2024 Review of maritime transport

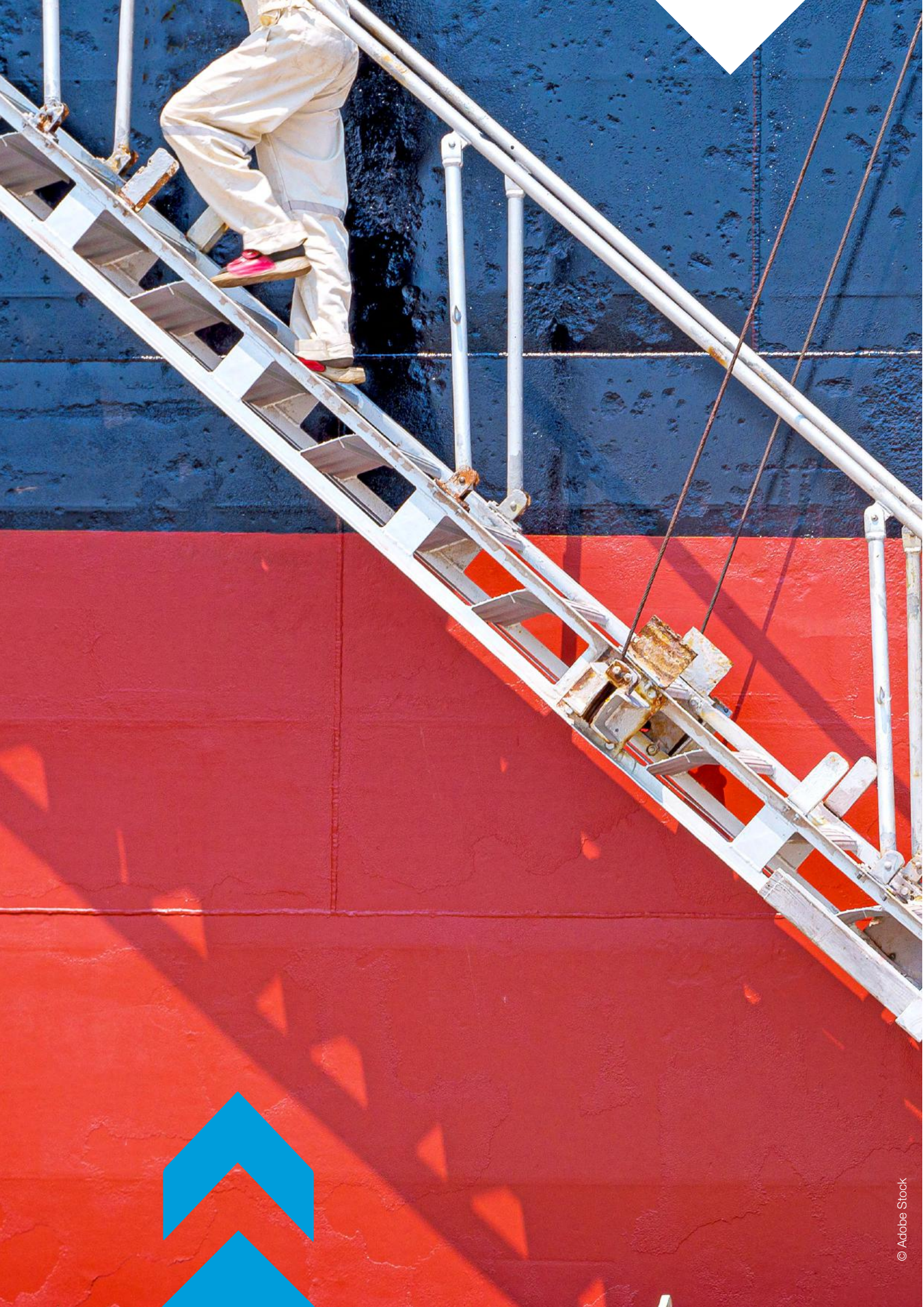
Chapter IV

Port performance and maritime trade and transport facilitation

In 2023 and early 2024, port performance worldwide showed positive trends, with an increase in port calls, better connectivity and improved cargo handling. After experiencing congestion and slowdowns during the COVID-19 pandemic, ports are now recovering and stabilizing, thanks to trade facilitation and investments in infrastructure. However, this stability may be short-lived, as mid-2024 is showing signs of renewed congestion due to deviations and disruptions resulting from the disruptions in the Red Sea and reduced capacity in the Panama Canal.

When evaluating seaport performance, it is important to look at how well the port is connected to nearby areas and beyond, a factor known as hinterland connectivity. This includes how well the port links with different types of transport, such as trains, truck, or barges, to move goods quickly and efficiently. Good transport links to and from ports, including connections to neighbouring landlocked countries as well as optimized trade facilitation measures, can help reduce congestion at ports and enhance overall port operations. In addition to improving port management, these strong transport connections play a key role in the efficiency of global supply chains.

This chapter is divided into three sections, as follows: section A presents trends in port performance with regard to port calls, liner shipping connectivity and cargo-handling; section B provides insights from the TrainForTrade Port Performance Scorecard (PPS); and section C examines the links between improved hinterland connectivity, trade facilitation and port performance.

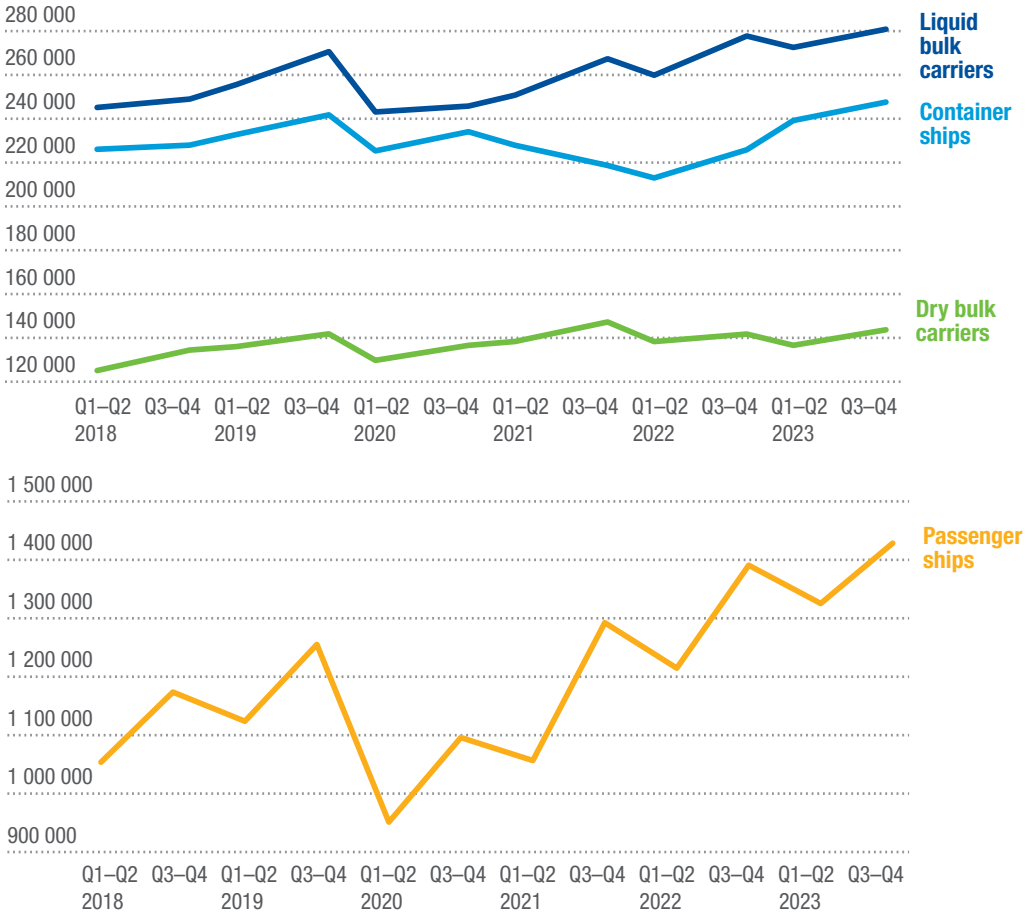


A. Port performance

Increasing port calls

Port calls by container ships saw a strong rebound in 2023, reaching record levels. Calls by tankers and passenger ships also increased. After a decline during 2021 and in the first half of 2022, port calls by container ships surged to almost 250,000 calls during the second half of 2023. Year-on-year, this represents a 12 and 9 per cent increase in the first and second halves of 2023 (figure IV.1). Similarly, tanker port calls continued to grow throughout 2023, increasing by 5 per cent in the first two quarters, and by 1 per cent in the last two quarters compared to the same periods in 2022. Port calls for dry bulk carriers remained at levels similar to 2022. Port calls by passenger ships continued to rise, with 9 and 3 per cent year-on-year increases in the first and second halves of 2023. In 2023, container shipping lines increased the number of ships on routes covering multiple regions, such as East Asia to Europe via South Asia and the Middle East, to handle excess capacity. Meanwhile, ships often skipped port calls on the East Asia to Europe route to manage demand.

Figure IV. 1
Port calls per half year, world total



Source: UNCTAD calculations, based on data provided by Marine Traffic.
Note: Ships of 1,000 GT and above. For the underlying data see http://stats.unctad.org/maritime.

Port calls by **container ships** surged to almost **250,000 calls during the second half of 2023**

By late 2023, changes in shipping routes and longer distances began to play a more significant role. This led to more port calls to meet operational needs, seize economic opportunities and improve logistics.

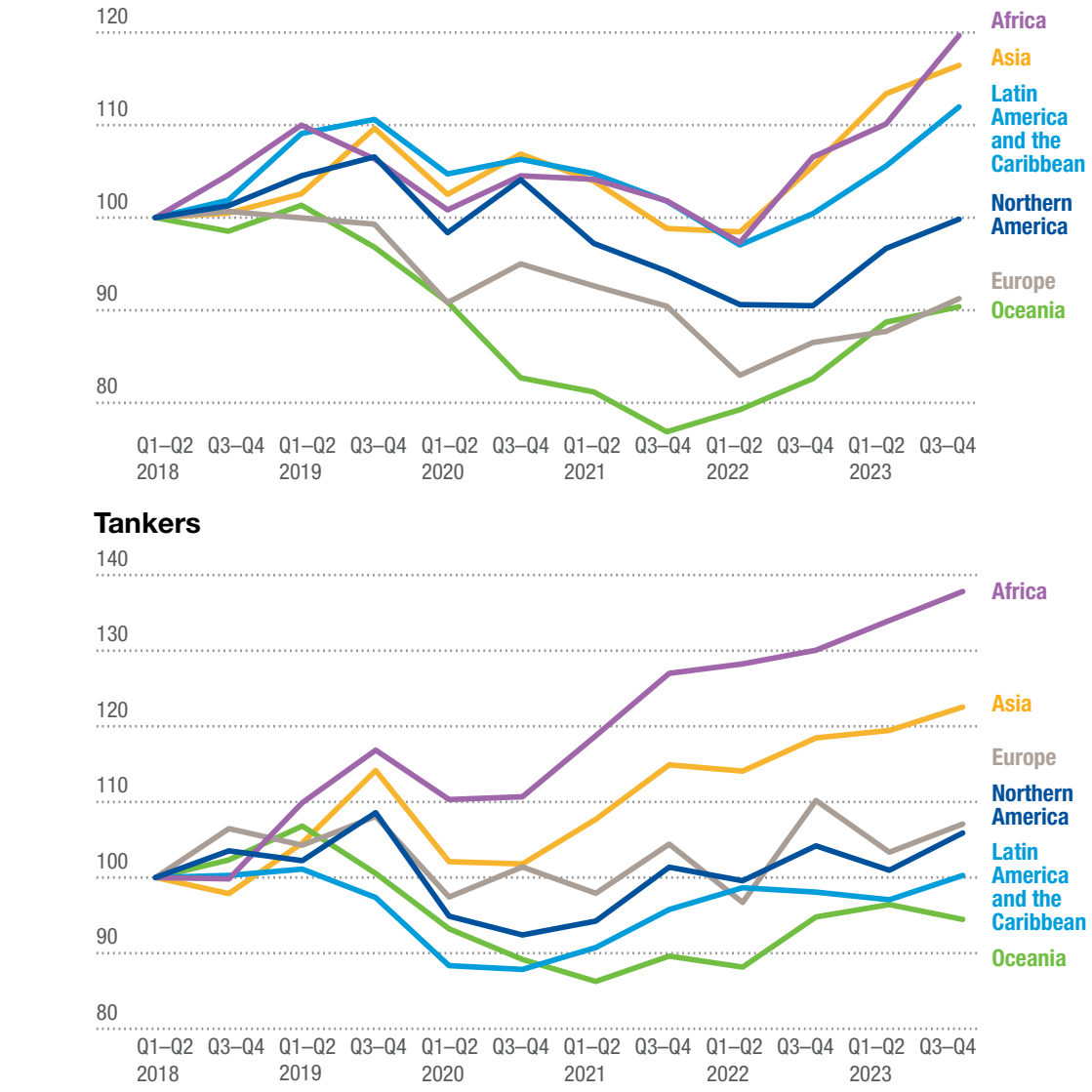
Tanker and container ship port calls increasing in Africa and Asia

Since 2018, Africa and Asia have recorded the largest increases in port calls by container ships and tankers.

