UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

REVIEW OF MARITIME TRANSPORT

2022

Navigating stormy waters

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ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
ASYCUDA	Automated System for Customs Data
ASYREC	Automated System for Relief Emergency Consignments
BIMCO	Baltic and International Maritime Council
BWM Convention	Ballast Water Management
MMBtu	British thermal units
CAPEX	capital expenditure
CCFI	China Containerized Freight Index
CIF	cost, insurance and freight
CII	Carbon Intensity Indicator
CIMC	China International Marine Containers
CLC	International Convention on Civil Liability for Oil Pollution Damage
CMA CGM	Compagnie Maritime d'Affrètement and Compagnie Générale Maritime
FOB	free on board
CH4	methane
CO_2	carbon dioxide
COP	Conference of the Parties
CR4	four-firm concentration ratio
CSIS	Center for Strategies and International Studies
DCSA	Digital Container Shipping Association
dwt	deadweight tonnage
EBIT	earnings before interest, taxes
EBP	experience-building phase
ECA	Economic Commission for Africa
ECSA	East Coast of South America
ECE	United Nations Economic Commission for Europe
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
EDI	Electronic Data Interchange
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Existing Ship Index
EGCS	exhaust gas cleaning systems
ESCAP	United Nations Economic Commission for Asia and the Pacific
ESCWA	United Nations Economic and Social Commission for Western Asia
eTIR	electronic International Road Transport system
EU ETS	European Union Emissions Trading Scheme
FAL Convention	Convention on Facilitation of International Maritime Traffic
FIATA	International Federation of Freight Forwarders Associations
FMC	Federal Maritime Commission
FOB	free on board

GDP	Gross domestic product
GHG	greenhouse gas
GT	gross tonnage
GVC	global value chain
HNS	hazardous and noxious substances
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICC	International Chamber of Commerce
ICS	Institute of Chartered Shipbrokers
ILO	International Labour Organization
IMF	International Monetary Fund
IMRB	International Maritime Research and Development Board
IMO	International Maritime Organisation
WISTA	Women's International Shipping & Trading Association
IOPC-FUND	International Oil Pollution Compensation Funds
ISO	International Standards Organization
ISWG-GHG	Intersessional Working Group on Reduction of GHG Emissions from Ships
ITF	International Transport Workers' Federation
JCC	Joint Coordination Centre
JICA	Japan International Cooperation Agency
LAC	Latin America and the Caribbean
LDC	least developed country
LLDC	landlocked developing country
LLMC	Limitation of Liability for Maritime Claims
LNG	liquified natural gas
LPG	liquified petroleum gas
LSCI	Liner shipping connectivity index
MARPOL Convention	International Convention for the Prevention of Pollution from Ships
MENA	Middle East and North Africa
MEPC	IMO Marine Environment Protection Committee
MGO	marine gasoil
MLC	Maritime Labour Convention
MLETR	UNCITRAL Model Law on Electronic Transferable Records
MSC	IMO Maritime Safety Committee
MSC	Mediterranean Shipping Company
MSW	maritime single window
N_2O	nitrous oxide
NMTDs	negotiable multimodal transport documents
NOR	notice of readiness

NTFC	National Trade Facilitation Committee
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of the Petroleum Exporting Countries
PCS	port community system
PIANC	World Association for Waterborne Transport Infrastructure
PPPs	public-private partnerships
PPS	Port Performance Scorecard
R&D	research and development
RCEP	Regional Comprehensive Economic Partnership
SCFI	Shanghai Containerized Freight Index
SEEMP	Ship Energy Efficiency Management Plan
SIDS	small island developing States
SOx	Sulfur oxide
SPS	Sanitary and Phytosanitary Measures
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TBT	Technical Barriers to Trade
TEU	twenty-foot-equivalent unit
TFA	Trade Facilitation Agreement
TIR	Transports Internationaux Routiers
UN/CEFACT	The United Nations Centre for Trade Facilitation and Electronic Business
UNCITRAL	United Nations Commission on International Trade Law
UNCLOS	United Nations Convention on the Law of Sea
UNCTAD	United Nations Conference on Trade and Development
UNDESA	UN Department of Economic and Social Affairs
UNFCCC	United Nations Framework Convention on Climate Change
UNOHRLLS	UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
VLCCs	very large crude carriers
VLSFO	very low sulphur fuel oil
WCO	World Customs Organization
WHO	World Health Organization
WTO	World Trade Organization
XSI	Xeneta shipping index

NOTE

The *Review of Maritime Transport* is a recurrent publication prepared by the UNCTAD secretariat since 1968 with the aim of fostering the transparency of maritime markets and analysing relevant developments. Any factual or editorial corrections that may prove necessary, based on comments made by Governments, will be reflected in a corrigendum to be issued subsequently.

