
Source: UNCTAD, based on data provided by MDS Transmodal.

3. Asian countries continue to lead in cargo handling performance

Asian container ports excel

The Container Port Performance Index (CPPI) is produced jointly by the World Bank and S&P Global Market Intelligence. It is based on available data pertaining to the time a vessel spends in port, combined

Figure 4.8 Number of active container ports, regional totals, 2006 Q1–2023 Q2



Source: UNCTAD, based on data provided by MDS Transmodal.

with container handling; it should be interpreted as an indicative measure of waterside container port performance (World Bank, 2023a). Amongst the top 25 ports globally, 18 are in Asia, including 11 in Eastern Asia and four in Western Asia (table 4.1).

Table 4.1 Top 25 ports under the Container Port Performance Index 2022

Port name	Country	2022 rank	Index points	2021 rank	Change
Yangshan	China	1	215.0	4	3
Salalah	Oman	2	212.3	2	0
Khalifa Port	United Arab Emirates	3	199.5	5	2
Cartagena	Colombia	4	197.5	12	8
Tanger-Mediterranean	Morocco	5	193.5	6	1
Tanjung Pelepas	Malaysia	6	188.2	18	12
Ningbo	China	7	184.5	7	0
Hamad Port	Qatar	8	182.6	3	-5
Guangzhou	China	9	181.2	9	0
Honk Kong, China	Hong Kong, China	10	178.1	50	40
Port Said	Egypt	11	177.3	15	4
Yokohama	Japan	12	171.5	10	-2
Cai Mep	Viet Nam	13	170.8	13	0
Shekou	China	14	169.5	16	2
Mawan	China	15	166.3	44	29
King Abdullah Port	Saudi Arabia	16	165.1	1	-15
Posorja	Ecuador	17	163.9	66	49
Algeciras	Spain	18	162.0	11	-7
Singapore	Singapore	19	157.5	31	12
Buenaventura	Colombia	20	149.8	20	0
Yeosu	Republic of Korea	21	149.6	33	12
Busan	Republic of Korea	22	148.6	25	3
Chiwan	China	23	147.6	17	-6
Djibouti	Djibouti	24	145.9	19	-5
Tianjin	China	25	145.8	27	2

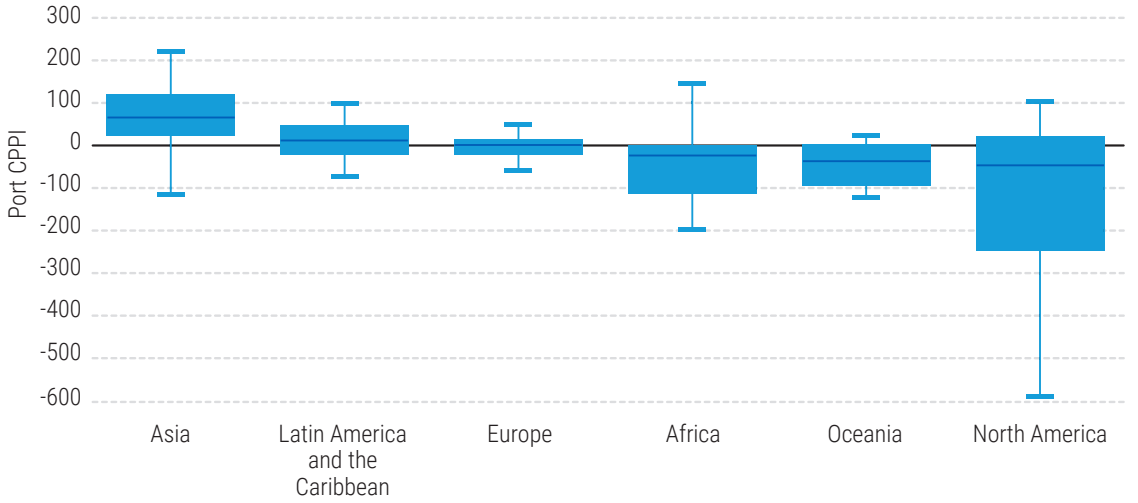
Source: World Bank and S&P Global Port Performance Program.

Note: Ranked by the Administrative Approach scores.

Asian ports dominate the global ranking, with a median index value of +53.6. This is followed by Latin America and the Caribbean (median index of +12.0), Africa (-27.3), Oceania (-33.1), and North America (-42.6) (figure 4.9).

The CPPI reflects a port's capacity to handle containers for export, import and trans-shipment. The top performers on the index are the ports of Yangshan, China, and the port of Salalah, Oman. Both ports have invested in trans-shipment operations, have developed automation and enhanced the interoperability of their systems among border agencies and logistics operators. This investment illustrates the positive relation between the business environment, port facilities, and port performance, ultimately leading to greater efficiency and shorter port calls.

Figure 4.9 Container Port Performance Index values 2022, ports' regional distributions



Source: World Bank and S&P Global Port Performance Program.

Note: Ranked by the Administrative Approach scores. The middle line represents the median, the top and bottom lines of the boxes represent the first and third quartile, and the top and the bottom lines (the whiskers) represent the minimum and the maximum values (excluding outliers).

Trans-shipment does not normally involve customs clearance, hence it leads to reduced dwell times at port compared to export and import operations, which require regulatory interventions of border agencies and often necessitate additional container movements inside the port. A port's specialization in import, export, or trans-shipment operations explains some of the differences in the CPPI rankings. The ports at the bottom of the CPPI list mainly focus on imports.

Box 4.1 discusses developments in the Arab region, home to ports specializing in trans-shipment, notably King Abdullah Port in Saudi Arabia, Port Salalah in Oman, Hamad Port in Qatar, and Khalifa Port in Abu Dhabi, that record the highest indices.

Box 4.1 Container port efficiency in the Arab region

Arab countries are striving to position themselves as hubs for international trade and take advantage of the strategic location of the region, which sits astride three continents. To reach this goal, countries in the region have invested extensively in building ports and facilities, to gain a competitive edge. Current port development plans show a strong desire to expand capacities. The plans also aim to improve current infrastructure usage and modernize port operations through streamlined procedures and automation, among other changes.

Ports in the region secured four of the top five positions on the Container Port Performance Index (CPPI) of 2021.[2] King Abdullah Port in Saudi Arabia, Port Salalah in Oman, Hamad Port in Qatar, and Khalifa Port in Abu Dhabi make up the top four regional ports.

Key port performance metrics reveal significant differences in global port efficiency in 2021, with top performers like King Abdullah Port averaging 97 container moves per hour compared to just 26 container moves per hour at the major ports on the West Coast of North America.[3]

Box 4.1 Container port efficiency in the Arab region *(cont.)*

In 2022, only three ports—Salalah, Khalifa, and Tanger-Med—were able to maintain spots in the top five positions as regards the CPPI, with Hamad Port dropping to 8th and King Abdullah Port to 17th. The Tanger Med port strengthened its position as an important port in the Mediterranean in 2022 by handling 7.5 million containers, an increase of 6 per cent from 2021, owing to its increased role as hub for African trade. An estimated 35 per cent of African trade with the rest of the world is currently transiting Tanger Med, which is connected to about 40 African ports.[4]

It is critical to consider that the closer ports come to reaching their full capacity, the slower the container moves become. In 2022, container throughput in Salalah Port reached 4.5 million TEUs, below its capacity of 5 million TEUs yearly. Port efficiency is really tested when large container volumes are handled yearly, and ports still manage to secure top places. For example, Shanghai Port is considered to be the world's largest container port, exceeding 47.4 million TEUs,[5] with one of its most efficient terminals handling almost 22.9 million TEUs (Yangshan), ranked as the most efficient port in 2022. The port managed to reduce ship waiting time by a sizeable three hours per call in 2022 compared with 2021, and berth hours also improved over most call size ranges.[6]

At country level, only Morocco and the United Arab Emirates have secured positions in the top countries for vessel turnaround time in 2021. Morocco registered a median vessel turnaround time of .76 days while the United Arab Emirates registered a median of 1 day compared to .36 days for Japan, the best performer.[7] The two countries are also leading the region in terms of their scores in the LSCI of 2022 with the United Arab Emirates ranked 1st regionally and Morocco 2nd, while the Kingdom of Saudi Arabia ranks 3rd followed by Egypt and Oman.

Trade facilitation implementation is an important factor for reducing total time spent at ports, not only for time spent loading and unloading vessels but also the time of clearing goods and turnaround times for trucks inside the port, which could nullify the gain from reducing vessel turnaround times.

Reducing waiting times for vessels and trucks in ports not only saves time and money, thus reducing trade costs, but also contributes to reducing CO_2 emissions produced by vessels while waiting at ports.