Until the second half of 2023, port calls by container ships increased by 20 per cent in Africa and by 16 per cent in Asia. For tankers, the difference was even higher, with port calls in Africa rising by 38 per cent and by 23 per cent in Asia over the same period (figure IV.2).

Figure IV. 2

Port calls by container ships and tankers per half year, by region, index value (2018 Q1–Q2 = 100)



Source: UNCTAD calculations, based on data provided by MarineTraffic.
Note: Ships of 1,000 GT and above. For the underlying data see http://stats.unctad.org/maritime.

Liner shipping connectivity

The Liner Shipping Connectivity Index (LSCI) is a global index used in the maritime industry that measures how well different countries and ports are connected to the global container shipping network. Better connectivity usually leads to reduced costs, improved times and greater reliability thanks to a wider variety of connections, companies and service providers. In turn, this benefits shippers and trade as a whole.

In 2024, the LSCI methodology was revised to adjust the weight and importance of its six components.[1] Previously, the calculation emphasized the size of the largest ship and total deployed carrying capacity, since these two indicators have increased over the last two decades, reflecting trends in the liner shipping market. However, maximum vessel size shows a weaker correlation with other connectivity measures. Maximum ship size was also found to be less relevant to trade or transport costs compared to other LSCI components (UNCTAD, 2024a).

The updated methodology for calculating the LSCI closely resembles the original, with two key differences concerning the way the six components and the Index itself are normalized. Firstly, the components are now standardized using the average rather than the maximum for each component. Secondly, the reference time point has changed from Q1 2006 to Q1 2023. Details of the revised methodology are shown in table IV.1.

The revisions lead to a more balanced distribution across the six components. In practice, it means that countries and ports receiving fewer but larger ships would potentially be ranked lower than before, while countries and ports that do not receive large ships but are served by many carriers and have more connections and services could see their ranking increase (UNCTAD, 2024a).

Asian countries are at the top of the LSCI ranking; Viet Nam has the largest long-term increase in connectivity

In the second quarter of 2024, Asian countries continued to feature among the top 10 best-connected countries on the LSCI scale, with China ranking first, followed by the Republic of Korea and Singapore. Other Asian countries in the top 10 were Malaysia, Japan, and Viet Nam. The United States ranked fourth, while the most connected European countries were Spain, the United Kingdom and the Kingdom of the Netherlands.

Table IV. 1
Changes to the updated Liner Shipping Connectivity Index: Main differences

2016 LSCI	Updated 2024 LSCI
1. Normalize each component's individual value by dividing its value by the **maximum** value of this component in **Q1 2006**.	1. Normalize each component's individual value by dividing its value by the **average** value of this component in **Q1 2023**.
2. Calculate the index as the average of all six components.	2. Calculate the index as the average of all six components.
3. Normalize the index by dividing its value by the **maximum** value of the index in **Q1 2006** and multiplying it by 100.	3. Normalize the index by dividing its value by the **average** value of the index in **Q1 2023** and multiplying it by 100.

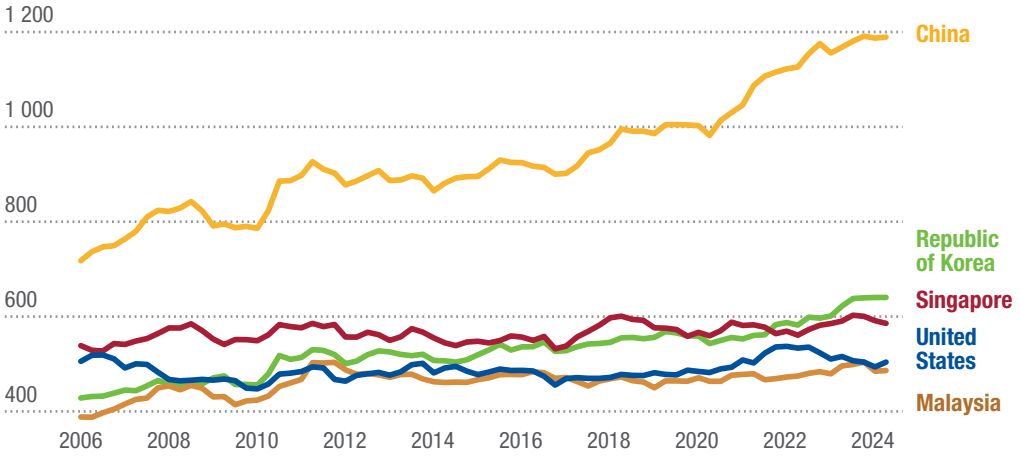
[1] The six components of the LSCI (port and country level) are:
(a) The number of scheduled ship calls per week in the country or port.
(b) Deployed annual capacity in TEU.
(c) The number of regular liner shipping services.
(d) The number of liner shipping companies.
(e) The size, in TEU, of the largest ships deployed on a scheduled service.
(f) The number of other countries (or ports) that are connected to the country (or port) through direct liner shipping services.

During the second quarter of 2023 and the second quarter of 2024, Spain recorded the largest increase in its LSCI score (3.8 per cent) among countries in the top 10. This was driven by increases in weekly calls and deployed capacity. Spanish ports such as Algeciras and Valencia serve as trans-shipment centres for containers that were previously shipped through the Suez Canal, yet now require feedering services from the Western to the Eastern Mediterranean Sea. LSCI for the Republic of Korea increased by 2.9 per cent, following the rise in the number of operators, while for Japan, the LSCI went up by 2.6 per cent, reflecting an increase in the maximum vessel size.

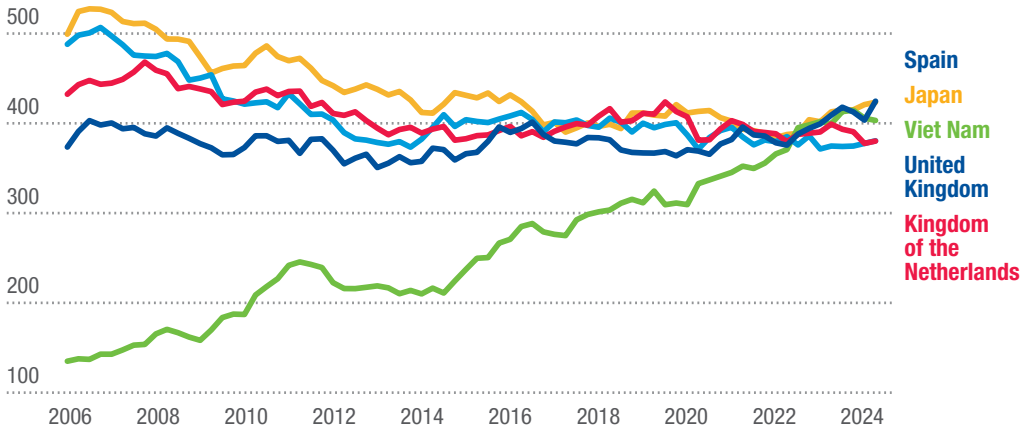
Examining the long-term trend since 2006, the highest LSCI increases among the top 10 countries were observed in Viet Nam (199 per cent), China (66 per cent) and the Republic of Korea (50 per cent). In all three cases, improved LSCI ranking was mainly due to increases in ship sizes and deployed capacity, as well as an increased number of service providers and weekly calls (figure IV.3).

Figure IV. 3
Top 10 economies in the Liner Shipping Connectivity Index

Top 5 economies



Top 6–10 economies



Source: UNCTAD calculations, based on data provided by MDS Transmodal.
Note: Index is set at 100 for the average value of country connectivity in the first quarter of 2023.

Small island developing States aiming to increase connectivity

Many SIDS face the challenges of remoteness, small trade volumes and trade imbalances. The average connectivity of SIDS (excluding "big hub" SIDS, namely the Dominican Republic, Jamaica, Mauritius and Singapore) is over 10 times less than non-SIDS (including the four big hub SIDS). The long-term trend for SIDS is volatile, with the index for these countries not yet recovered after a 7 per cent drop between the third and fourth quarters of 2021.

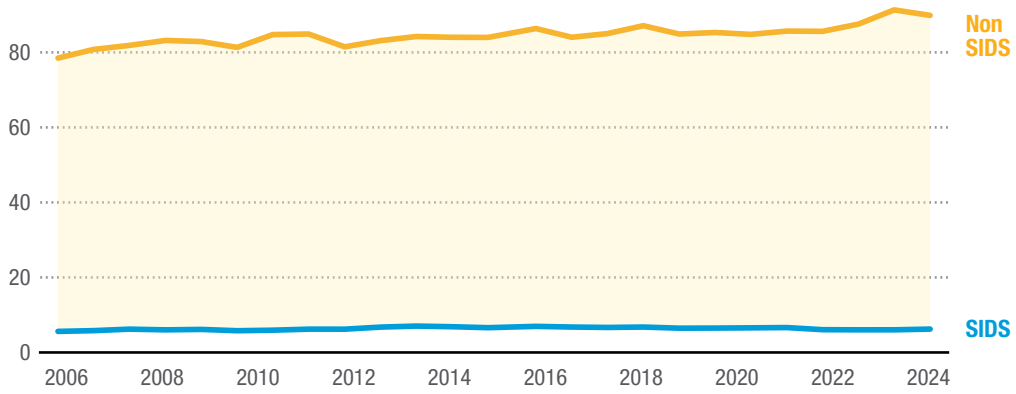
In contrast, steady growth has continued in other groups of countries. Over the last 10 years, the average LSCI of SIDS (excluding the four big hub SIDS) has decreased by 9 per cent, while the average LSCI of non-SIDS (including the four big hub SIDS) rose by 7 per cent over the same period (figure IV.4).

Many SIDS face a vicious cycle whereby lower trade volumes discourage more frequent services and larger ships visiting their ports. This leads to higher freight rates, which reduces trade competitiveness (box IV.1).

The average connectivity of SIDS is over **10 times less than non-SIDS**

Figure IV. 4

Average Liner Shipping Connectivity Index of small island developing States excluding the four big hubs Dominican Republic, Jamaica, Mauritius and Singapore compared to the rest of the world



Source: UNCTAD calculations, based on data provided by MDS Transmodal.
Note: Index is set at 100 for the average value of country connectivity in the first quarter of 2023 (UNCTAD, 2024a). SIDS exclude the four big hub SIDS (the Dominican Republic, Jamaica, Mauritius and Singapore). Non-SIDS include the four big hub SIDS. For countries with no liner shipping connections, values are assumed to be zero, to better reflect lost connectivity. Countries with no liner shipping connections for the entire period are excluded from the averages.