This edition of the *Review* covers data and events from January 2021 until June 2022. Where possible, every effort has been made to reflect more recent developments.

All references to dollars ($) are to United States dollars, unless otherwise stated.

"Ton" means metric ton (1,000 kg) and "mile" means nautical mile, unless otherwise stated.

Because of rounding, details and percentages presented in tables do not necessarily add up to the totals.

Two dots (..) in a statistical table indicate that data are not available or are not reported separately.

All websites were accessed in September 2022.

The terms "countries" and "economies" refer to countries, territories or areas.

Since 2014, the *Review of Maritime Transport* does not include printed statistical annexes. UNCTAD maritime statistics are accessible via the following links:

All datasets: http://stats.unctad.org/maritime

Merchant fleet by flag of registration: http://stats.unctad.org/fleet

Share of the world merchant fleet value by flag of registration: http://stats.unctad.org/vesselvalue_registration

Merchant fleet by country of ownership: http://stats.unctad.org/fleetownership

Share of the world merchant fleet value by country of beneficial ownership: http://stats.unctad.org/vesselvalue_ownership

Ship recycling by country: http://stats.unctad.org/shiprecycling

Shipbuilding by country in which built: http://stats.unctad.org/shipbuilding

Seafarer supply: http://stats.unctad.org/seafarersupply

Liner shipping connectivity index: http://stats.unctad.org/lsci

Liner shipping bilateral connectivity index: http://stats.unctad.org/lsbci

Container port throughput: http://stats.unctad.org/teu

Port liner shipping connectivity index: http://stats.unctad.org/plsci

Port call performance (Time spent in ports, vessel age and size), annual: http://stats.unctad.org/portcalls_detail_a

Port call performance (Time spent in ports, vessel age & size), semi-annual: http://stats.unctad.org/portcalls_detail_sa

Number of port calls, annual: http://stats.unctad.org/portcalls_number_a

Number of port calls, semi-annual: http://stats.unctad.org/portcalls_number_sa

Seaborne trade: http://stats.unctad.org/seabornetrade

National maritime country profiles: http://unctadstat.unctad.org/CountryProfile/en-GB/index.html

Vessel groupings used in the *Review of Maritime Transport*

Group	Constituent ship types
Oil tankers	Oil tankers
Bulk carriers	Bulk carriers, combination carriers
General cargo ships	Multi-purpose and project vessels, roll-on roll-off (ro-ro) cargo, general cargo
Container ships	Fully cellular container ships
Other ships	Liquefied petroleum gas carriers, liquefied natural gas carriers, parcel (chemical) tankers, specialized tankers, reefers, offshore supply vessels, tugboats, dredgers, cruise, ferries, other non-cargo ships
Total all ships	Includes all the above-mentioned vessel types
Approximate vessel-size groups according to commonly used shipping terminology	
Crude oil tankers	
Ultra large crude carrier	320,000 dead-weight tons (dwt) and above
Very large crude carrier	200,000-319'999 dwt
Suezmax crude tanker	125,000-199,999 dwt
Aframax/Long Range 2 crude tanker	85,000-124,999 dwt
Panamax/Long Range 1 crude tanker	55,000-84,999 dwt
Medium Range tankers	40,000-54,999 dwt
Short Range/Handy tankers	25,000-39,000 dwt
Dry bulk and ore carriers	
Capesize bulk carrier	100,000 dwt and above
Panamax bulk carrier	65,000–99,999 dwt
Handymax bulk carrier	40,000–64,999 dwt
Handysize bulk carrier	10,000–39,999 dwt
Container ships	
Neo Panamax*	Ships that can transit the expanded locks of the Panama Canal with up to a maximum 49m beam and 366 m length overall.
Panamax	Container ships above 3,000 20-foot equivalent units (TEUs) with a beam below 33.2 m, i.e. the largest size vessels that can transit the old locks of the Panama Canal.
Post Panamax	Fleets with a capacity greater than 15,000 TEUs include some ships that are able to transit the expanded locks.