Source: UN-ESCWA.

Table 4.2 presents port performance measured in minutes per container move at the country level.[8] Among the top 25 countries by port calls, the more containers are moved per port call (i.e., the bigger the call size), the faster the loading and unloading. For call sizes of 4001 moves and above, it takes on average less than one minute to load or unload per container. The underlying reason is the deployment of more port cranes per ship, which allows for parallel operations. Larger port calls also tend to involve the use of more automation across cranes and yards.

Hong Kong, China, was the fastest across five categories of call sizes. It was followed by Japan, the United Arab Emirates and Viet Nam, which recorded the fastest container handling speeds in three categories each. Malaysia and Viet Nam reached top speeds in two categories, and China, India, the Republic of Korea, Türkiye and Taiwan Province of China recorded top speeds in one call size category each.

Table 4.2 Minutes per container move, 2022, by range of call size, top 25 countries by port calls

Country	<500	501–1000	1001–1500	1501–2000	2001–2500	2501–3000	3001–4000	4001–6000	>6000
China	3.7	2.2	1.5	1.1	0.9	0.8	0.7	0.5	0.4
United States	3.7	2.6	2.4	2.2	2.1	2.0	2.2	1.9	1.2
Singapore	3.5	1.9	1.3	1.0	0.9	0.8	0.6	0.5	0.4
Republic of Korea	2.5	1.7	1.2	0.9	0.8	0.8	0.7	0.6	0.5
Malaysia	3.6	2.0	1.4	1.1	0.9	0.8	0.6	0.5	0.4
Brazil	3.3	2.2	1.6	1.4	1.2	1.1	1.0	0.7	-
Spain	3.7	2.2	1.5	1.1	1.0	0.8	0.8	0.8	0.7
Germany	4.4	2.5	1.8	1.7	1.4	1.4	1.3	1.3	1.2
Belgium	3.7	2.2	1.5	1.3	1.1	1.0	1.0	0.9	0.8
Honk Kong, China	2.8	1.7	1.2	0.9	0.7	0.7	0.6	0.5	0.3

Table 4.2 Minutes per container move, 2022, by range of call size, top 25 countries by port calls *(cont.)*

Country	<500	501–1000	1001–1500	1501–2000	2001–2500	2501–3000	3001–4000	4001–6000	>6000
United Arab Emirates	4.2	2.0	1.3	0.9	0.8	0.7	0.7	0.5	0.5
Japan	2.2	1.4	1.1	1.0	0.9	0.8	0.8	0.6	-
Kingdom of the Netherlands	6.6	3.2	2.1	1.8	1.5	1.5	1.1	0.9	0.8
United Kingdom	4.0	2.5	1.9	1.6	1.9	1.4	1.3	1.1	0.8
Panama	3.5	2.3	1.6	1.3	1.1	1.0	0.9	1.4	1.7
Türkiye	3.8	2.6	1.8	1.4	1.4	1.3	1.2	0.8	0.2
Taiwan Province of China	3.3	2.0	1.3	1.0	0.9	0.7	0.7	0.7	0.8
Australia	3.8	2.9	2.3	1.9	1.7	1.5	1.3	1.2	1.4
India	2.8	1.7	1.2	0.9	0.8	0.8	0.7	0.6	-
Italy	4.1	3.1	2.1	1.7	1.8	1.8	1.7	1.6	1.4
Viet Nam	2.6	1.7	1.4	1.0	0.7	0.7	0.6	0.6	0.5
France	3.5	2.8	2.0	1.9	1.8	1.9	1.5	1.1	1.1
Thailand	2.6	2.5	1.3	1.0	0.9	0.8	0.7	0.7	0.6
Indonesia	3.6	2.3	1.8	1.4	1.2	1.1	0.9	0.8	-
Philippines	5.8	5.2	3.9	3.8	2.4	1.6	1.6	-	-
Average	**3.7**	**2.4**	**1.7**	**1.4**	**1.2**	**1.1**	**1.0**	**0.9**	**0.8**
Per cent change from 2021	**1.8**	**4.8**	**4.7**	**6.0**	**3.4**	**5.7**	**3.7**	**5.1**	**1.3**

Source: S&P Global Port Performance Program.

Improvements in the performance of bulk shipping

Integrating Automatic Identification System (AIS) data on ship movements with information about cargo transfers generates performance indicators for dry and liquid bulk cargo. Table 4.3 summarizes cargo and vessel handling performance of bulk carriers for the top 30 countries in terms of ship arrivals.

Australia recorded the highest average loading speed, at 48 tons per minute, while Oman was fastest when it comes to unloading dry bulk cargo, at 34 tons per minute. All four indicators covered in the table saw improvements over the last year, i.e. average loading and unloading speeds increased, while average waiting times decreased. This reflects a combination of long-term technological progress and a recovery from pandemic disruptions.

Table 4.3 Cargo and vessel handling performance for dry bulk carriers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022

Country	Ton per minute (loading)		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
China	22.5	17.3	28.3	14.6	61.5	-20.8	39.0	-19.1
Australia	48.4	2.6	10.4	6.3	105.7	-9.2	53.1	-8.7
United States	15.1	1.8	9.2	-3.8	91.1	-17.9	41.6	-30.0
Brazil	23.7	-2.9	9.9	1.2	217.9	16.8	98.8	-35.1
Russian Federation	12.8	-2.4	4.4	15.7	45.1	-7.5	28.6	-75.9
Canada	17.2	1.9	7.0	-27.6	107.3	1.7	35.5	-37.5
Argentina	16.3	-27.3	8.1	-6.8	36.0	-5.5	23.8	-0.1
Indonesia	17.7	2.9	11.3	1.0	76.2	-5.5	54.2	22.8
South Africa	16.6	3.0	9.2	8.6	98.9	-24.4	55.1	-31.8

Table 4.3 Cargo and vessel handling performance for dry bulk carriers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022 *(cont.)*

Country	Ton per minute (loading)"		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
India	17.5	17.0	20.7	10.7	55.2	-19.5	35.3	-30.8
Japan	7.9	0.1	19.3	5.0	37.5	4.9	36.5	-8.8
Viet Nam	8.6	2.7	14.1	10.6	71.6	43.8	27.7	-27.4
United Arab Emirates	21.3	10.0	11.7	14.7	35.5	-1.3	27.4	23.1
Republic of Korea	9.8	-0.1	14.7	2.4	32.4	-9.9	72.9	1.2
New Zealand	9.6	1.4	7.5	1.4	68.8	-1.6	44.4	47.0
Chile	15.4	14.1	10.0	12.1	88.3	5.9	124.3	-2.3
Norway	24.6	-2.0	6.3	-2.3	56.0	-31.1	80.9	28.7
Ukraine	7.7	102.8	1.0	-84.0	10.8	-65.3	1.0	-97.2
Türkiye	7.7	9.0	9.0	0.7	46.1	-21.0	64.5	4.8
Colombia	22.6	0.8	8.7	29.5	40.9	-55.1	31.5	-27.6
Oman	15.5	0.7	33.6	37.4	45.9	-29.8	36.7	-56.4
Romania	6.4	-18.4	7.2	-19.2	95.1	30.1	41.0	-28.1
Peru	31.2	8.4	11.9	20.3	95.2	14.5	41.3	-36.0
Saudi Arabia	9.4	12.8	7.1	27.1	57.3	-8.9	58.3	-14.9
France	10.2	-3.2	8.1	-23.3	46.8	10.4	58.9	-6.4
Malaysia	9.9	-0.5	11.2	-3.1	48.6	-28.8	53.0	-48.8
Mozambique	13.8	-19.5	7.0	13.2	171.8	22.4	154.4	-20.5
Spain	15.3	11.0	10.1	-0.1	61.2	12.2	42.3	-23.8
Taiwan Province of China	9.9	-6.1	15.0	-6.1	27.3	-11.3	65.8	20.2
Germany	9.0	23.3	19.0	29.0	46.5	-32.3	45.9	-19.5
Average	**15.8**	**5.4**	**11.7**	**2.8**	**69.3**	**-8.1**	**52.5**	**-18.0**

Source: UNCTAD, based on data provided by VesselsValue (http://vesselsvalue.com/).

Note: Ranked by number of dry bulk carrier arrivals for loading. Data for ton per minute calculated as total dead weight tons per total time in minutes for loading/discharging. The data for 2023 is the average from January 2023–April 2023.