Box IV. 1
Connectivity challenges in the Caribbean

Maritime connectivity for freight in the Caribbean operates within a dual hub and spoke system. This means there are central hubs and smaller connecting routes. The intraregional network is centred on Trinidad and Tobago, which serves as the main hub. From this central port, smaller feeder routes (spokes), connect to other regional hubs and islands. This setup allows large ships to deliver cargo to Trinidad and Tobago, from which smaller ships transport goods to various ports and islands, managing the flow of cargo across the region. The extraregional network (hubs: Kingston, Jamaica; Panama; Miami, United States), provides connectivity for international trade. This dual structure results in two distinct route networks, each playing a crucial role in regional and global trade dynamics (Briceño-Garmendia et al., 2015).

Identifying connectivity challenges

At the Global Supply Chain Forum organized by UNCTAD and held in Bridgetown from 21 to 24 May 2024, several critical connectivity challenges in the Caribbean were highlighted. One issue is the high cost of freight. This is driven by ineffective liner routes, limited carrier competition and diseconomies of scale. The small sizes of regional ports contribute to the issue, as does the imbalance in trade flows; liner services often travel fully loaded southward but return northward empty, which inflates costs. Dependence on the routing decisions of major shipping lines (Edwards, 2024) and a high market concentration among a handful of liners (Briceño-Garmendia et al., 2015) further inflates these expenses. Shipping a 40-foot container from Miami, United States, to SIDS in the Caribbean can be up to four times more expensive than shipping the same container to China or Argentina (box table IV.1.1).

Box table IV. 1. 1
Shipping costs from Miami, United States to small island developing States and to other international ports, selected destinations

Destination	Cost (United States dollars)	Distance (km)
Roseau, Dominica	5 750	2 298
Bridgetown, Barbados	4 559	2 611
Freeport, Bahamas	3 164	144
Kingston, Jamaica	2 897	1 413
Port of Spain, Trinidad and Tobago	2 870	2 677
Buenos Aires, Argentina	1 200	10 350
Shanghai, China	985	18 199

Source: ESCAP calculations, based on data from iContainers and sea-distance.org.
Note: Rates for 40-foot containers, full container load as of 27 June 2024. Costs include loading onto the ship, customs clearance and transport.

Another pressing issue is insufficient inter-island connectivity, partly due to the high cost of port services and a tax structure that hinders regional integration and short sea shipping. Port handling charges in the Caribbean are two to three times higher than in similar ports elsewhere. For instance, shipping a container from Shanghai to Miami can be cheaper than shipping it to a neighbouring island 100 miles away. These high costs are often linked to procedural inefficiencies and poor port management (Telemaque, 2022).

Inadequate infrastructure further compounds these challenges. Many Caribbean ports are ill-equipped to handle modern vessels or large volumes of cargo (Edwards, 2024). The scarcity of berths often means prioritizing cruise vessels over cargo vessels. Despite the clear need for investment, small cargo volumes and high service costs lead port management to continually assess whether the volume justifies further investment or whether alternative solutions should be explored (Telemaque, 2022).

Strategic recommendations

Experts at the Global Supply Chain Forum provided several strategic recommendations to address these connectivity challenges, as summarized in box figure IV.1.1.

Box figure IV. 1. 1

Recommendations to improve connectivity among small island developing States

Adressing diseconomies of scale to reduce costs

- Consolidating cargo volume with other ports to reduce freight costs and inefficiencies along the logistics chain.
- Facilitating bulk shipping for SMEs: Encourage collaboration among SMEs to consolidate shipments and reduce individual shipping costs.

Infrastructure Development

- Enhance port infrastructure through private investment to handle new-Panamax ships of 13,500 TEUs, fostering substantial growth in transshipment activities in the Caribbean.
- Develop Third-Party Logistics plan and commission a regional approach to logistics.
- Take advantage of services value chains to enhance connectivity.

Improving Logistics Performance

- Improve customs clearance processes.
- Enhance transport infrastructure through ports and improve internal connections.
- Develop local logistics competencies through partnerships with abroad investors.

Addressing these challenges and implementing these recommendations can significantly enhance maritime connectivity in the Caribbean, fostering regional economic growth and integration into the global economy.

Source: ESCAP, based on cited sources.

The global liner shipping network **grows again**

Global liner shipping network returns to an increasing trend

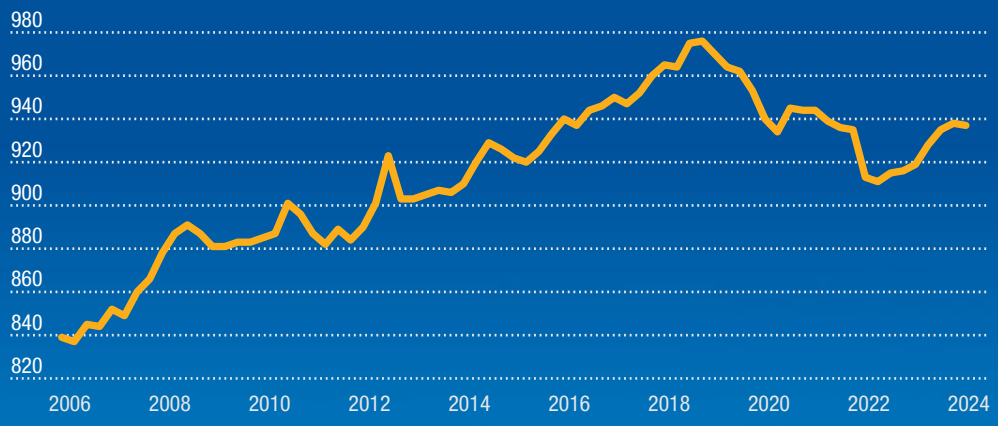
After a steep decline from 2019 to 2022, the global liner shipping network is growing again. In the second quarter of 2024, 937 ports were connected to at least one regular liner shipping service, an increase of 2 per cent compared to the second quarter of 2023. This observed rise in the number of active ports was evenly spread across global regions (figure IV.5).

Over the last 10 years, Asia has recorded an increase of 12 per cent, exceeding growth in other regions. There is an even more notable difference when comparing growth since 2006, with Asia experiencing a 35 per cent rise.

Time in port, waiting time and cargo handling performance

Port congestion and logistical disruptions eased in 2023, leading to improvements in the amount of time ships spent in port and enhanced cargo-handling performance. While consolidated data is not yet available for 2024, there are concerns that the service deviations resulting from the disruptions in the Red Sea and the Panama Canal may trigger a new wave of congestion. Ports such as Singapore and those in the Western Mediterranean are facing growing demand for trans-shipment services.

Figure IV. 5
Number of active container ports, world total



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

Improved turnaround times

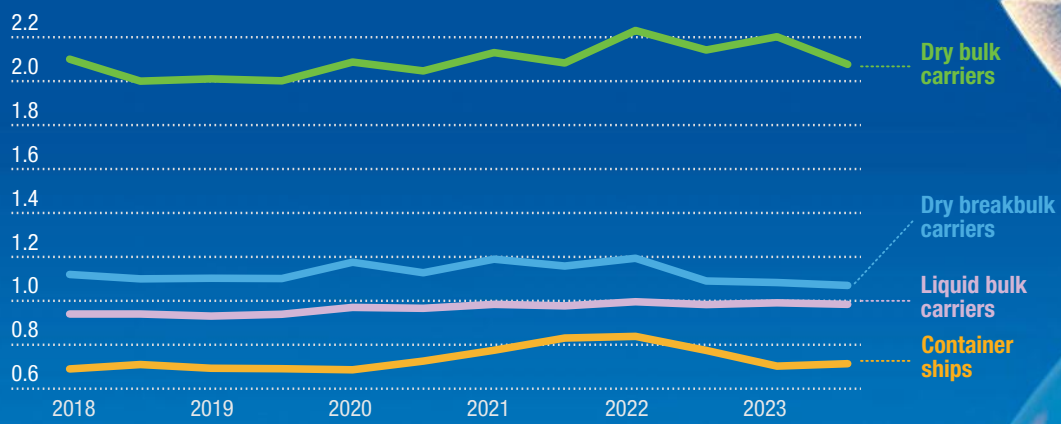
In 2023, the median time that container ships and dry breakbulk ships spent in ports was back to pre-pandemic levels of 0.7 days in the first half of the year and 1.1 days in the second half of the year. The trend for tankers was also stable, remaining at the level of just below 1 day, similar to the median in the last three years. Turnaround times for dry bulk carriers improved in both halves of 2023, reaching 2.2 and 2.1 days, although these have yet to return to the faster turnaround times observed in 2019 (figure IV.6).

Congestion building up in developing countries

Congestion can be measured as the time needed to enter a berth from the moment a vessel first anchors in the port area. Developed countries were more affected by industry disruptions in 2021 and 2022 but were able to reduce the waiting time in early 2023 to over 4 days, slightly higher than times observed in 2020 and in earlier years. The impact in developing countries was weaker, as was later improvement.

Disruptions in the Red Sea and the Panama Canal may trigger **a new wave of congestion in ports**

Figure IV. 6
Time in port, world median
(Days)



Source: UNCTAD calculations, based on data provided by MarineTraffic.
Note: Ships of 1,000 GT and above.

The first few months of 2024 showed another jump in waiting times, which reached nearly 10 days in July 2024 (figure IV.7).

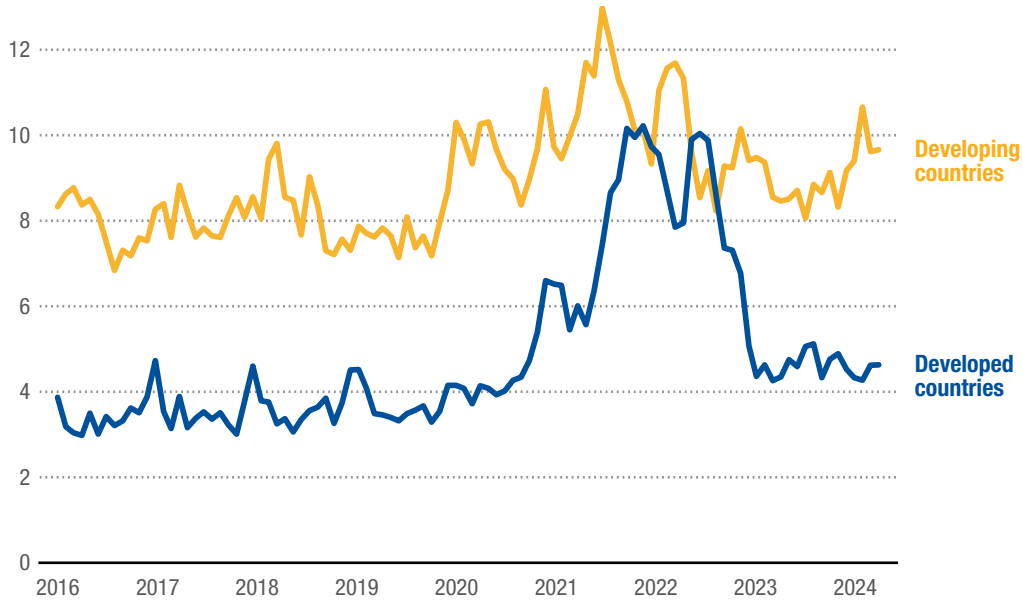
Container ships waiting time for developing countries up to almost

10 days

Figure IV. 7

Average waiting times that container ships spent at port

(Hours per month)



Source: UNCTAD calculations, based on data provided by Clarksons Research.
Notes: Waiting time estimates based on time between vessel first entering an anchorage associated with a port group (or a port where the vessel has not been seen in an anchorage shape) and vessel first entering a berth in the port.

Many Asian ports among the best in terms of cargo-handling performance

The Container Port Performance Index (CPPI) is calculated based on the time a vessel spends in port in relation to the number of container moves, or how fast cargo is loaded and unloaded. The Index provides insights into port performance (World Bank, 2024). In 2023, Asian ports dominated the global CPPI ranking, with 21 of the ports in Asia featured among the top 25. Among these top 25 ports, Chiwan (China), Dalian (China), Visakhapatnam (India), Tanjung Priok (Indonesia), Lianyungang (China), Mundra (India) and Yantian (China) recorded the largest improvements in their CPPI ranking in 2023 compared to 2022 (table IV.2).