* 12-14,999 TEU 'Neo-Panamax' fleet includes some ships which are too large to transit the expanded locks of the Panama Canal based on current official dimension restrictions; 15,000+ TEU 'Post-Panamax' fleet includes some ships which are able to transit the expanded locks.

Source: Clarksons Research.

Note: Unless otherwise indicated, the ships mentioned in the *Review of Maritime Transport* include all propelled seagoing merchant vessels of 100 gross tons and above, excluding inland waterway vessels, fishing vessels, military vessels, yachts, and fixed and mobile offshore platforms and barges (with the exception of floating production storage and offloading units and drill-ships).

FOREWORD

Rarely has the importance of maritime logistics for trade and development been more evident than during the last year. Historically high and volatile freight rates, congestion, closed ports and new demands for shipping following COVID-19 and the war in Ukraine have all had measurable impacts on people's lives. With ships carrying over 80% of volume of global trade, higher shipping costs and lower maritime connectivity lead to higher inflation, shortages of food, and interruptions of supply chains – all of which are among the features of the current global crisis.

Concretely, the *Review* estimates that higher grain prices and dry bulk freight rates in early 2022 contribute to a 1.2 per cent increase in consumer food prices. Container ships spent 13.7 per cent longer in port in 2021 compared to 2020, exacerbating delays and shortages. And during the last year, total greenhouse-gas emissions from the world fleet increased by 4.7 per cent.

UNCTAD's *Review of Maritime Transport* has assessed and accompanied developments in shipping and seaports since 1968. The experience and extensive data sets generated during the last decades help UNCTAD provide a comprehensive and thorough assessment of the causes and impacts of the trends covered in the *Review*. And the message emanating from our analysis is clear: The world again needs the shipping industry to navigate through the rough seas of crises.

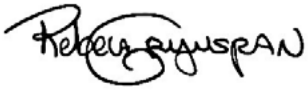
The war in Ukraine has disrupted major shipping routes and supply chains. It has also triggered record prices that could push tens of millions more people across the world into hunger and poverty this year, as has been stated by the UN Global Crisis Response Group. Maritime transport has a key role to play in cushioning the blow. Prices need to come down to affordable levels, especially for developing countries, and for the world to have enough fertilizers to feed itself.

Under the leadership of UN Secretary General Antonio Guterres, the United Nations has sought to address these two pressing concerns through the parallel implementation of two initiatives: the Black Sea Grain Initiative, through which over ten million metric tons of grain have been shipped from Ukrainian ports, and the Memorandum of Understanding on Promoting the unimpeded exports of Russian Food and Fertilizers to the World Markets. Alongside Türkiye, a key player in this effort, we signed the two agreements in Istanbul on July the 22nd. UNCTAD, and in particular our teams working on maritime logistics, provided essential support to these initiatives, which highlight the real development impact of UNCTAD's policy research in this field.

As the ongoing supply chain crisis is easing, with decreasing freight rates and improving port performance, we must not lose sight of the actions needed to prepare for the long term development of the sector. We need a transparent multilateral framework for the decarbonization of maritime transport, to reduce uncertainty for policy makers and industry alike. Confronted with uncertainty, ship owners have delayed some new building orders, and the average age of the world container ship fleet has increased from 10.3 to 13.7 years.

We also need to ensure that the concerns of the developing countries, notably the most vulnerable economies including Least Developed Countries and Small Island States, are addressed. We must avoid that the same countries that are most negatively affected by climate change – and who have contributed the least to its causes – would also be those who would be most negatively affected by climate change mitigation.

Thus, looking beyond the horizon, the *Review* points to major challenges, but also opportunities for developing countries. Extensive data sets and analysis show how decarbonization, digitalization, and market consolidation require novel and collaborative policy responses. The *Review of Maritime Transport 2022* provides the necessary assessment, and it is my hope that it will help to identify the solutions for a future world that counts on sustainable and resilient maritime supply chains.