Table 4.4 presents tanker cargo and vessel handling performance for the top 30 countries in terms of ship arrivals. Here again, cargo handling performance improved for both loading and discharge. Similarly to dry bulk carriers, tankers observed improved average waiting times for loading, but the average increased for discharge, mainly due to significant increases in Qatar (six-fold) and Angola (two-fold), resulting from tanker port congestion in these two countries in 2022. The fastest loading times are recorded for Angola, at 98 tons per minute, while Kuwait had the fastest unloading times, at 169 tons per minute.

Table 4.4 Cargo and vessel handling performance for tankers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022

Country	Ton per minute (loading)		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
United States	26.4	6.6	32.9	0.9	49.1	0.8	56.2	-1.0
Russian Federation	38.1	1.9	28.2	20.7	31.5	-19.1	36.4	25.0
Saudi Arabia	77.3	0.4	26.5	4.1	37.7	1.3	49.7	16.6

Table 4.4 Cargo and vessel handling performance for tankers, top 30 economies by vessel arrivals, average values for the first four months of 2023 and changes from 2022 *(cont.)*

Country	Ton per minute (loading)		Ton per minute (discharge)		Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023	2023	% change from 2022 to 2023
Brazil	54.5	-4.5	31.1	3.1	38.9	-12.1	72.9	-1.3
China	28.0	13.1	45.0	3.0	37.9	-10.3	56.3	-18.5
United Arab Emirates	67.2	1.0	25.1	-8.9	49.3	-20.8	51.8	-49.1
India	32.5	26.1	50.1	-0.9	41.5	-19.8	45.2	-20.5
Republic of Korea	27.4	-1.1	79.2	9.9	47.0	-14.8	37.8	-10.8
Malaysia	27.8	1.2	37.3	1.9	48.0	-12.7	48.6	-17.9
Singapore	30.2	6.7	38.9	-4.1	44.2	0.3	30.1	-34.3
Indonesia	17.8	9.8	25.3	-3.2	44.8	-7.6	41.7	-2.2
Mexico	25.2	-1.5	21.2	-2.5	84.5	14.5	89.3	-22.2
Italy	18.0	4.4	39.9	4.4	53.6	8.8	55.0	10.1
Kingdom of the Netherlands	18.1	22.4	35.9	18.7	61.7	2.5	49.8	0.1
Iraq	54.8	17.7	7.7	-16.6	34.8	-9.9	79.0	-24.6
Kuwait	87.3	7.4	169.3	282.2	32.8	-25.9	62.5	16.7
Türkiye	50.2	-1.3	27.8	-5.9	30.1	-11.8	56.5	45.0
Nigeria	42.8	9.2	8.0	-9.9	26.7	-16.5	79.2	-5.7
Norway	68.0	5.4	21.4	10.1	27.4	-28.3	32.0	-31.6
Canada	34.8	-7.8	49.1	7.7	35.8	3.4	57.0	-8.8
Egypt	69.5	17.7	57.4	27.0	27.0	-14.9	92.2	43.7
United Kingdom	39.9	11.7	33.4	26.6	44.8	-7.2	55.3	-2.3
Spain	13.4	-13.7	34.5	0.0	38.8	5.2	41.0	-10.4
Qatar	91.3	12.5	62.5	-4.3	23.4	4.3	58.2	492.4
Angola	97.7	-9.9	17.8	8.0	21.8	-17.2	40.7	106.6
Argentina	26.0	7.6	18.3	12.6	39.8	0.9	38.0	44.8
Oman	39.0	-1.5	20.4	142.2	44.1	-34.6	65.5	6.1
Libya	59.5	2.1	9.5	11.8	22.6	-6.3	111.6	20.6
Algeria	44.1	6.4	10.3	13.4	27.6	-21.9	19.6	-35.3
Belgium	11.0	7.9	15.8	8.2	53.5	19.0	32.3	-31.7
Average	**43.9**	**5.3**	**36.0**	**18.7**	**40.0**	**-8.4**	**54.7**	**16.7**

Source: UNCTAD, based on data provided by VesselsValue (http://vesselsvalue.com/).

Note: Ranked by number of dry bulk carrier arrivals for loading. Data for ton per minute calculated as a total dead weight tons per total time in minutes for loading/discharging. The data for 2023 is the average from January 2023–April 2023.

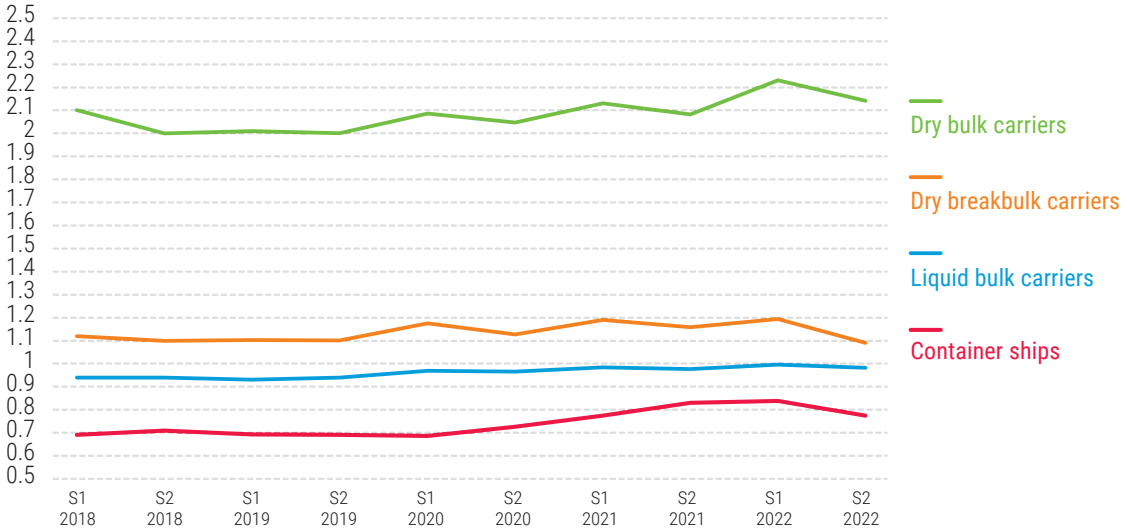
4. Time in port and congestion recovering from pandemic disruptions

Improved time in port since mid-2022

Over the years, the time that ships spend in ports has been slowly but steadily improving. However, during the COVID-19 pandemic, progress was lost, and all vessel types saw an increase in port times. As the pandemic and related disruptions fade, ship turnaround times improved in the second semester of 2022, albeit still remaining above pre-pandemic levels (figure 4.10).

A typical dry bulk carrier spends about three times longer in port than a container ship. Cargo tends to be less valuable, and speed is less important. Also, normally the full load tends to be loaded or unloaded, while a container ship calls at a series of ports and in each port only a portion of the cargo is loaded or unloaded.

Figure 4.10 Time in port, world median, in days, 2018 S1–2022 S2



Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1 000 GT and above.

Congestion reduced for containerships

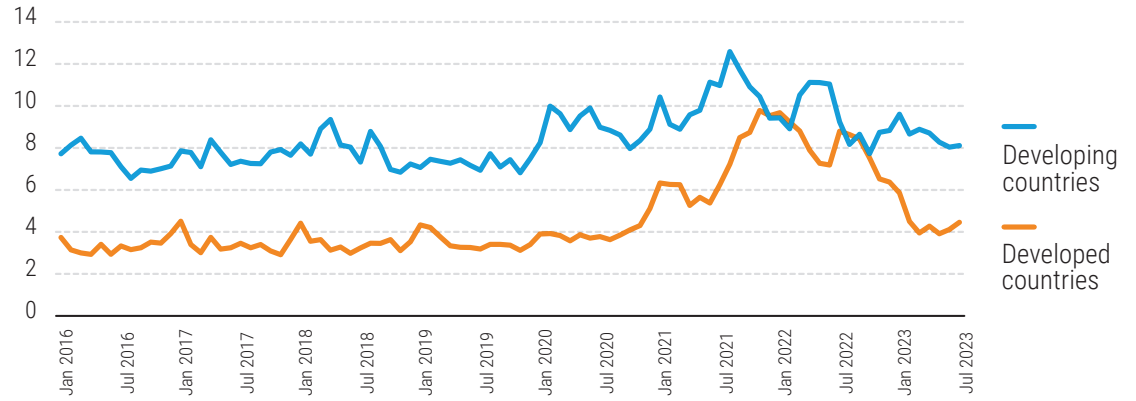
Vessel waiting times before tying up at a berth are an indicator of possible port congestion. Container ships tend to spend more time in port in developing countries than in developed countries (figure 4.11). These averages can be explained by a combination of faster clearance times, better infrastructure, and higher labour productivity. During the COVID-19 pandemic, however, waiting times surged in developed countries more than in developing countries, even exceeding those of the latter in early 2022. As demand for manufactured imports went up, especially during periods of lock-downs combined with economic stimulus packages, ports could not cope with the surge in volumes and experienced serious congestion, especially in North America and some European ports.