Asian ports dominated the global CPPI ranking

Table IV. 2
Top 25 ports in Container Port Performance Index

Port	2023 rank	Index points	2022 rank	Change in rank 2023 compared to 2022
Yangshan, China	1	177.9	1	0
Salalah, Oman	2	164.7	2	0
Tanger-Mediterranean, Morocco	3	159.6	5	2
Tanjung Pelepas, Malaysia	4	158.3	6	2
Chiwan, China	5	158.2	23	18
Cartagena, Colombia	6	158.0	4	-2
Guangzhou, China	7	153.7	9	2
Cai Mep, Viet Nam	8	150.8	13	5
Yokohama, Japan	9	150.5	12	3
Hamad Port, Qatar	10	149.8	8	-2
Ningbo, China	11	145.4	7	-4
Algeciras, Spain	12	142.3	18	6
Mawan, China	13	142.2	15	2
Dalian, China	14	139.0	44	30
Hong Kong, China	15	134.1	10	-5
Port Said, Egypt	16	131.2	11	-5
Yeosu, Republic of Korea	17	130.7	21	4
Visakhapatnam, India	18	129.6	112	94
Singapore, Singapore	19	127.9	19	0
Tanjung Priok, Indonesia	20	127.3	282	262
Lianyungang, China	21	126.5	77	56
Mundra, India	22	124.8	50	28
Kaohsiung, Taiwan Province of China	23	123.1	26	3
Yantian, China	24	121.6	51	27
Shekou, China	25	121.1	14	-11

Source: UNCTAD calculations, based on data provided by World Bank and S and P Global Port Performance Programme.
Note: Index points correspond to administrative approach.

-24%
decrease in
container move time
down to
36 seconds for calls over 6 000 moves

Better performing ports are called more often

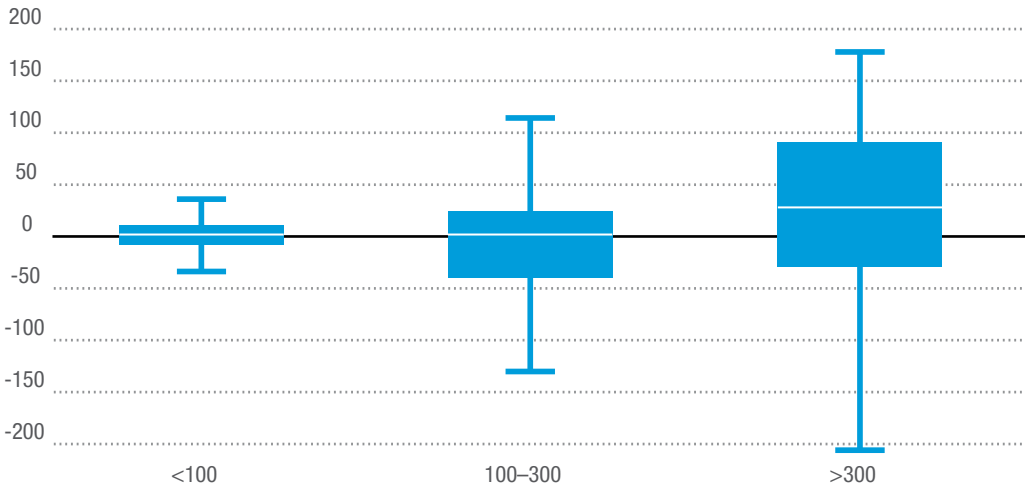
In cargo-handling, there is a direct link between how busy ports are and how well they perform. The relationship works both ways: improved port performance makes the port more attractive for carriers, leading to more frequent calls. Additionally, if there are more containers per call, this encourages the use of larger and specialized container port cranes, which allows for greater economies of scale. For ports that received over 300 calls in 2023, the CPPI median was higher (28 index points) compared to ports that received fewer calls (2 index points for those in the category of "less than 100 calls" and in the category of "between 100 and 300" calls). Ports with fewer than 100 calls performed similarly in terms of cargo-handling performance, with half of these ports recording CPPI values ranging between -8 and 11 index points (figure IV.8).

Increased container-handling performance in ports

Across the 25 economies to receive the largest number of port calls in 2023, it is evident that containers are moved more quickly when handled by larger vessels. These ships often benefit from parallel crane operations and automation in larger ports, where they are also more regularly involved in trans-shipments.

As shown in table IV.4, in 2023, among these 25 economies, Japan performed the best across four call size categories, with up to 2,000 container moves per call. Hong Kong, China, also recorded the fastest container move times in four categories (covering call sizes from 1,001 to 2,000 and between 2,500 and 4,000 moves). These were followed by Malaysia, reaching top speeds in three categories, and Spain and Viet Nam, both recording the fastest container-handling speed in two categories. China, the Republic of Korea, Singapore, Brazil and India recorded the highest performance in one category each.

Figure IV. 8
Container Port Performance Index 2023: Distribution of ports by number of calls



Source: UNCTAD calculations, based on data provided by World Bank and S and P Global Port Performance Programme.
Note: Index based on the administrative approach. The middle line represents the median, the top and bottom lines of the boxes represent the first and third quartile and the top and bottom lines (whiskers) represent the minimum and maximum values (excluding outliers).

In 2023, the same 25 economies handled their containers more quickly compared to the previous year, with faster speeds for all port calls with more than 500 container movements. The bigger the ships, the bigger the gain. Time required to handle containers fell by 24 per cent for calls of over 6,000 moves, decreasing from 47 seconds per container move in 2022 to 36 seconds in 2023. In contrast, the container handling time in the case of the smallest calls, less than 500 moves, increased by 15 per cent, reaching an average of over four minutes per container move in 2023 (table IV.3 and figure IV.9).

Table IV. 3

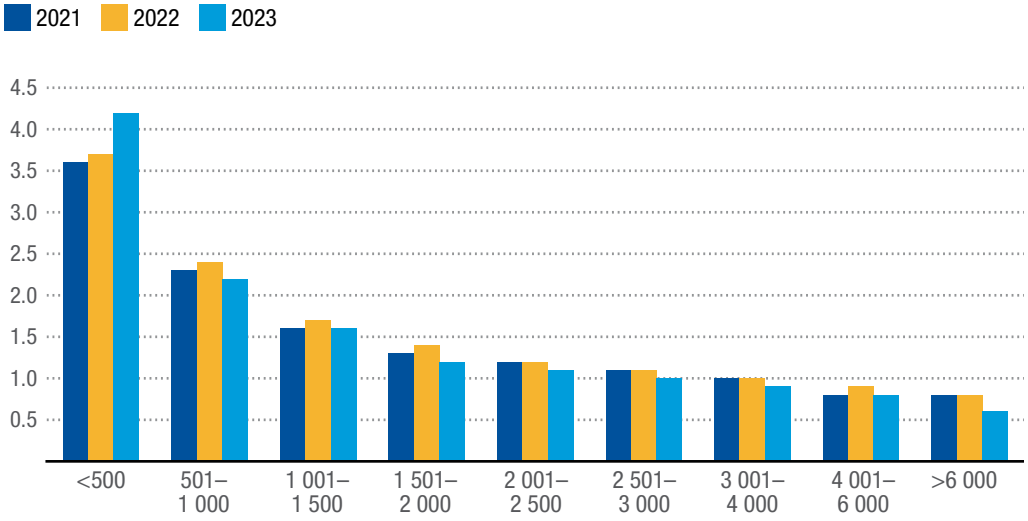
Time taken to move a container per port call by call size, top 25 economies, 2023

(Minutes)

Economy	<500	501–1000	1001–1500	1501–2000	2001–2500	2501–3000	3001–4000	4001–6000	>6000
China	3.4	1.8	1.2	0.9	0.8	0.7	0.6	0.5	0.4
United States	4.2	2.4	1.8	1.6	1.6	1.5	1.3	1.1	0.9
Republic of Korea	2.7	1.7	1.2	0.9	0.8	0.7	0.7	0.6	0.5
Singapore	3.3	1.7	1.2	0.9	0.8	0.7	0.6	0.5	0.4
Malaysia	3.0	1.9	1.2	0.9	0.8	0.6	0.6	0.4	0.3
Brazil	4.3	2.4	1.8	1.6	1.3	1.2	1.3	0.9	0.0
Spain	3.9	2.0	1.3	0.9	0.7	0.7	0.6	0.7	0.6
Germany	5.8	2.2	1.6	1.3	1.2	1.0	0.9	0.8	0.7
United Arab Emirates	5.0	2.1	1.5	1.0	0.9	0.8	0.6	0.6	0.5
Japan	2.5	1.3	1.0	0.9	0.9	0.9	0.9	-	-
Belgium	4.9	2.4	1.5	1.2	1.1	1.1	0.9	0.8	0.6
Hong Kong, China	2.6	1.5	1.0	0.9	0.8	0.6	0.5	0.6	-
United Kingdom	4.3	2.2	1.4	1.2	1.2	1.1	0.8	0.8	0.7
Panama	5.3	2.3	1.5	1.3	1.0	0.9	0.7	1.1	0.7
Kingdom of the Netherlands	7.8	2.6	1.7	1.3	1.0	0.9	0.8	0.7	0.5
Taiwan Province of China	2.7	1.5	1.1	1.1	0.8	0.9	0.6	0.5	-
Türkiye	5.4	3.4	2.7	1.9	1.9	1.9	1.5	1.1	-
Viet Nam	2.7	1.5	1.1	1.0	0.8	0.6	0.5	0.6	0.4
India	3.7	2.4	1.2	0.9	0.8	0.8	0.7	0.5	0.4
Italy	4.9	2.8	2.0	1.6	1.5	1.4	1.2	1.4	1.9
Australia	6.4	3.1	2.3	1.8	1.5	1.4	1.2	1.1	-
France	4.7	2.9	2.1	1.8	1.7	1.5	1.4	0.9	0.6
Thailand	3.2	2.7	1.3	1.1	0.9	0.9	0.7	0.7	0.6
Indonesia	3.7	2.2	1.7	1.3	1.0	0.9	0.8	0.7	-
Philippines	4.5	3.2	2.5	1.9	1.4	2.2	-	-	-
Average	**4.2**	**2.2**	**1.6**	**1.2**	**1.1**	**1.0**	**0.9**	**0.8**	**0.6**

Source: S and P Global Port Performance Programme.
Note: Nine call-size categories based on total number of containers moved during a port call, regardless of container size, ranging from <500 moves (first category) to >6,000 moves (last category).

Figure IV. 9
Average time taken to move a container per port call by call size, top 25 economies



Source: UNCTAD calculations, based on data from S and P Global Port Performance Programme.
Note: Nine call-size categories based on total number of containers moved during a port call, regardless of container size, ranging from <500 moves (first category) to >6,000 moves (last category).

B. TrainForTrade Port Performance Scorecard

Importance of measuring port performance

The future of the international port industry is shaped by the ongoing paradigm shift in the shipping sector and in the global economy, as decarbonization becomes a global objective. With vessels converting to alternative fuels, the port sector needs to respond to the associated challenges and opportunities.

Over the past three decades, the UNCTAD TrainForTrade Port Management Programme has developed a strong reputation as a global training and capacity-building network for ports (UNCTAD, 2024b).

In 2012, an initiative to chart and measure port management performance was launched under the PPS. This builds on an annual survey of data points agreed upon by PPS port members (UNCTAD, 2024c).

The members vary in size and ownership. A typical port handles 8 million tons of cargo each year. The largest ports often operate under a "landlord" model—whereby they manage port facilities but private companies handle operations—or a "mixed model" depending on the type of cargo. Many of these ports are publicly owned, although the port services are largely provided by the private sector.