Rebeca Grynspan
Secretary-General of UNCTAD

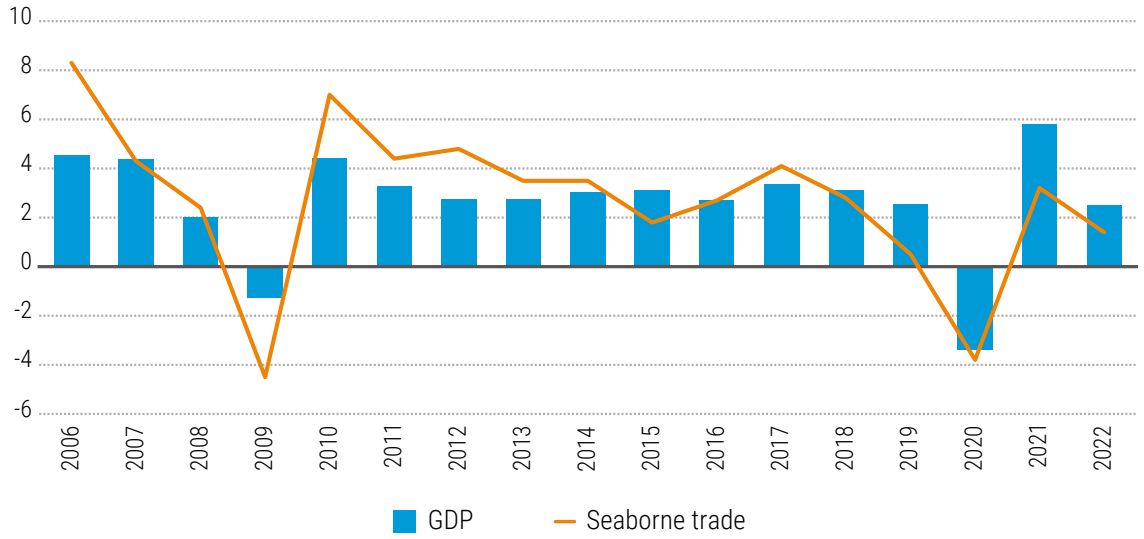
OVERVIEW

NAVIGATING THROUGH SUPPLY CHAIN DISRUPTIONS

Maritime trade recovered in 2021, but in 2022 faces a complex operating environment fraught with risk and uncertainty

Following a 3.8 per cent decline in 2020, international maritime trade bounced back in 2021 with an estimated growth of 3.2 per cent, and overall shipments of 11 billion tons (figure 1). This was slightly below pre-COVID-19 levels, as trade was still hampered by the prolonged pandemic, an unprecedented logjam in global logistics caused by a large upswing in demand and acute shortages of capacity on the supply side. Growth was driven primarily by increases in demand for containerized cargo. Gas, and dry bulk shipping also increased while shipments of crude oil declined.

Figure 1 **International maritime trade and world GDP**
Selected years (percentage annual change)



Source: UNCTAD secretariat, based on UNCTADstat data and *Review of Maritime Transport*, various issues. GDP figure for 2022 based on table 1.1, World Output Growth, 1991–2023, UNCTAD Trade and Development Report 2022.

For 2022, UNCTAD projects maritime trade growth to moderate to 1.4 per cent, and for the period 2023–2027 to expand at an annual average of 2.1 per cent, a slower rate than the previous three-decade average of 3.3 per cent. For many years the fastest growing segment was containerized trade, for which growth in 2022 is projected to be a tepid 1.2 per cent, before marginally picking up to 1.9 per cent in 2023. The projected deceleration is a consequence not just of pandemic-induced lockdowns, but also of strong macroeconomic headwinds combined with a weakening in China's economy. In addition, faced with rising inflation and living costs, consumers are spending less, while to some extent switching expenditure from goods to services.

For 2022, the operating landscape remains complex. Globally, inflation and living costs are rising. In China, which is the world's largest exporter, a zero-COVID policy triggered shutdowns and disrupted manufacturing, logistics, and supply chains. In Ukraine, a major food exporter, since the beginning of the war ports in the Black Sea were closed.

Industrial action and labour strikes in a number of world ports, including in Germany, the Republic of Korea, South Africa and the United Kingdom have also been affecting maritime transport. At the same time, a series of extreme weather events, with, for example, floods, hurricanes and heatwaves across Australia, Brazil, Pakistan, East Africa, Europe and the United States are also having an impact.