Figure 4.12 shows the fleet capacity held up at an anchorage or in port. This indictor can serve as a proxy to infer port productivity and congestion trends. From July 2022 to April 2023, the proportion of the global containership fleet capacity in port decreased from 37.1 per cent to 32 per cent. For bulk carriers, after a significant drop from 35.4 to 30.9 per cent between April and August 2022, the share of capacity in port slightly increased to 32.7 per cent in April 2023.

The share of the chemical tanker fleet capacity in ports remains at the elevated levels of about 46 per cent since late 2021, compared to an average of about 42 per cent before the outbreak of COVID-19. Chemical tanker congestion has gradually risen since the end of 2020, with increased congestion in East Asia and Europe as key drivers. Meanwhile, disruption from the war in Ukraine has driven up congestion in the Mediterranean and Black Sea. In Northwestern Europe, terminal capacity has struggled to accommodate the recent increase in shipments as land-borne Russian volumes have begun to be phased out.

Interestingly, the proportion of container ship and bulk carrier capacity in ports are comparable, even though container ships tend to benefit from faster cargo handling work. The reason for this is that container ships are faster at sea, normally with higher voyage speeds than bulk carriers, but they also call at a larger number of ports while providing a liner shipping service. Both vessel types saw a surge in the share of fleet capacity in port during the pandemic, and both saw an improvement since early 2022.

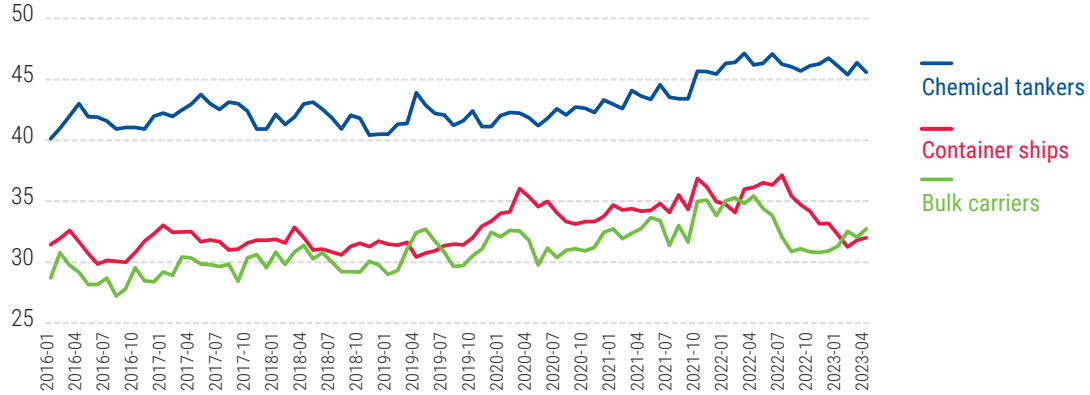
Figure 4.11 Average waiting times of container ships at port in hours, monthly, January 2016–July 2023



Source: UNCTAD, based on data provided by Clarksons Research.

Notes: Waiting time estimated based on the time between vessel first entering an anchorage associated with a port group (or port where vessel has not been seen in an anchorage shape), and first entering a berth within a port.

Figure 4.12 Per cent of fleet capacity at anchorage or in the port, by vessel type, January 2016–April 2023



Source: UNCTAD, based on Clarksons Research, Shipping Intelligence Network timeseries.

Note: Based on seven-days moving average. Data based on the proportion of vessels (in terms of dead weight tons) in the fleet in a defined port or anchorage location. Container ships of 8 000 TEU and above. Bulk carriers consist of Capesize and Panamax. Chemical tankers of 100 GT and above.

B. FACILITATING MARITIME TRADE AND TRANSPORT

1. Maritime trade facilitation and port performances

Progress made

While the year 2022 was challenging for maritime transport with congestion and long dwell times for goods moving through ports, the situation improved in early 2023 with a reduction in both congestion and release times.

The 2023 World Bank Logistics Performance Index (LPI), covering 2022 data, suggests robustness of the maritime supply chains with adaptability to the recent shocks (World Bank, 2023a). Yet major challenges remain in many ports, with significant dwell times offshore and while vessels are docked. Port time is still above pre-pandemic levels with a median time in port of 1.04 days for all ships in 2022. This contributes to the total time it takes for goods to be cleared before their release in the importing seaport.[9] These developments impact the efficiency of port performance and, therefore, global supply chains.

Among the ports which reduced the most the average arrival times[10] during 2021–2022, Dar es Salaam port comes first on the Container Port Performance Index (CPPI) 2022 (World Bank, 2023a). The improved performances of some African and Asian ports have benefited from expanding port capacity and upgrading technology, including investments in trade facilitation reforms. As an example, the government of United Republic of Tanzania has invested heavily in the Dar es Salaam port facilities. It improved clearance procedures with the goal of making the port the entry point of the Central Corridor and the route to Southern Africa. As a result, port performance has improved not only regarding container capacity but also the overall position of Dar es Salaam in maritime transport networks, with an increase on the LSCI of 50 per cent since 2006.

Trade facilitation most relevant for import cargo

Cargo traffic in seaports can be categorized into export, import, transit and trans-shipment operations. Border agencies are required to intervene to ensure compliance with the regulations and clearance of consignments, especially for imports, exports and transit, less so for trans-shipment.

According to the World Bank Logistics Performance Index 2023, export and import dwell time of container ports evolve similarly. However, more customs and compliance controls are linked to imports than exports. This means that dwell time is higher for imports due to border agencies needing to intervene to clear consignments. Import lead time was the highest driver of variability in international trade in 2022 (World Bank, 2023b).

2. Factors that impact port performance

Trade facilitation measures and port performance

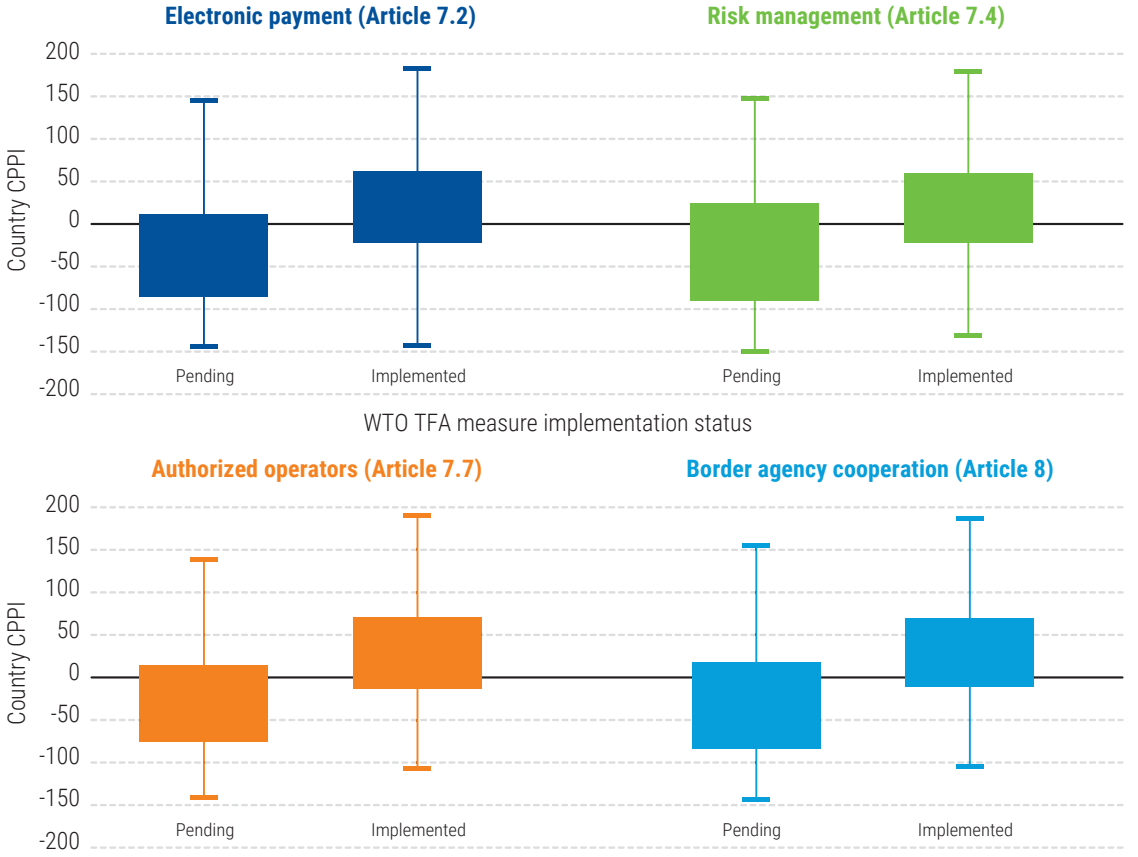
Delays occur when vessels, containers, or goods are not moving. The lack of movement points to inefficiencies in ports, including complexity regarding the administrative or institutional requirements for the clearance of goods. It is important to invest in digitalization and technology, which can help increase the predictability and reliability of global supply chains, to achieve greater clearance efficiency and reduce delays - a defining factor of port performance.