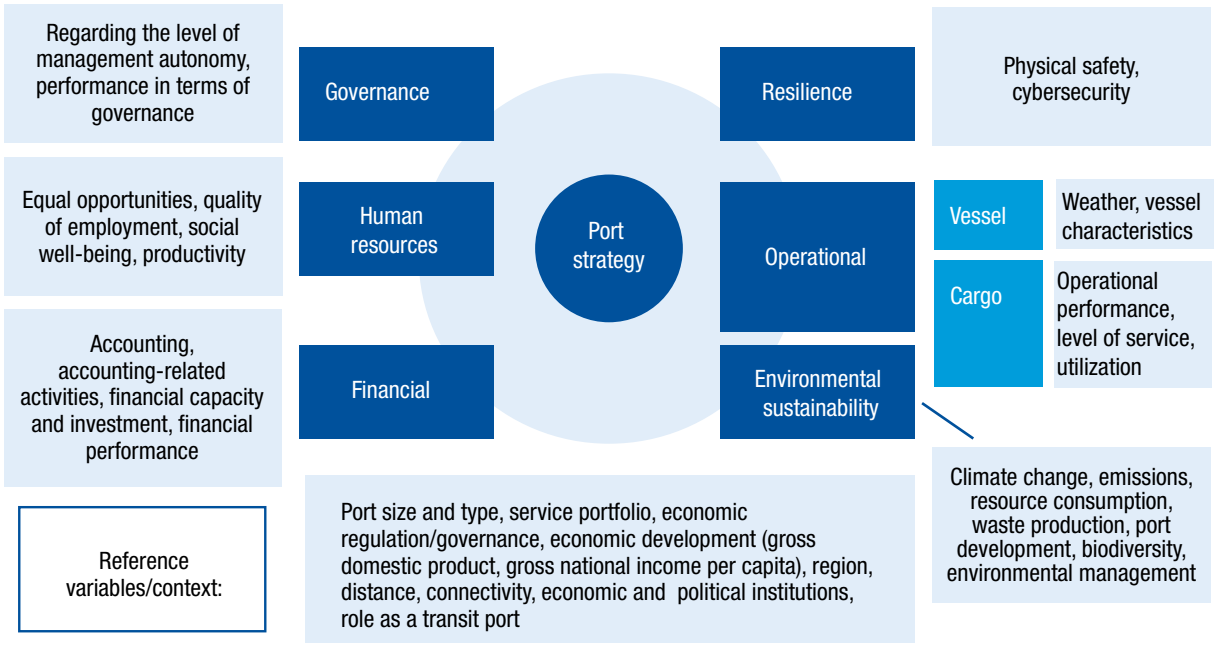
A new era for measuring port performance

In 2023, TrainForTrade reviewed the range of indicators and measures used to evaluate port performance worldwide. This review was inspired by work carried out by UNCTAD in the 1980s and the Monographs on Port Management series, namely, Monograph No. 6, Measuring and Evaluating Port Performance and Productivity (UNCTAD, 1987), which offers a comprehensive review of international port performance indicators. The 2023 review, conducted in partnership with the Port Authority of Valencia and Fundación Valenciaport, Spain, has resulted in an exhaustive list of indicators, including three new categories on governance, resilience and environmental sustainability (UNCTAD, 2024d). The addition of a governance index is a significant innovation that draws on data points to measure transparency and accountability, levels of cooperation between ports, support to industrial and port clusters and port–city and citizen relations. The human resource category has been improved, with measures that chart employment quality and social welfare indicators. Finance indicators address the scale and form of capital investment in ports at a time when port managers are responding to capacity constraints, demands for resilience in supply chains and a transition to sustainable operations. A colour-coding system (green, orange and red) has been proposed to define the level of comparability for each indicator.

One challenge ports face is the need to tailor the proposed set of international port performance indicators (UNCTAD, 2024d) to fit their specific requirements and circumstances—perhaps selecting a subset of indicators that are most relevant and feasible—while maintaining the highest possible levels of international comparability (figure IV.10). The new methodology also introduces practical metrics on how these indicators can be measured and their linkages with the Sustainable Development Goals.

Port performance indicators **link the SDGs directly to daily port operations**

Figure IV. 10
Adopted set of international port performance indicators example



Source: UNCTAD, 2024d.

The last decade showed the **volatility in port growth**

The challenge with any international benchmarking process is how to agree on definitions of data points and which tools to use to collect data. The following may also be addressed:

- The large number of parameters
- A lack of updated, objective and reliable published data
- Difficulty convincing entities to provide sensitive data
- An absence of generally agreed and accepted definitions
- The strong influence of local factors on the data obtained
- Divergent interpretations of identical results by different stakeholders

It is difficult to compare ports, as each port is unique and has characteristics that stem from various local, historical and social contexts. Therefore, the following analysis relies on the longitudinal nature of the data as evidence of steady and reliable trends. While the analysis does not necessarily point to causality between the variables, it does provide useful baseline information for port planners and managers.

TrainForTrade port management network collaborative approach to measuring port performance

Based on a series of annual conferences organized with participating members across three linguistic networks (French, English and Spanish-speaking), TrainForTrade focused on specific indicators that have a high degree of comparability. PPS is divided into six core categories comprising finance, human resources, gender, cargo operations, vessel operations and environment (table IV.4).

It is useful to reflect on the main scorecard in terms of primary and secondary data. The primary data are comparable globally (finance and gender). The secondary data relate to ports in terms of scale, region and cargo mix.

Some ports have stable operating margins yet unpredictable growth

Finance data between ports is comparable at a global level when expressed as ratios and reported by scale and region. The finance indicators capture economic sustainability and are common to all ports, given that most of the reporting entities are managed and report in accounting terms as corporate entities.

Over the past decade, the growth of ports—measured by the amount of cargo they handle and the revenue they generate—has been highly unpredictable. This unpredictability is due to major global events that have profoundly impacted worldwide trade and shipping. One example is the COVID-19 pandemic, which caused sudden and severe disruptions.

In the case of ports, the pandemic led to lockdowns and restrictions that halted or slowed down shipping operations, leading to fluctuations in the amount of cargo being handled and affecting the revenue of ports worldwide. Such events highlight the vulnerability and volatility of port growth in the face of global crises.

Additional critical risk factors that influence the economic performance of ports include major conflicts or climate change. These issues can interrupt supply chains and pose challenges to environmental sustainability. For example, wars or geopolitical tensions can interfere with shipping routes and cargo movement, while climate change can lead to rising sea levels and extreme weather, also affecting port operations. This has been seen in the drought conditions affecting the Panama Canal since 2023. In 2023, these risks were reflected in port performance data, as cargo volume growth continued to decline for the second year in a row, and revenue growth was barely above 1 per cent.

The main comparator in the finance data is the primary operating margin, namely, earnings before interest, tax, depreciation and amortization.

Table IV. 4
Port Performance Scorecard

		Median Values							
	Indicator	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Finance	EBITDA/revenue (operating margin) (percentage)	34.4	36.7	42.7	40.8	34.2	42.0	43.4	49.8
	Labour/revenue (percentage)	17.3	19.0	17.8	18.0	21.7	17.1	19.0	16.2
	Vessel dues/revenue (percentage)	15.4	16.4	19.9	15.1	15.7	14.8	13.3	13.6
	Cargo dues/revenue (percentage)	36.3	34.1	26.4	31.4	35.2	31.8	27.6	27.7
	Concession fees/revenue (percentage)	2.0	6.6	14.7	14.0	14.0	21.2	17.0	7.8
	Rents/revenue (percentage)	3.1	2.7	3.4	2.8	3.3	2.7	3.5	2.3
Human resources	Tons/employee (tons)	14 091	15 500	32 889	34 237	26 805	34 008	32 128	26 572
	Revenue/employee (United States dollars)	129 813	112 527	132 904	162 492	147 258	222 382	246 596	245 679
	EBITDA/employee (United States dollars)	46 600	41 851	57 573	68 510	48 447	60 745	107 123	81 210
	Labour cost/employee (United States dollars)	23 231	21 753	21 771	33 176	25 294	29 027	36 145	18 060
	Training cost/wages (percentage)	0.8	1.0	1.1	0.8	0.3	0.5	0.4	0.5
Gender (women participation rate)	All categories (percentage)	13.7	14.5	15.7	15.2	15.9	15.4	14.5	17.7
	Management (percentage)	33.9	35.0	39.3	38.8	42.3	39.4	40.2	40.5
	Operations (percentage)	23.8	21.1	7.0	9.1	11.2	7.7	8.4	7.1
	Cargo handling (percentage)	0.0	3.1	5.9	1.3	0.0	2.3	0.6	1.2
	Other employees (percentage)	28.6	24.8	26.6	29.3	27.4	26.3	22.3	28.2
Vessel operations	Average waiting time (hours)	4	8	11	7	6	7	9	7
	Average gross tonnage per vessel (tons)	16 375	15 431	16 817	16 994	17 607	17 428	22 065	23 529
	Oil tankers arrivals (percentage)	7.2	8.2	9.0	7.7	8.6	6.7	7.0	7.1
	Bulk carrier arrivals (percentage)	6.8	13.2	12.1	9.8	12.0	11.7	7.5	5.1
	Container ship arrivals (percentage)	24.5	33.7	21.7	24.6	24.9	24.2	26.2	18.1
	Cruise ship arrivals (percentage)	1.2	0.9	1.1	1.0	0.0	0.0	0.6	0.5
	General cargo ship arrivals (percentage)	21.6	14.7	18.4	19.3	20.5	21.9	26.2	9.4
	Average of other ship arrivals (percentage)	16.3	10.7	17.5	7.9	14.7	6.6	13.7	14.6
Cargo operations	Average tonnage per arrival (all ships) (tons)	6 379	9 419	8 618	10 230	8 110	6 689	6 324	5 572
	Tons per working hour, dry or solid bulk	244	219	261	176	238	179	99	92
	Tons per hour, liquid bulk	737	222	186	171	158	143	173	94
	Containers lift per ship hour at berth	22	26	18	20	19	20	18	16
	Average container dwell time (days)	5	4	5	5	5	5	5	3
	Tons per hectare (all cargo)	136 449	102 683	91 325	88 454	86 171	90 568	88 200	83 002
	Tons per berth meter (all cargo)	2 703	3 043	3 203	2 980	2 771	2 891	2 795	2 620
	Total passengers on ferries	1 159 902	1 278 558	1 190 458	1 216 646	335 505	181 758	940 778	1 535 348
	Total passengers on cruises	63 614	26 071	34 420	28 244	1 275	0	10 891	18 822
Environment	Investment in environmental projects/total CAPEX (percentage)	0.0	1.3	1.2	0.3	0.1	0.4	0.2	0.5
	Environmental expenditures/revenue (percentage)	0.0	0.2	0.2	0.7	0.3	0.2	0.5	0.2
	Number of entities reporting	24	29	32	33	31	30	28	22

Source: UNCTAD calculations, based on data from port entities reporting to PPS.
Note: Data summarized without applying any methodologies for handling missing data.
Abbreviations: EBITDA = earnings before interest, taxes, depreciation and amortization, CAPEX = capital expenditure.