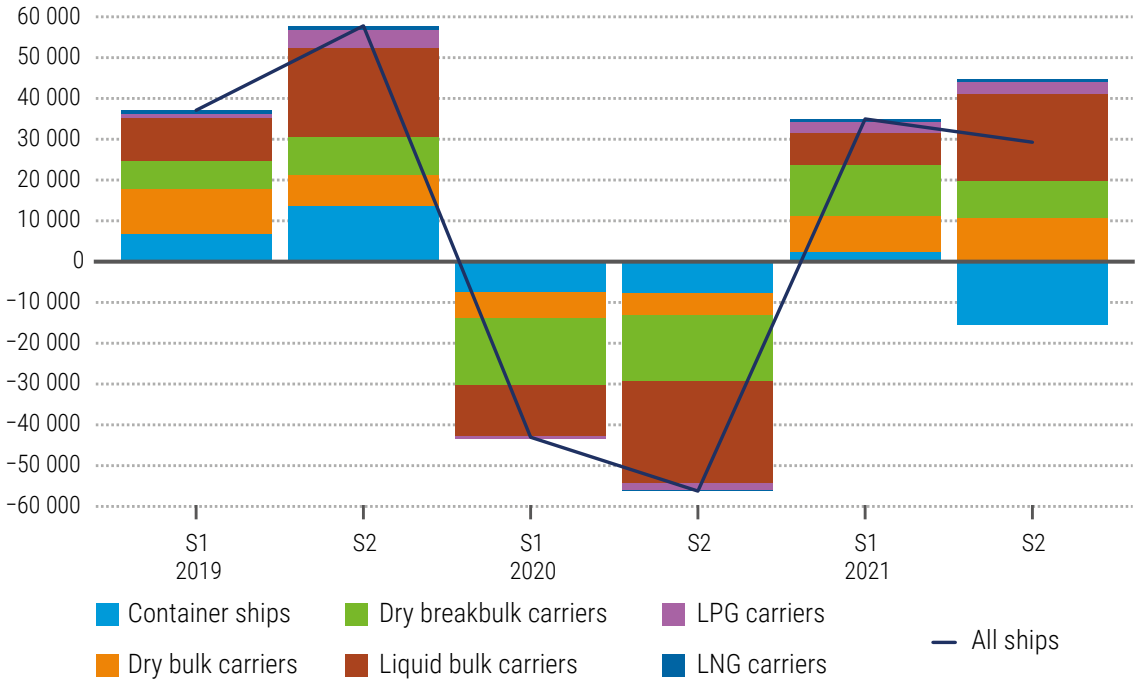
All these problems spell further trouble for global supply chains and logistics – and for maritime trade. By the fourth quarter of 2022, projected global economic growth had been revised downward, with fears that the world economy could slip into recession and stagflation.

To some extent, trade in ton-miles is being sustained by market and supplier substitution. The Russian Federation, faced with economic and other restrictive measures, is seeking alternative markets, while European importers are considering other sources of supply. Ton-mile demand is also likely to be boosted as African countries source grain from more distant locations.

Port calls change with rising congestion and shifts in liner shipping connectivity

In line with maritime trade, port calls also bounced back in 2021 amid unmatched port congestion with hotspots being concentrated in the United States, Europe and China (figure 2). In Northern Europe, some shipping operators, seeking to boost efficiency, cut the number of port call locations per rotation. This pushed up the volume of cargo exchange per call, while extending work time at terminals and putting pressure on the main ports. The effects of congestion and logjams rippled across a range of industries such as car manufacturing, healthcare and electronics, and notably through a serious shortage of semiconductors.

Figure 2 **Changes in port calls per half year, world total**
First semester 2019–second semester 2021
(year-on-year differences)



Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1,000 GT and above, not including passenger ships and Ro/Ro vessels.