Looking into the connections between the CPPI and regulatory processes, figure 4.13 correlates the distributions of the CPPI by country according to their implementation status for selected measures under the WTO Agreement on Trade Facilitation. There are positive linkages for certain measures such as Electronic Payment (article 7.2), Risk management (article 7.4), Authorized Operators (article 7.7), and Border Agency Cooperation (article 8). Interestingly, these articles are also among the measures with the lowest implementation rate by least developed countries (LDCs) and developing countries.

Digital solutions and interoperability

Digitalization is key to port efficiency. Investing in new technology such as interactive data exchange, artificial intelligence and other new processes allows for increased efficiency and agility in global supply chains. This also relates to governments which invest in these systems to improve the efficiency of their regulatory procedures, thereby improving their trading environment and trade efficiency.

Figure 4.13 Country Container Port Performance Index values 2022 by implementation status of selected measures under the WTO Trade Facilitation Agreement



Source: UNCTAD, based on data from the Container Port Performance Index 2022 and the WTO Trade Facilitation Agreement Facility.

Note: Country grouping implementation status based on the WTO TFA articles. Distributions showing port efficiency according to the 2022 Container Port Performance Index of the World Bank and S&P Global using the Administrative Approach scores. The middle line represents the median, the top and bottom lines of the boxes represent the first and third quartile, and the top and the bottom lines (the whiskers) represent the minimum and the maximum values (excluding outliers).

The decision of IMO for compulsory Maritime electronic Single Windows (MSWs) from 1st January 2024 will further promote digital port infrastructure. This will increase the need for interoperability and coordination of port agencies while requiring the exchange of information.

Port efficiency is also based on predictability and reliability of data exchange linked to pre-arrival processing which allows for "just-in-time" arrivals at the port. By way of example, successful experiences in various ports of the United Arab Emirates in data exchange to better manage the flows of vessels arriving at ports show the benefits of investments in digital port systems and interconnectivity (AD Ports Group, 2023). Another example is Finland, where a digital platform with smartphone applications enables ships to view the current condition at ports and just-in-time arrival. Port community systems are another example of digital solutions that facilitate maritime trade and serve as platforms to coordinate stakeholders in a port community and enable seamless information exchange. By streamlining communication and automating data, they enhance efficiency, transparency, and security. The integration of port community systems with the port digitalization agenda can help in this regard (World Bank, 2023c).

The role of border agencies

Technology not only increases port efficiency and maritime supply chains but can enhance public-private collaboration and trust between partners. Thus, digitalization requires both political will and dedicated engagement from border agencies, in collaboration with the private sector, to build an organized ecosystem in which data flows are clearly identified and secured.

Customs and other border agencies are often identified among the underperforming stakeholders in the World Bank Logistics Performance Index, with at times extremely low scores, in particular in least developed countries. While trade facilitation is not the only factor impacting port performance, efficient and agile border agencies, including for instance their pre-arrival procedures for cargo and vessels, will positively impact the handling and flow of the consignment through the port and up to the goods' final destination. In this respect, the more digitalized and interconnected border agencies are, and the better public-private partnerships are integrated, the higher the port performance.

3. Trade facilitation and hinterland connectivity

Congestion frequently occurs both inside and outside seaports and hampers the flow of goods. Hinterland activities can be as important as port activities, especially for the international trade of Landlocked Developing Countries (LLDCs). The cost of hinterland transport is about 40 per cent of total container transport cost.

Elements such as corridors and dry ports, as well as efficient integrated border management and transit procedures are all important to create an efficient intermodal transport environment. In this regard, transit regimes can assist in lowering the time and costs of LLDC overseas trade. They also contribute to reducing port congestion if they help speed up the release of transit goods.

Transit trade benefits from mutually recognized regional or international transit regimes. Ideally, they are combined with transit guarantee, and digital solutions such as the SIGMAT solutions developed by UNCTAD, which establish interconnectivity between national customs management systems in West Africa. In addition, transit regimes should be combined with other harmonized trade and transport regimes accepted by customs administrations and other border agencies, to ensure that transit trade can be efficiently facilitated from the seaports to landlocked countries and other inland destinations.

A good example of an efficient regional transit solution is the East African Community (EAC), a Customs union, with two main corridors linking LLDC members to the Mombasa and Dar es Salaam ports. Policy reforms adopted by the EAC Partner States to implement a customs transit system, the Regional Electronic Cargo Tracking System (RECTS), One-Stop Border Posts (OSBPs) and setting up the institutional ecosystem on the Northern and Central Corridors have helped increase intraregional trade. They have also contributed to connecting the landlocked countries of Burundi, Rwanda and Uganda to regional and global supply chains. As a result, the time to move cargo from Mombasa to Kampala has been reduced from 18 days to three days, and from Mombasa to Kigali from 21 days to six days. The cost of transport from Mombasa to Nairobi has also been reduced by 56 per cent, by 26 per cent to Kampala (Uganda) and by 28 per cent to Kigali (Rwanda).

International standards are key to facilitating international intermodal connectivity. There is an important role for international bodies to develop such standards, and for countries to apply them. By way of example, standardizing the packing of intermodal shipping containers can be a practical way of facilitating intermodal transport (box 4.2).

Box 4.2 Code of Practice for Packing of Cargo Transport Units

Poor practices related to packing cargo in containers, in particular regarding load distribution and securing cargo, but also regarding classification and declaration of cargo, are estimated to cost the worldwide transport and logistics sector more than $6 billion every year. They can be the cause of incidents, in which people, whether supply chain workers or the general public, can be injured or lose their lives. Poor practices must therefore be eliminated, and the right code of practice should be applied for handling and packing containers and other cargo transport units for transport by sea and land.

Such is the Code of Practice for Packing of Cargo Transport Units (CTU Code), a joint publication of the International Maritime Organisation (IMO), the International Labour Organisation (ILO) and the United Nations Economic Commission for Europe (UNECE), which provides comprehensive information and references all aspects of loading and securing cargo in containers and other cargo transport units and takes into account the requirements of all sea and land transport modes.

The CTU Code applies to transport operations throughout the entire intermodal transport chain and provides guidance to those responsible for cargo packing and securing as well as to all parties involved in the supply chain.

Box 4.2 Code of Practice for Packing of Cargo Transport Units *(cont.)*

The CTU Code is currently being reviewed and updated, taking into account the latest developments in the freight transport sector. Updates are proposed to practices concerning issues such as transporting solid bulk cargos in cargo transport units, transporting liquids in flexitanks, blocking material and arrangements, package stability and bedding arrangements, as well as preventing pest contamination.

Further information about the UNECE Working Party on Intermodal Transport and Logistics is available under https://unece.org/transport/intermodal-transport.

Source: UN-ECE.

Another development towards improved hinterland connectivity lies in 'port regionalization' (Notteboom and Rodrigue, 2005). The concept describes the emergence of hub-and-spoke networks to help reduce the pressure on port terminals and facilitate border clearance. Spokes are the physical infrastructure, such as inland container terminals or dry ports that serve as extended gates of the seaport (hub) where consolidation and distribution of goods take place. The hub and spoke requires interdependency of public and private stakeholders, with clearly identified processes and regulatory frameworks, achieved by establishing Special Trade Regimes (STRs) and Export Processing Zones (EPZs).

4. Trade facilitation is essential to respond to new requirements emerging from environmental and climate policies

New legal requirements in relation to environmental protection will lead to additional needs for controls when importing goods. This could create new obstacles to trade if it leads to additional red tape. For instance, the Carbon Border Adjustments Mechanism (CBAM) is an instrument of the European Green Deal within the overall strategy to mobilize funding for all sectors related to climate change. As of 1 October 2023, the mechanism will be an import tariff on carbon-intensive goods from abroad paid by the importer when products enter the European Union.