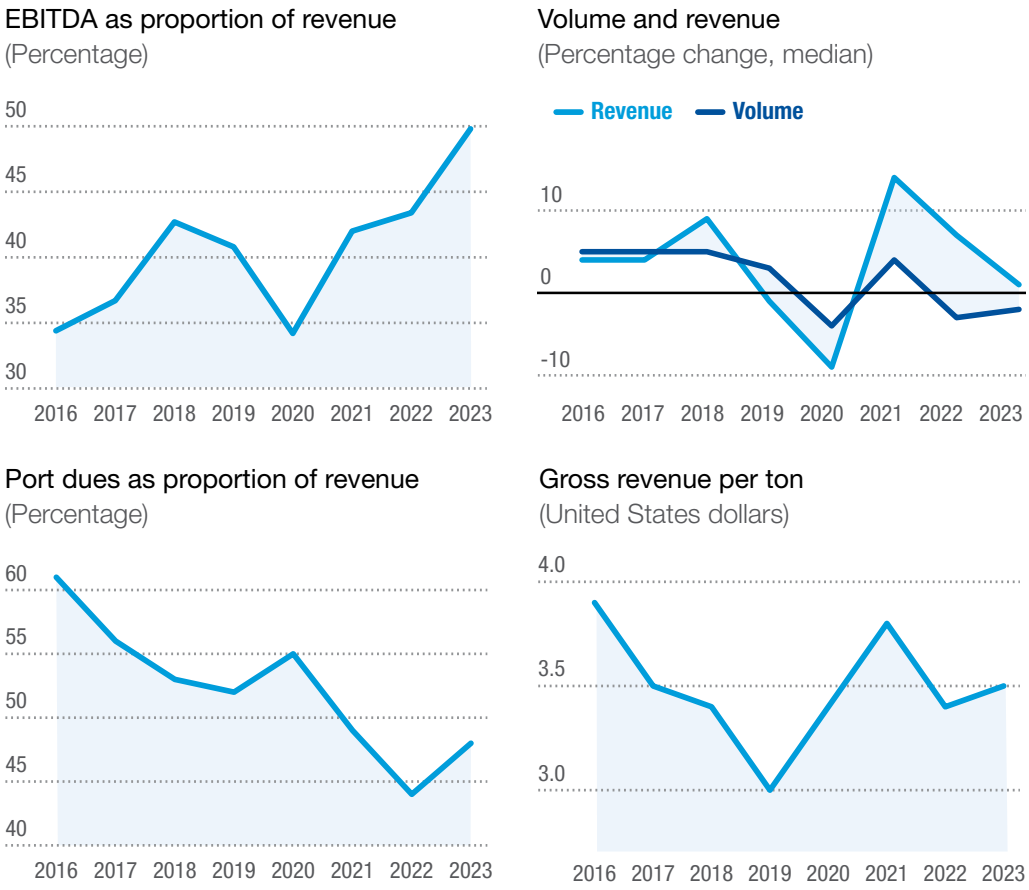
This levels the basis for comparison by removing local factors and the balance sheet structure of the port entity in terms of debt and age of assets. In 2023, such earnings as a proportion of total revenue was 50 per cent, with a median return per ton of $3.50. Port dues (cargo and vessel income from infrastructure charges) remained within a consistent range, at 48 per cent of total income, compared to 44 per cent in 2022. The balance of income comes from the provision of services by the port entity and from property charges, including concession fees.

The delivery of port services and property activity tend to have a lower profit margin than asset management; therefore, combining the two income streams will lower the weighted average for the port entity (figure IV.11).

Importance of employing women in the maritime industry

Gender-related statistics in ports are tracked in PPS as part of considering alignment with social sustainability goals,

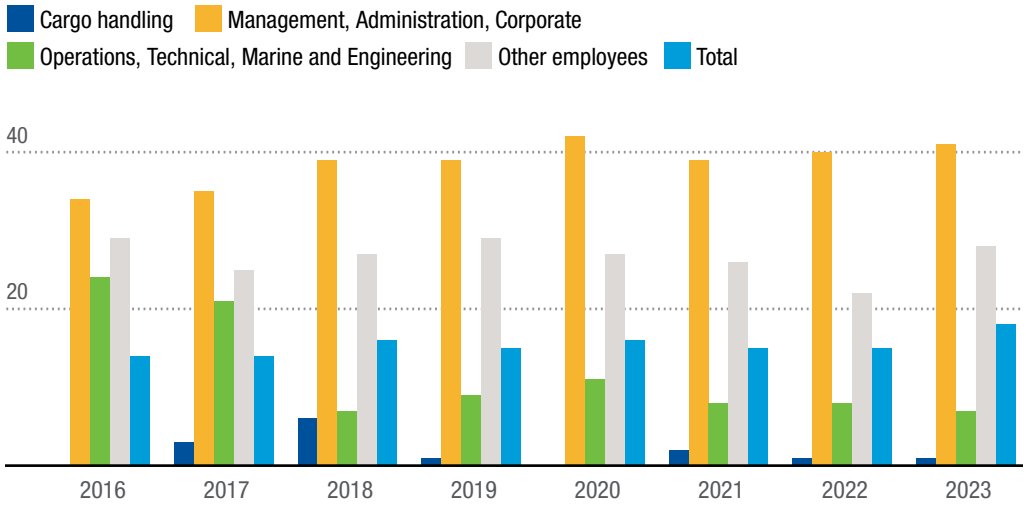
Figure IV. 11
Selected port performance indicators of the Port Performance Scorecard, median value across all reporting entities



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

with ratios used in order to facilitate global comparisons. In 2023, the average share of women employed in ports was 18 per cent. However, in management and administrative roles—where women often have a greater presence—the share was 41 per cent. Many job categories, such as cargo-handling and operations, still require improved strategies to attract more women into these roles (figure IV.12 and box IV.2).

Figure IV. 12
Women's participation in port workforces, median across all ports



Source: UNCTAD calculations, based on data from port entities reporting to PPS.
Note: Data summarized without applying any methodology for handling missing data.

The average share of **women employed in ports was 18%**

Box IV. 2
Status of women in shipping

Only 5% of highest management positions **held by women**

The year 2024 marked the third IMO International Women in Maritime Day. During the event, the IMO Secretary-General stressed the importance of investing in women's education and professional development, to help create a sustainable future, and the IMO Gender Equality Award was launched, to recognize individuals, irrespective of gender, who have made significant contributions to advancing gender equality and empowering women in the maritime sector.

The Women's International Shipping and Trading Association (WISTA) states that over the past three years, efforts to address the gender gap in the sector have become more apparent (WISTA, 2024). In 2021, IMO and WISTA launched the women in maritime survey (IMO, WISTA, 2021); a second survey is scheduled for 2024. Both IMO member States and the private sector have shown increased interest in gathering robust data for women in shipping. The 2021 survey showed that women accounted for only 29 per cent of the overall workforce, with seafarers making up 2 per cent of the crewing workforce. In the over 500 companies that participated in the survey, only 5 per cent of senior management positions were held by women. The results of the second survey will act as a benchmark to monitor any changes in these patterns and identify areas of opportunity, and the survey has been enhanced to cover aspects such as roles in sustainability, chartering, academia and facilities for women on board ships. Obtaining more data will be critical in formulating better gender representation.

One of the limiting factors in attracting women to seafaring careers is the presence of sexual harassment and assault in the maritime sector, an issue identified in a study by the Global Maritime Forum (2023). The joint ILO–IMO Special Tripartite Committee of the 2006 Maritime Labour Convention discusses the adoption of regulations, mechanisms and policies for reporting and addressing bullying and harassment, including sexual assault and harassment. WISTA is actively participating in the discussions, as gender-focused policy and regulation are paramount for increasing the share of women seafarers.

Over the past 50 years, both internationally and through its 59 national associations, WISTA has participated in initiatives aimed at supporting and training women to enter the sector and to accelerate their maritime careers, both onboard and ashore. Initiatives include the United Nations Global Compact Maritime Just Transition Task Force, the IMO–WISTA Maritime Speakers Bureau (IMO, WISTA, 2024), showcasing women as maritime experts, as well as collaborating with other organizations, training providers and IMO to support capacity-building projects for women in maritime and trade globally, with a particular focus on developing nations.

Source: Women's International Shipping and Trading Association, based on cited sources.

Improved times for container-handling

PPS secondary (or "sectoral") data on cargo and vessel operations can also be a valuable source of information. For example, container data reveals annual growth in handling rates and dwell times. In 2023, the average time that containers spent in a port was three days, down from five days in 2022. This type of cargo is easy to compare internationally given its high levels of standardization. In general, vessel and cargo metrics can be analysed by scale or region. When examining port performance, it is also important to consider both estate income (money earned from leasing or using port land and property) and cargo volume per hectare (amount of cargo handled per unit of land). Larger port areas often handle less cargo per hectare because the space is bigger. Additionally, when analysing cargo volumes per berth (the amount of cargo handled at each docking area), it is assumed that all berths are always available for any type of cargo.

Performance measurement informing port decision makers

TrainForTrade supports more detailed casework on port performance, including data reported in PPS, as part of the programme's dissertation process, that is, the business reports focused on improving the ports that participate in the Modern Port Management course. These reports are a source of analysis and augment the questions raised by the data in the PPS, and offer examples of South–South cooperation (UNCTAD, 2024e).

The PPS project continues to accumulate data and the casework informs network members. Primary-level data supports performance appraisal and scenario modelling for strategic planning. In addition, challenges related to measuring port performance are taken into account; the common caveat to benchmarking ports is that there will always be issues with comparisons and data definition due to local conditions and priorities. However, use of PPS shows that if ports work together on definitions and data collection and use digitalization, advanced data collection methods and nuanced analysis, it is highly beneficial for ports to get involved in this initiative.

The TrainForTrade programme brings together strong examples of **South–South cooperation across ports and port stakeholders**

Box IV. 3
How ports can support the development of green hydrogen in Africa

Transitioning from the use of fossil fuels to renewable energy sources is on the agenda of African leaders and policymakers. In this context, countries across the continent are exploring the potential to harness green hydrogen to meet energy needs and broaden the energy mix. Green hydrogen requires substantial renewable energy and hydropower resources. The interplay of these resources, as well as land availability and quality of port infrastructure, defines the geography of the hydrogen economy in Africa. Coastal countries possess significant potential in this regard, not only due to water and energy availability, but also due to the existence of port infrastructure. The energy requirements of industries as well as the shipping sector in particular, are expected to lead to a substantial demand for hydrogen in the vicinity of ports. Ports could play a variety of roles in the hydrogen economy, such as acting as landlords by providing land for the hydrogen economy and investing in infrastructure, including pipelines, terminals and fuel stations, among others.

African countries have a range of opportunities along the value chain of green hydrogen development. These include generating renewable energy and producing green hydrogen and handling its transportation, storage and application. Ports could be involved in the different stages of this value chain. For instance, when conceived as industrial zones, ports could be used not only to generate renewable energy but to produce and store green hydrogen. Green hydrogen could be produced from onshore and offshore wind farms and could be imported or exported through ports. In this regard, Europe is expected to be a main importer of green hydrogen from Africa, particularly from North Africa, by 2050 (European Commission, 2023). For imports of green hydrogen to Africa, ports are expected to play a key role in facilitating hydrogen supply to the wider port community and hinterlands, due to their role as energy hubs.

The potential to export green hydrogen to international markets has led some African countries to become involved in production. African countries nearer to Europe—which offers a market for green hydrogen—and those with good port infrastructure are well placed to take advantage of this opportunity. According to mapping carried out by the African Hydrogen Partnership, Djibouti, Egypt, Ethiopia, Ghana, Kenya, Mauritania, Morocco, Nigeria, Rwanda, South Africa and the United Republic of Tanzania are potential landing zones or hubs for storing and distributing green hydrogen (AbouSeada and Hatem, 2022). Countries such as Namibia and South Africa are considered hubs due to their well-established international shipping routes.

In 2023, Namibia and Hyphen Hydrogen Energy agreed on a deal to produce and export up to 300,000 tons of green hydrogen per year (Voice of America, 2023). Similar projects are expected in Angola, Egypt, Mauritania, Morocco, Tunisia and other countries. Most hydrogen is imported or exported on ships. Countries that aspire to harness ports to develop a green hydrogen economy need to invest in import and export terminals, port equipment such as refuelling stations and bunkering infrastructure and pipelines to transport hydrogen. International trade in green hydrogen also requires market development and promotional activities. It entails developing policies to market green hydrogen and creating regional alliances to encourage its use, as well as trade within and between countries. An example of one such partnership is the African Green Hydrogen Alliance, formed by six coastal countries, namely, Egypt, Kenya, Mauritania, Morocco, Namibia and South Africa (Green Hydrogen Organisation, 2024).