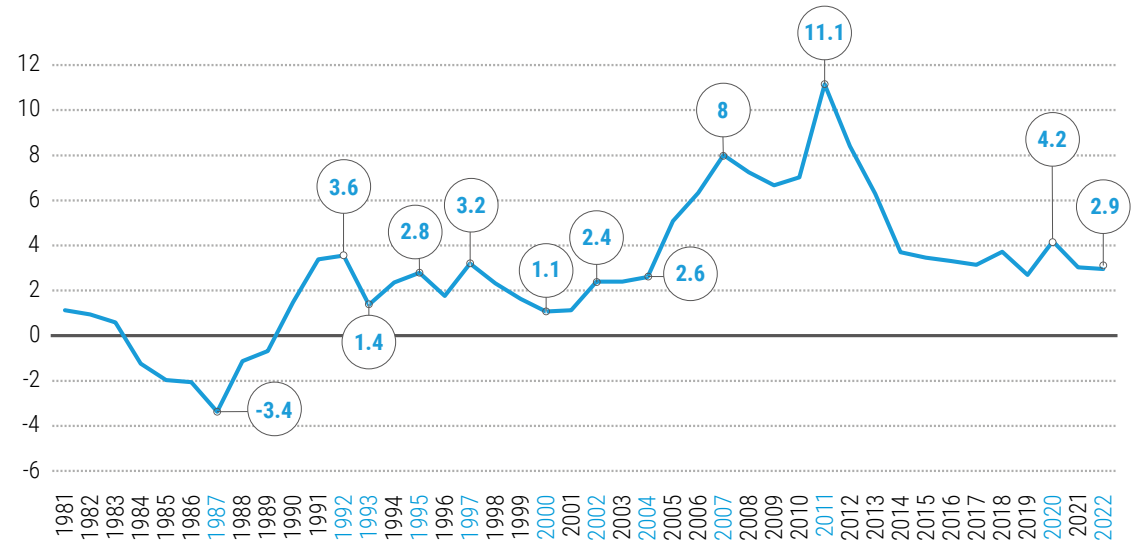
Since the onset of the logistics disruptions in late 2020, there has been an overall global decline in liner shipping connectivity, though with variations between countries. The world's most connected country remained China which widened its lead. And India extended its regional connections by upgrading port capacity. Similarly, in North Africa continued development of port infrastructure helped mitigate the impact of the pandemic.

These gains were offset by declines in connectivity elsewhere, including leading economies. In the United States of America, for example, container port operational performance was undermined by weakness in West Coast port infrastructure as a consequence of long-term underinvestment. But the picture was even worse in parts of the developing world: over this period, most of Africa and Latin America and the Caribbean suffered significant reductions in direct connections.

Trade recovery is confronted with low fleet growth

In 2021, the global commercial fleet grew by under three per cent – second lowest rate since 2005 (figure 3). The fastest growth, driven by global gas demand was for liquefied gas carriers followed by containerships and bulk carriers.

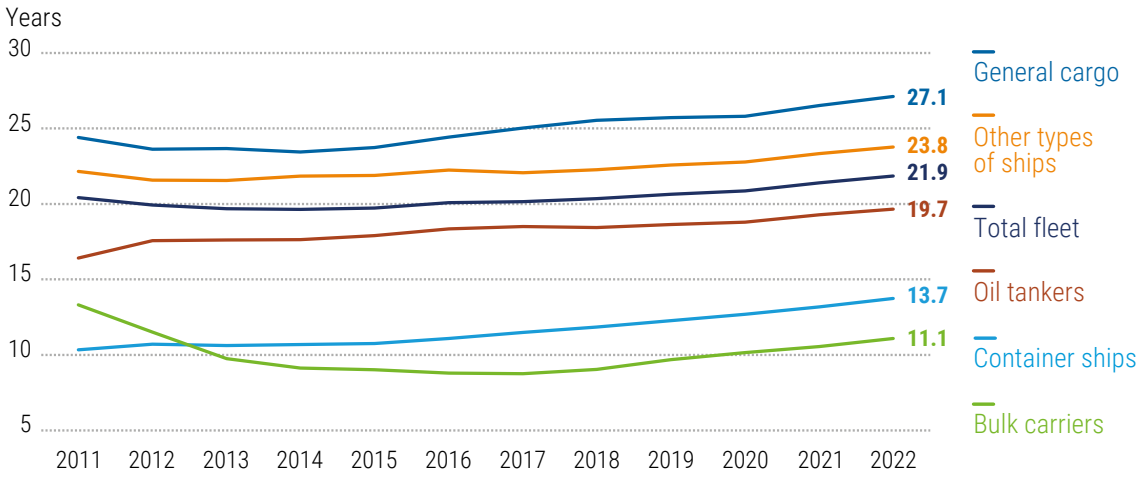
Figure 3 Annual growth of commercial fleet, 1981–2022
Growth rate (percentage of the dwt)



Source: UNCTAD calculations, based on data from Clarksons Research.
Note: Propelled seagoing vessels of 100 gross tons and above, as of 1 January 2022.