The role of border agencies will be to report the carbon emissions verified by an accreditation authority in charge of issuing the CBAM certificate. The certificate is equivalent to one ton of carbon dioxide emissions. One administrative burden of the CBAM will be at certification level prior to the border crossing. As a result, these new carbon mechanisms will potentially change the trade facilitation process in terms of certification and compliance before customs clearance.

Finally, trade facilitation itself can help to lower emissions by reducing congestion and the use of paper. Consequently, climate-smart trade facilitation has emerged as a new relevant concept, reflecting the need for sustainable and green supply chains, in view of reducing carbon emissions.

C. LESSONS LEARNED FROM THE TRAINFORTRADE PORT MANAGEMENT PROGRAMME

1. Port performance trends and insights from the TrainForTrade programme

The UNCTAD TrainForTrade Port Management Programme helps ports deliver more efficient and competitive services, impacting port performance and efficiency. Since 2012, TrainForTrade's network members have completed an annual survey which collects data in a secure and confidential manner to produce a Port Performance Scorecard (PPS), enabling port managers to benchmark their performances and provide evidence for policy analysis at global, regional, and state levels. A total of 37 port entities contributed data from which the PPS derived 26 indicators under the following categories: finance, human resources, gender, vessel operations, cargo operations, and environment. The outcomes of these activities provide interesting insights that help inform this section of the Review (UNCTAD, 2023a, 2023b, and 2023c).

The ports in the survey are typically small and medium in size, with the median sized port handling just above 10 million tons per annum and generating median annual revenue of under $60 million. These are more than 80 per cent state owned, with most operating as corporate entities.

The infrastructure and port services mix varies across the group in terms of vessel and cargo types. The median port will have 20 per cent of arrivals by container vessels, 27 per cent as general cargo and 15 per cent in bulk carriers and tankers. Other vessel calls, such as passenger vessels and cruise vessels, make up the balance (table 4.5).

Table 4.5 Port Performance Scorecard, 2016–2022

	Indicator	Number of port entities reporting	2016	2017	2018	2019	2020	2021	2022
Finance	EBITDA/revenue (operating margin)	31	34.4%	36.7%	44.6%	40.9%	33.7%	40.4%	43.8%
	Labour/revenue	31	14.9%	19.0%	16.8%	18.0%	20.5%	16.4%	16.8%
	Vessel dues/revenue	30	15.4%	16.4%	19.2%	14.9%	14.8%	15.8%	12.7%
	Cargo dues/revenue	30	36.3%	34.1%	26.7%	31.6%	35.7%	32.6%	27.6%
	Concession fees/revenue	28	2.0%	6.6%	14.3%	13.3%	10.2%	21.2%	16.5%
	Rents/Revenue	31	3.1%	2.7%	3.3%	3.3%	3.6%	2.7%	0.6%
Human resources	Tons/employee	28	14 091 t	15 500 t	36 288 t	34 647 t	27 265 t	35 018 t	32 331 t
	Revenue/employee	27	129 813 USD	112 527 USD	143 113 USD	169 912 USD	162 933 USD	268 501 USD	226 522 USD
	EBITDA/employee	27	46 411 USD	41 851 USD	59 844 USD	74 174 USD	52 835 USD	61 898 USD	88 035 USD
	Labour cost/employee	27	23 231 USD	21 753 USD	21 355 USD	25 074 USD	25 938 USD	23 370 USD	19 573 USD
	Training cost/wages	28	0.9%	1.0%	1.1%	0.7%	0.3%	0.3%	0.3%
Gender	Female Participation Rate - All categories	22	13.7%	14.5%	15.7%	16.2%	16.9%	15.4%	16.1%
	Female Participation Rate - Management	31	34.0%	35.0%	40.7%	38.8%	42.9%	40.1%	40.7%
	Female Participation Rate - Operations	28	23.8%	21.1%	6.4%	7.4%	10.7%	6.4%	10.5%
	Female Participation Rate - Cargo Handling	18	0.0%	3.1%	5.9%	4.4%	2.3%	4.5%	0.5%
	Female Participation Rate - Other employees	19	28.6%	24.8%	26.9%	31.2%	29.3%	26.1%	23.7%
Vessel operations	Average waiting time	30	4 h	8 h	14 h	5 h	8 h	7 h	10 h
	Average gross tonnage per vessel	34	16 163 GT	14 952 GT	16 759 GT	16 298 GT	16 525 GT	16 322 GT	22 543 GT
	Average of Oil Tankers arrivals	32	4.0%	4.7%	7.7%	9.6%	6.4%	6.6%	6.3%
	Average of Bulk Carrier arrivals	32	5.4%	6.1%	5.0%	6.6%	7.6%	8.3%	5.8%
	Average of Container Ship arrivals	32	35.6%	40.9%	26.7%	26.8%	28.2%	24.2%	20.8%
	Average of Cruise Ship	32	0.3%	0.3%	0.2%	0.3%	0.0%	0.0%	0.0%
	Average of General Cargo Ship	32	15.4%	15.8%	21.3%	22.0%	20.6%	24.6%	26.8%
	Average of Other Ship	32	13.0%	11.8%	12.9%	8.8%	14.6%	6.2%	13.9%

Table 4.5 Port Performance Scorecard, 2016–2022 *(cont.)*

	Indicator	Number of port entities reporting	2016	2017	2018	2019	2020	2021	2022
Cargo operations	Average tonnage per arrival (all)	32	5 360 t	7 945 t	7 008 t	7 190 t	5 469 t	5 253 t	5 623 t
	Tons per working hour, dry or solid bulk	29	244 t	219 t	261 t	191 t	229 t	147 t	95 t
	Tons per hour, liquid bulk	26	737 t	222 t	186 t	201 t	166 t	140 t	120 t
	Containers Lift Per Ship Hour at Berth	27	22	26	18	20	22	21	18
	Average container dwell time in days	23	5	4	5	5	5	5	3
	Tons per hectare (all)	29	141 091 t	109 608 t	94 226 t	93 205 t	86 171 t	94 271 t	95 563 t
	Tons per berth meter (all)	33	3 071 t	3 125 t	3 325 t	2 990 t	2 833 t	2 905 t	2 796 t
	Total Passengers on Ferries	18	1211 915	1396 864	1172 711	1145 084	302 213	147 170	1055 517
	Total Passengers on Cruise	20	32 700	23 880	32 054	25 585	1 275	0	5 470
Environment	Investment in Environmental Projects/ Total CAPEX	20	0.0%	1.3%	1.2%	0.9%	0.1%	0.2%	0.3%
	Environmental expenditures/Revenue	24	0.0%	0.2%	0.2%	0.8%	0.3%	0.2%	0.2%

Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.

Note: EBITDA, earnings before interest, taxes, depreciation, and amortization; CAPEX, capital expenditure. Data summarized without applying any methodologies for handling missing data.

2. Trends in traffic, income, employment, and digitalization

Post-pandemic recovery hampered

Data from members of the TrainForTrade port management programme for 2019 to 2022 reflects the impact of disruption on port volumes and revenue growth rates (figure 4.14). Median growth rates of both volume and revenue fell in 2019 and 2020 for ports in the network. There was a strong recovery in 2021 with a subsequent fall in 2022. This might be explained by trade flow disruptions linked to the war in Ukraine, port congestion and other factors, although the impacts vary by cargo or commodity across the group of ports.

Financial performance levels (measured by earnings before interest, tax, depreciation, and amortization (EBITDA) vs total revenue) showed a fall in 2020 with profit levels for the median port falling to levels that would, if sustained, impact the longer-term capacity of ports to invest in port infrastructure. The reports for 2021 and 2022 showed a return to levels above 40 per cent, consistent with levels required of infrastructure utilities.

Passenger traffic rebounds after the pandemic

The cruise operations across the network vary greatly in type and scale. In March 2020, the entire world cruise fleet came to a near total stop. This is visible in figure 4.15, showing a significant drop in cruise passenger numbers in 2020 and 2021. The situation slightly improved in 2022 but is still far from pre-2020 levels. Local passenger traffic turned out to be more resilient, reaching pre-pandemic values in 2022.