In terms of hydrogen-related applications, the transport sector, particularly the shipping industry, is attracting investment in research and development. Ports are envisaged to play an important role in fuelling maritime vessels with hydrogen. The ongoing disruptions in the Red Sea have demonstrated the importance of ports in Southern Africa in servicing vessels passing the Cape of Good Hope on an alternative route from Asia to Europe. Ports in this region have provided bunkering and other services to vessels. Globally, the maritime industry is already embracing green hydrogen as an alternative fuel in marine engines. The World Bank has assisted South Africa in exploring the requirements for establishing green marine bunker fuel value chains at the ports of Boegoebaai and Saldanha. Both ports have the potential to develop into green hydrogen hubs, each offering a unique value proposition (World Bank, 2023).

Source: ECA based on cited sources.

C. Facilitating maritime trade and transport: Seaport performance and hinterland connectivity

Global container port traffic has increased by over 50 per cent over the past decade. This highlights the need to quickly and efficiently transfer cargo and containers through ports to hinterland destinations and along transit routes to final destinations. As noted in the previous section, port calls have been increasing and the number of active container ports further increased in 2023.

More frequent port calls, together with larger vessel sizes, drive the need for efficient cargo-handling in ports. Recent disruptions to shipping and supply chains have underscored the difficulties in ensuring efficient transport and logistics connections to hinterland destinations. Congestion and inefficiencies in ports when unloading and reloading cargo leads to long dwell times and increased costs. Speeding up the transfer of cargo between ports and hinterland destinations can alleviate the pressure on ports and reduce congestion and delays.

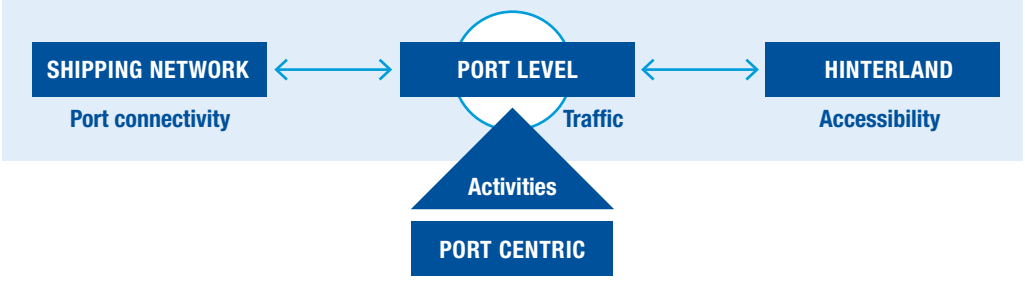
Port cargo dwell time (the time cargo waits in port to be processed) is a key performance indicator for ships and ports. However, dwell time also occurs along inland transport routes, including at dry ports, warehouses, corridors and transit points, and when clearing cargo. Relatively high cargo dwell time is associated with less efficient transport networks and facilities. In many ports in developing countries, there are extended delays at ports. In 2010, a comparative analysis of transport costs along the Northern Corridor (a key transport route in East Africa, linking the port of Mombasa, Kenya, to landlocked countries such as Burundi, Rwanda and Uganda) showed that 44 per cent of the total transport cost on the Mombasa–Kigali route was linked to the cost of various delays (CPCS, 2010). These considerations underline the importance of efficient hinterland connections, including for landlocked developing countries, which face disproportionately higher transport and trade costs.

The hinterland of an international port is the region in which goods are conveyed through the port to and from international markets, and is usually served by road, rail and inland waterways, as well as airports and pipelines in some cases (figure IV.13). The volumes of cargo flows originating or destined to the hinterland, the number and capacity of modes of transport to and from the seaport and the frequency of services are some indicators that define the connectivity level of the hinterland to a port (Arvis F, et al., 2018).

Links to hinterland destinations face difficulties as shipping and supply chain connections are disrupted

Figure IV. 13

Transport supply chain, from ports to surrounding areas



Source: UNCTAD. See https://resilientmaritimelogistics.unctad.org/guidebook/31-port-interface.

Good port hinterland connections improve access and **facilitate the movements of goods** between a seaport and the hinterland

Enhanced port–hinterland connectivity is generally associated with rapid and efficient transfer of cargo, in particular containers, from ports to final destinations by way of various transport modes, including intermodal options. Access to the hinterland is often handled along transport and transit corridors and involves transport networks such as rail and road, as well as facilities such as dry ports and inland container depots (dry ports specialized in handling containerized cargo). Improved hinterland connections are key to reducing overall logistics costs. It has been estimated that inland transport costs can vary between 40 and 80 per cent of the total transport cost of a container (Notteboom and Winkelmans, 2001).

Port–hinterland connectivity is crucial for port competitiveness and can be a key parameter in decision-making processes, including selecting a port of call. Good port hinterland connections improve access and facilitate the movements of goods between a seaport and the hinterland. They also increase market and business opportunities for ports and stakeholders. Furthermore, the availability of customs and other clearance services at hinterland locations is an important factor when deciding on logistics strategies.

An example from the East African Community (EAC) serves to illustrate the positive correlation between port performance, the quality and efficiency of hinterland connections and trade facilitation measures applied at ports and at transport and logistical facilities in hinterlands. For example, in 2021, the port of Mombasa, Kenya, handled 28 per cent of cargo sent to the EAC hinterland. Kenya supports logistics facilities along the Northern Corridor, with 76 per cent of this cargo going to Uganda in 2021 (Northern Corridor Transport Observatory, Annual report 2021). Kenya is part of the EAC transit system and has five inland container depots and one inland port, which facilitates the efficient movement of cargo from the port to other destinations along the Northern Corridor and into the hinterlands.

Efficient trade and transit facilitation is essential for the competitiveness of seaports, the hinterland **and landlocked countries**

Decreasing the time cargo spends at ports and reducing delays along corridors and transit routes and at dry ports is crucial for lowering costs. Efficiencies can be achieved by applying trade and transport facilitation measures, such as those outlined in the WTO Agreement on Trade Facilitation (TFA), which make the movement of cargo faster, more efficient and less expensive. Doing so, combined with infrastructure solutions such as improving physical connections to reduce bottlenecks or relocating administrative functions such as customs clearance and trade compliance to dry ports and inland container depots, can improve port connectivity with the hinterland.

In the following subsections, measures that can improve hinterland connectivity are outlined, namely, trade and transit facilitation measures and infrastructure, regulatory framework and market structure-related measures.

Trade and transit facilitation

Efficient trade and transit facilitation is essential for the competitiveness of seaports, the hinterland and landlocked countries. Improvements can involve measures to streamline customs and trade compliance processes, reduce cargo dwell time and enhance the overall efficiency of supply chains. Key strategies can include those detailed in this section.

Automating customs and trade compliance

Implementing automated clearance for customs and trade compliance can reduce paperwork, processing times, and costs for trade and government agencies. The TFA emphasizes the importance of measures such as single windows (article 10.4), which consolidate the automatic submission of documents and data through a single-entry point, thereby speeding up clearance processes.

The UNCTAD Automated System for Customs Data (ASYCUDA) is an example of how customs clearance processes may be automated and the UNCTAD approach to establishing single window solutions is an example of best practices in bespoke implementation that serves the needs of user countries (UNCTAD, 2024f). Digital platforms such as Port Community Systems and Maritime Single Windows, which are mandatory under the International Convention on Facilitation of International Maritime Traffic (FAL Convention, 1965), are examples of how digitalization can be implemented in the maritime sector to facilitate better coordination among stakeholders.

Authorized Operators

An Authorized Operators programme (TFA article 7.7) can provide benefits such as reduced inspections and faster clearance for compliant businesses, enhancing the flow of goods through ports and into the hinterland. Authorized economic operators can manage customs procedures at their premises, further reducing port congestion. Within a regional context, mutual recognition of Authorized Operators among neighbouring countries can further strengthen the benefits of such a programme.

Transit systems

Implementing simplified transit procedures, including portable regional or international guarantee schemes, can improve efficiency and reduce the financial burden of moving goods in transit across borders (TFA article 11) or to hinterland destinations (TFA article 9). This is particularly significant for traders from landlocked countries that depend on smooth transits through neighbouring coastal nations. In this context, the exchange of data across borders is equally important, although this provision is not included in article 11. A good example of how cross-border transit data are implemented is the SIGMAT system operated with ASYCUDA, which is the interconnected system for the management of goods in transit and is widely used for exchanging transit data between several West African countries (UNCTAD, 2022).

Reducing cargo dwell time and cargo clearance

Reducing the time that cargo spends in ports and transit points due to clearance procedures is vital. Trade facilitation measures such as pre-arrival processing (TFA Article 7.1), risk management (TFA Article 7.7) and border agency coordination (TFA Article 8) can help achieve this. Establishing and publishing average release times (TFA Article 7.6) can be instrumental in identifying bottlenecks in the clearance process. Average release times refer to the typical time taken for cargo to be cleared through customs and by other compliance authorities before being officially released for onward transport.

Coordination between the public and private sectors

Coordination between public and private sector stakeholders is crucial for simplifying cross-border clearance processes. Without such cooperation, efforts may be fragmented, making it more difficult to achieve intended efficiency improvements. National trade facilitation committees (NTFCs) (TFA article 23.2) can help ensure effective consultation and coordination and facilitate decisions on most trade and transport facilitation reforms. UNCTAD provides capacity-building and technical assistance for such committees (UNCTAD, 2024g). Border-level coordination and transit coordination are equally important. UNCTAD also offers capacity-building on these issues, including training for transit coordinators (UNCTAD, 2024h).

The UNCTAD approach to establishing **single window solutions** is an example of best practices

Coordination between public and private sector stakeholders is crucial for **simplifying cross-border clearance processes**

Inland container depots help in decentralizing and relocating customs and regulatory functions **away from congested ports**

Regional cooperation

Initiatives such as the East African Community (EAC) Customs Union and the Single Customs Territory have demonstrated the benefits of regional cooperation in trade facilitation to significantly reduce transit times and costs. The development of one-stop border posts in the EAC region is a successful example of a solution reducing trade costs.

Infrastructure, regulatory framework and market structures

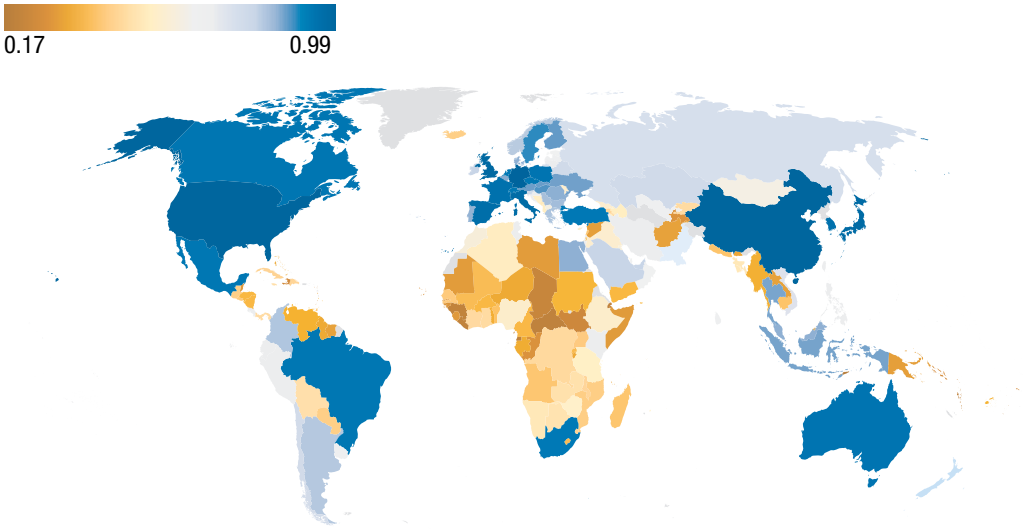
Effective trade facilitation is underpinned by robust infrastructure. Investment in transport corridors, dry ports, and inland container depots helps to relocate customs and regulatory functions away from congested ports. The physical infrastructure connecting seaports to hinterlands is crucial for improving port performance. Developing and maintaining efficient road and rail networks is essential for the smooth movement of goods. The quality of transport infrastructure in many developing countries, particularly many LLDCs in Africa, as well as many transit countries in Africa, ranges between 20 and 50 per cent of the quality benchmark set by the best performing jurisdictions globally (map IV.1).