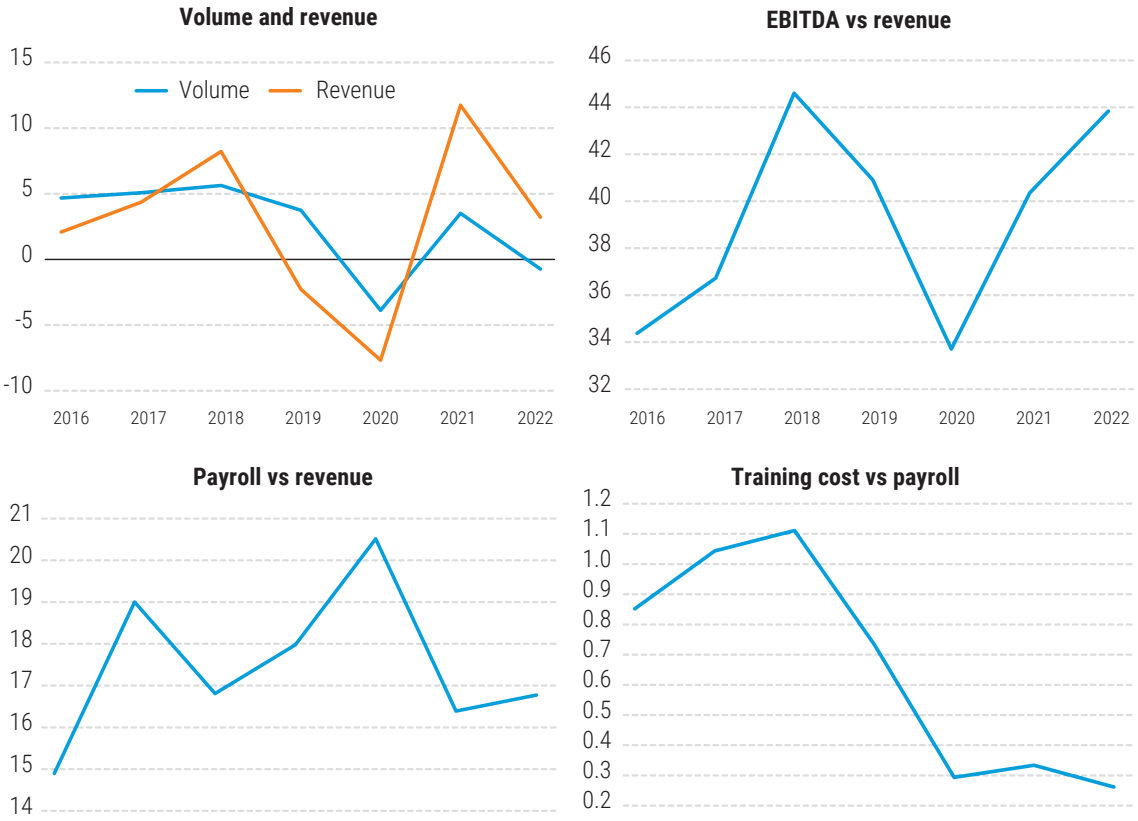
Growth in concession and property income share

Revenue across ports varies, and partly depends on the extent to which the port has privatized service provisions within the port, and the extent of a landbank under management. Ports in the UNCTAD TrainForTrade network recorded a growth in concession and property income. Larger container ports in particular, may see a shift over time, reflecting revenues from privatised container terminals.

Investing in decarbonization

The environmental performance debate has moved on from management systems and monitoring data to the decarbonization of maritime transport in ports and at sea (see also chapter 3). Strategically, ports in the UNCTAD TrainForTrade network are increasingly looking at performance in terms of carbon reduction, provision of alternative fuels to vessels, and onshore power supply by green energy. Other port feedback includes integrating technology into all port activities, and digitalization, which will in turn transform performance appraisal in terms of metrics and data access.

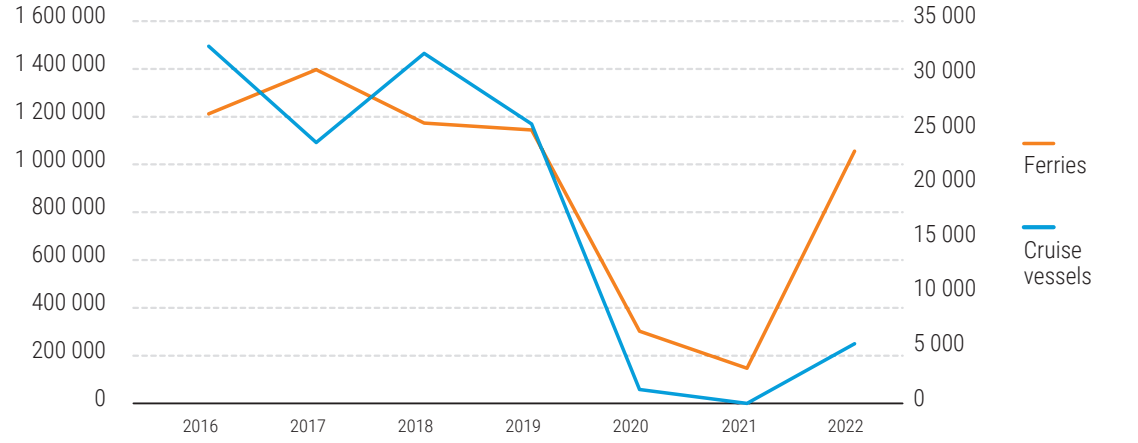
Figure 4.14 Selected port performance indicators, median value across all port members of the TrainForTrade Port Management programme, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.

Note: Volume and revenue values calculated as median year-to-year percentage change across all ports to minimize the bias due to data availability from reporting port entities. EBITDA, earnings before interest, taxes, depreciation, and amortization. Data summarized without applying any methodologies for handling missing data.

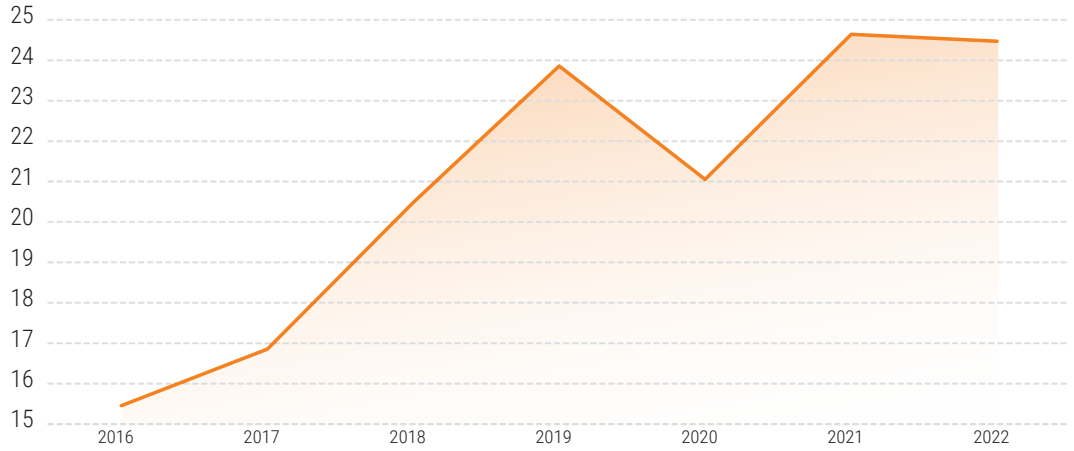
Figure 4.15 Cruise and ferry passenger, median value across all ports, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.

Note: Passengers on cruise vessels comprise of in, out and remain on board passengers. Passengers on ferries comprise of in and out passengers. Data summarized without applying any methodology for handling missing data.

Figure 4.16 Port authority revenue profile, median share of concession and property dues, members of the TrainForTrade Port Management Programme, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.
Note: Data summarized without applying any methodology for handling missing data.

Limited spending on training

Payroll as a proportion of total revenue showed a decline, which may indicate disruption to wage increases and caution in recruitment plans. Also of note is the low level of median spending reported as committed to training as a proportion of payroll cost over the period 2016 to 2022 – ranging from 0.3 per cent to 1.1 per cent. The lowest value was recorded in 2022 reflecting a falling rate since 2018. While there is evidence of training programmes going online – a cost reduction – the overall level is arguably too low in the context of the transformative trends in the industry.

Digital transformation helps improve port performance

The following case presents interesting perspectives from a long-standing partner of the TrainForTrade Port Management Programme network: the Port Authority of Valencia (box 4.3). The case illustrates how the digital transformation journey related to Valencia's Port Community System helps with monitoring, benchmarking and planning activities through the use of standardized scorecards. It underlines that measuring performance is among the requirements to ensure good port management. In this case, the project and participation in the UNCTAD Port Performance Scorecard programme were essential in achieving the port's strategic vision.

Box 4.3 Digital transformation and scorecards – the Port Authority of Valencia

The success of the digital transformation in logistics chains greatly depends on the ability of various actors, including ports, to collect, aggregate, store, and distribute information. The Port Authority of Valencia's port data management project coordinates the entire data management process in the ports it operates. Its objective is to make the data available to internal processes and third parties. The port data management project lays the foundation for a new value proposition based on data. It incorporates governance mechanisms to ensure a smooth transition towards advanced analytics models and solutions such as Artificial Intelligence and Digital Twins in ports.

Externally, the Port Authority of Valencia manages the port community system (PCS) which provides information connectivity services to around 1,100 companies in the port community. The PCS, key to the competitiveness of the services offered, is a powerful digital platform that transmits information and plays a central role in the digitization process. The PCS is currently evolving to allow its users to share information to different members along the logistics chain.

Internally, implementing a new port management and information system and port collaborative decision making tools will provide comprehensive information about operations and management. It will be further enriched with information from the network of sensors deployed throughout the port (environmental control systems, cameras, etc.) contextualizing port operations.

Measuring performance and following up on strategic plans are fundamental to good port management. The port data management project automates the management of information needed for strategic monitoring.

Box 4.3 Digital transformation and scorecards – the Port Authority of Valencia *(cont.)*

The Port Authority of Valencia has been participating in UNCTAD's Port Performance Scorecard since its inception, as its objectives are aligned with the port authority's vision of the need to monitor its policies and strategies. The Port Performance Scorecard enables ports to bench themselves against other ports and compare performance with international standards. UNCTAD ensures independence and quality for the Port Performance Scorecard programme, making it a key external reference in port monitoring.

The port data management project and participation in the Port Performance Scorecard programme are essential for achieving the strategic vision for 2030, incorporating digitalization and excellence in management.

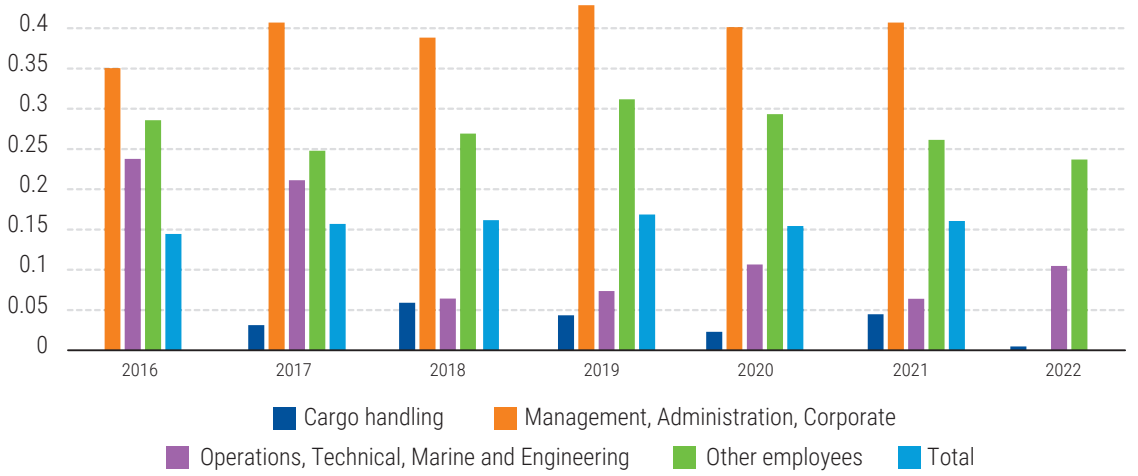
Source: Port Authority of Valencia, June 2023. See also https://www.valenciaport.com.

The need to further promote women in ports

The participation of women in the port industry remains low and little changed year on year. There remains a marked difference between those engaged in management or administrative grades and those more broadly defined as engaged in operations. These median values in figure 4.17 show that participation rates have at best increased by small single percentage points.

There are cases of individual ports and terminals where participation rates are considerably higher, and the range of data points is very large. From a policy perspective, there is a need for actions which support women in the port industry.

Figure 4.17 Women's participation in port workforces, median across all ports, 2016–2022



Source: UNCTAD calculations based on data from port entities reporting to the TrainForTrade Port Performance Scorecard.
Note: Data summarized without applying any methodology for handling missing data.

D. OUTLOOK AND POLICY RECOMMENDATIONS

Outlook

Following decades of long-term positive developments in port performance, the pandemic resulted in a decline in numerous port performance indicators. In response to the logistics challenges, during the pandemic, new initiatives towards digitalization and trade facilitation reforms were introduced, and these seem to be bearing fruit. As the pandemic ended, late 2022 saw many port performance indicators return to a positive trajectory.

Policy recommendations

Port performance

Port performance indicators contribute to transparency in terms of physical and financial operations, which in turn helps policy development and regulation. By providing a standardized framework for measuring and monitoring port activities and outputs, port performance indicators help stakeholders compare ports and identify trends and gaps in efficiency, leading to reliable assessments of how ports may stay competitive and improve performance over time.

- Port communities should improve their data acquisition and management and use port performance indicators, with benchmarks from the entire industry, to gauge where they stand and where there is potential for improvement.

Knowledge and skills

The challenges ports face, especially in the areas of digitalization and decarbonization lead to new demands for capacity building.

- Port managers should receive specialized training to enhance their knowledge and leadership skills, driving digital and decarbonization transformations. This capacity building requires matching budget and resources.

Public-private collaboration

National Trade Facilitation Committees (NTFC), as stipulated in the WTO Trade Facilitation Agreement, and National Maritime Transport Facilitation Committees, as recommended by the IMO Convention on Facilitation of International Maritime Traffic (FAL), represent important public-private-partnership platforms for coordinating and implementing policy reforms to facilitate exports, imports and transit.

- Policy reforms should be based on a close dialogue with the business community and maritime shipping stakeholders, including through national trade facilitation bodies. In countries with both NTFCs and FAL Committees, these should collaborate and coordinate their activities.

Hinterland connectivity

Port performance and throughput are closely linked to hinterland connectivity. Ports and transit countries play an essential role in improving access and connectivity for the trade of landlocked countries, which suffer from geographical and administrative barriers.

- Implementing and establishing transit regimes, corridors, dry ports and other hinterland facilitating measures are crucial to improving port performance, thus further enhancing the attractiveness of ports' connectivity and intermodal potential, both in relation to trans-shipment and transit.

Digitalization and modernization of trade procedures

New technologies provide opportunities for border agencies to simplify and expedite international cross-border trade, while at the same time controlling and securing international trade compliance related to the clearance and release of goods.

- There is a need for activities to promote trust and transparency between involved stakeholders to enable secure and efficient data exchange.
- Cross-border data exchange needs to be interconnected and facilitated between border agencies, with direct input from the private sector. Real-time data platforms need to be established, including trade and maritime Single Windows, as stipulated in the WTO Trade Facilitation Agreement and the IMO FAL Convention.

- Latest technologies and artificial intelligence can help predict and better manage the flows of goods through ports, manage risks and reduce waiting time, hence facilitate trade, increase port performance and reduce its carbon footprint.
- Special attention has to be attached to cybersecurity and business continuity plans in order to minimize risks related to increasing digitalization.

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END NOTES

1 Six components of the LSCI are:

a. The number of scheduled ship calls per week in the country.

b. Deployed annual capacity in 20-foot equivalent units (TEU).

c. The number of regular liner shipping services from and to the country.

d. The number of liner shipping companies that provide services from and to the country.

e. The size in TEU of the largest ships deployed by the scheduled service.

f. The number of other countries that are connected to the country through direct liner shipping services.

2 The index focuses on the elapsed time from when a ship reaches a port to its departure from the berth after having completed its cargo exchange.

3 https://www.worldbank.org/en/news/press-release/2022/05/25/middle-east-container-ports-are-the-most-efficient-in-the-world.

4 https://www.africanews.com/2022/02/17/throughput-growth-in-moroccan-port-tanger-med//.

5 https://www.seatrade-maritime.com/ports/shanghai-retains-worlds-top-container-port-crown-marginal-growth#:~:text=The%20port%20of%20Shanghai%20retains,largest%20container%20port%20in%202022.&text=Last%20year%2C%20container%20volume%20at,port%20for%2014%20consecutive%20years.

6 https://press.spglobal.com/2023-05-18-Chinas-Yangshan-Port-Tops-New-Container-Port-Performance-Index.

7 https://www.statista.com/statistics/1101596/port-turnaround-times-by-country/.

8 The underlying data are provided by S&P Global Market Intelligence. It is the same underlying data that are used by the World Bank to generate the CCPI index on the port level. At UNCTAD, for this *Review*, selected country averages are presented, but without transforming the data into an index.

9 For global time-in-port statistics see UNCTAD stat at http://stats.unctad.org/maritime.

10 Arrival time: The total elapsed time between the vessel's automatic identification system (AIS) recorded arrival at the actual port limit or anchorage (whichever recorded time is the earlier) and all lines fast at the berth (World Bank, 2023a).