Public–private partnerships are instrumental for developing quality infrastructure. Such partnerships foster private investment and expertise and help close infrastructure gaps. However, private sector participation brings challenges for regulators, who need to ensure competitive markets.

More attention should be paid to the aspects detailed in this subsection, since they have a direct impact on the flow of goods to and from hinterlands.

Map IV. 1

Quality of global infrastructure, 2023: Leading jurisdictions (China, Europe, North America) and areas for development (Africa, Caribbean, Central America)



Source: Global Quality Infrastructure Index Programme 2023.
Note: The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the United Nations concerning the legal status of any country, territory or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

Regulatory framework

Effective regulatory frameworks are essential to support hinterland connectivity. Governments should ensure that regulations are transparent and harmonized and promote smooth operations. This includes aligning national policies with international standards (TFA Article 10.3). Adhering to rules and regulations for infrastructure use, for instance observing weights and dimensions for trucks, and driving and rest-hour standards for drivers, are crucial not only for safety but for maintaining efficient infrastructure and fair market conditions.

Intermodal transport solutions

Due to containerization, integrating different modes of transport such as rail, road and inland waterways can facilitate the seamless movement of goods. Containerization reduces congestion at ports and enables quicker transit times. However, the through-transport of containers to final destinations is often lacking, even for full container loads, particularly since the COVID-19 pandemic. A number of container operators restrict the movement of containers to inland destinations due to concerns about long turn-around times for empty containers, which can disrupt logistics operations and increase costs. This impacts the overall efficiency of supply chains, as reloading in ports and delays in moving cargo inland can lead to bottlenecks and reduced throughput at ports. Unloading containers and transferring cargo to different modes of transport at ports causes congestion, which increases transport times and costs and can lead to the deterioration of cargo.

Efficient transport corridors

Transport corridors support the connection between ports and hinterlands. They enhance transport connectivity and support market and supply chain integration, often with a particular focus on landlocked countries. Involving all stakeholders along transport corridors and measuring performance are key objectives to ensure that everyone is on board and committed to a more efficient process.

Market structure

The efficiency of hinterland connectivity can be influenced by market structures and competition. For instance, “cargo reservation” regimes (policies that allocate or reserve cargo space) for trucking companies and quantitative restrictions and price schemes for inland transport can restrict competition and increase costs, while open market conditions can enhance efficiency.

This is particularly the case with road transport, whereby limiting licences for national and international carriage can trigger cost increases.

Dry ports

Dry ports act as inland extensions of seaports at which customs and other regulatory processes can be completed. They provide facilities for cargo-handling and storage and regulatory inspections away from seaports. Such decentralization is particularly beneficial for landlocked countries since it ensures efficient access to international trade routes. Dry ports also enhance multimodal transport capabilities, linking road, rail and waterways. Their efficiency depends on the collaboration between various stakeholders, including shipping lines, logistics providers, shippers and regulatory agencies. The effective management of dry ports can reduce costs, enhance service quality and improve overall supply chain performance. For example, the network of dry ports in China and the numerous inland container depots in India have proven effective in improving the flow of trade.

In conclusion, improving the performance of seaports involves several key steps, namely, improving connections to inland areas, integrating different types of transport more effectively and ensuring transport markets are competitive but well-regulated. By focusing on these areas, ports can operate more efficiently, lower costs and better meet the needs of their surrounding regions.

Efficient corridors are needed to support landlocked countries

Quantitative restrictions and price schemes for inland transport **can restrict competition and increase costs**

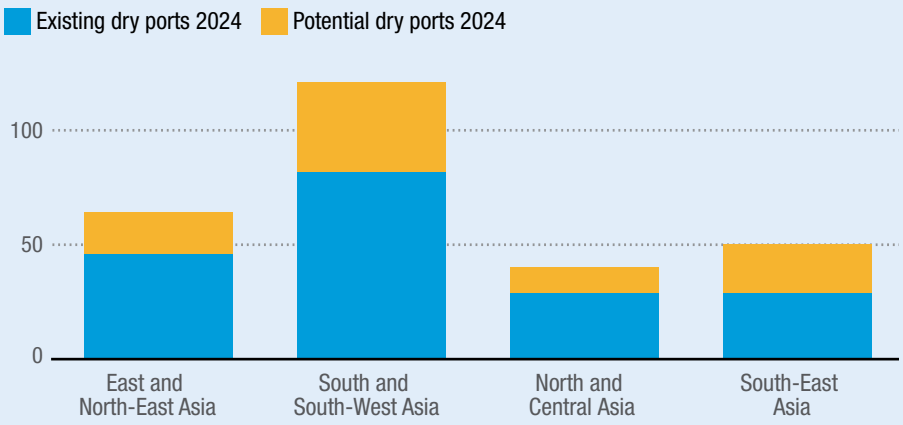
Box IV. 4
Dry ports and landlocked developing countries in Asia and the Pacific

In recent years, intermodal facilities and dry ports have attracted significant attention because of their potential to improve transport efficiency. By combining access to highways and railways with customs processing, warehousing, consolidation, distribution, manufacturing and economic clustering, dry ports are an integral support for supply chains along domestic and cross-border economic corridors. The dry port concept initially emerged from the idea of a seaport directly connected by rail to inland intermodal terminals, where shippers can deliver or collect standardized units as if they were at a seaport. Dry ports were developed in response to the challenges posed by the growth of containerized transport, including limited space at seaport terminals and increasing congestion on access routes.

Seaports can achieve economies of scale by operating with cost-effective and high-frequency intermodal transport to destinations beyond their traditional hinterlands, for example by using rail connections to expand hinterlands and stimulate intermodal transport. Seaports are integral links between maritime and land transport systems and dry ports are an essential part of inland trade distribution systems, providing an intermodal link between inland transport modes, such as between road and rail or between rail and inland waterways.

Regional cooperation in Asia and the Pacific to develop dry ports has intensified since the Intergovernmental Agreement on Dry Ports, 2013 was adopted as key components of the Asian Highway Network and the Trans-Asian Railway Network. This effort supports the broader goal of creating an integrated intermodal transport and logistics system for the region, with dry ports playing a crucial role in improving connectivity and efficiency. Currently, there are 275 dry ports in the region, formally designated as such by the Parties to the Intergovernmental Agreement on Dry Ports, 2013. The majority of existing and potential dry ports are located in South Asia and South-West Asia, mainly in India followed by countries in Central Asia (box figure IV.4.1).

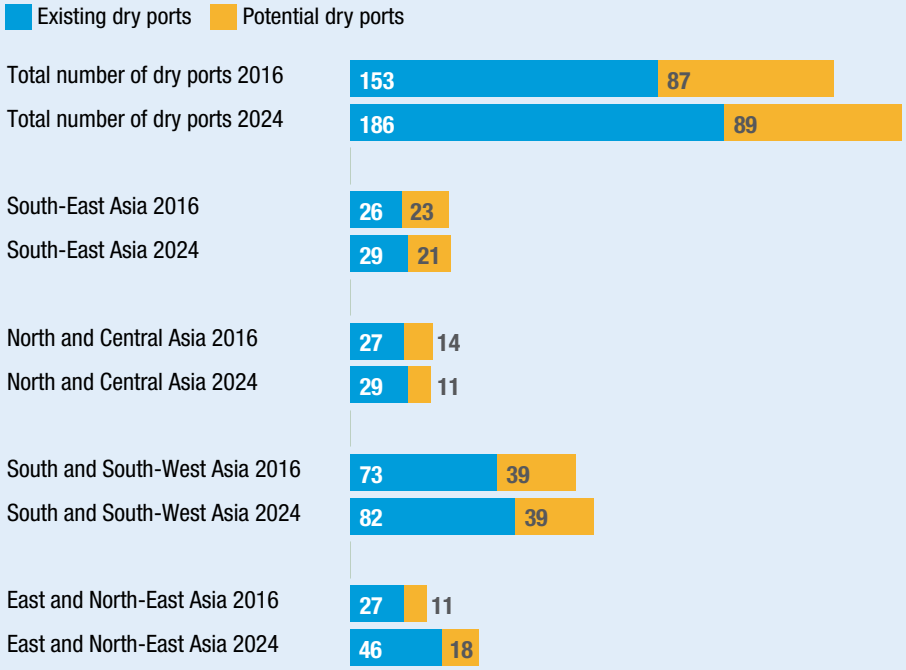
Box figure IV. 4. 1
Number of dry ports in Asia and the Pacific by subregion



Source: ESCAP, 2024.

Azerbaijan, China India, the Russian Federation and Türkiye host the largest number of dry ports in Asia and Eastern Europe. Dry port development is significant in several landlocked developing countries, including Azerbaijan, the Lao People's Democratic Republic and Mongolia. The number of dry ports has increased by 12 per cent since 2016 (from 240 to 275) with the share of potential (not yet operational) ports decreasing from 36 to 32 per cent (box figure IV.4.2). The most dynamic dry port development has taken place in India and the Russian Federation.

Box figure IV. 4. 2
Evolution of dry ports in Asia and the Pacific



Source: ESCAP, based on cited sources.

D. Policy considerations

Port performance

- **Monitor performance**: Ports should continue to monitor performance and adapt globally recommended sets of indicators to their needs, strategies and local conditions, while maintaining international comparability as much as possible. This will allow for meaningful internal comparisons overtime and benchmarking within countries, regions and globally, to inform of strategic targets and focus areas.
- **Modernize**: Ports need to be upgraded and modernized to become more resilient against external risks related to climate change, geopolitical conflicts and future pandemics and to protect ports and port communities, including hinterlands. Ports should minimize the impact on their surroundings and the environment through appropriate legislation and regulations, such as adequate due and fee policies to promote decarbonization and the use of green energy among shipping lines, operators and other members of the port community.
- **Human capital**: Ports should invest in human capital to ensure that they can improve and maintain performance over time. Training at all levels will boost efficiency and deliver long-term benefits for ports by improving quality and reducing personnel turnover. Increasing competencies of port workers, together with innovation and modernization, can help mitigate the impacts of potential labour shortages.

Women in ports

- **Promote all job roles**: The participation of women in ports should be further promoted and encouraged, particularly in areas that are still strongly underrepresented, such as cargo-handling, operations, technical, marine and engineering.

Trade facilitation and hinterland connectivity

- **Efficiencies**: Efficiency in hinterland connectivity is important for port performance and should be considered a crucial factor when measuring the performance of supply chains. Essential criteria in evaluating the efficiency of hinterland regions include connectivity, coordination and digitalization.
- **Streamlining**: Onward conveyance of cargo to hinterlands, including in LLDCs, should be facilitated through liberalized transport regulations, implementation of the WTO Agreement of Trade Facilitation, efficient port operations and streamlined intermodal operations.
- **Public–private partnerships**: To enhance connectivity, authorities and ports should encourage public–private partnerships in the development of dry ports, inland container depots and other facilities along corridors. National Trade Facilitation Committees are mandatory under the WTO Agreement on Trade Facilitation, to assist the implementation of trade facilitation reforms.
- **Through-transport**: Solutions for the through-transport of containers to final destinations, inland container stations and dry ports should be encouraged.
- **Digital**: Digitalization is key to improving hinterland connectivity and interoperability between the respective systems of public agencies and private stakeholders. This includes customs automation, digital exchanges of cross-border and transit data and single digital platforms such as single window solutions and the maritime single windows.

- **Regulation**: Regulatory frameworks, whether regional or national, enhance the harmonization of infrastructure, laws and trade development along transport corridors.
- **Sustainability**: Sustainability through green corridors should be included in policymaking decision processes when expanding hinterlands and building new terminals.
- **Transit**: Harmonizing customs transit systems and reducing border-crossing costs is crucial in successfully integrating developing countries into international trade, including cross-border exchanges of data and transit guarantee schemes.

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