Since 2011, the fleet has been ageing. By number of ships, the current average age is 21.9 years, and by carrying capacity 11.5 years. Bulk carriers remain the youngest vessels with an average age of 11.1 years, followed by container ships at 13.7 years, and oil tankers at 19.7 years (figure 4).

Figure 4 Average age of the commercial fleet, weighted by number of ships, by vessel type, 2011–2022



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

Average ship age has been increasing partly because, in the wet and dry bulk sector especially, shipowners have been uncertain about future technological developments and the most cost-efficient fuels, as well as about changing regulations and carbon prices. To benefit from the current high freight and charter rates, they have therefore kept their older ships in operation. In 2020, in terms of gross tons, ship deliveries contracted, but in 2021 they increased by 5.2 per cent. Nevertheless, shipbuilding volumes remain below the 2014–2017 levels.

Maritime trade recovery faces unprecedented port congestion and unreliable schedules

The global logistics logjam started in late 2020 and intensified in 2021. Congested ports struggled to cope with increased demand, as they and their hinterland connections were often short of equipment, of labour and of storage facilities. As a result, in 2021 global average container schedule delays doubled. And on

the Far East and North America routes, between the first quarter of 2020 and the last quarter of 2021, delays increased from two days to 12. Meanwhile, between 2020 and 2021, median turnaround time for container ships increased by 13.7 per cent (table 1).

Table 1 Time in port, vessel age and size, by vessel type, 2021 (world total)

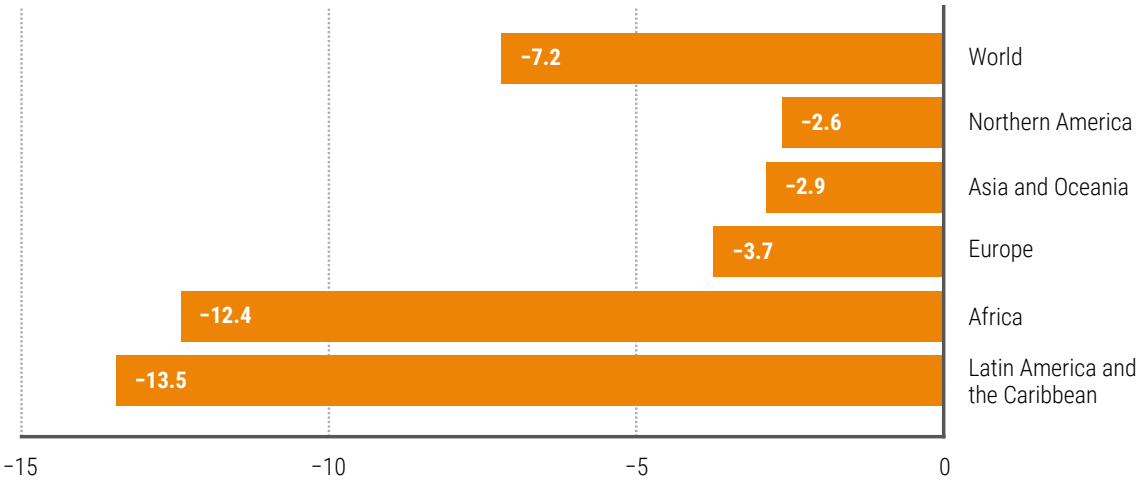
Vessel type	Median time in port (days)	Median time in port, annual change (%)	Average size (GT) of vessels	Maximum size (GT) of vessels	Average cargo carrying capacity (dwt) per vessel	Maximum cargo carrying capacity (dwt) of vessels	Average container carrying capacity (TEU) per container ship
Container ships	0.80	13.7	37 223	237 200			3 431
Dry breakbulk carriers	1.17	2.1	5 463	91 784	7 427	116 173	
Dry bulk carriers	2.11	2.3	32 011	204 014	57 268	404 389	
LNG carriers	1.13	0.9	95 356	168 189	74 522	155 159	
LPG carriers	1.03	-1.5	10 541	61 000	11 799	64 220	
Liquid bulk carriers	0.98	1.3	15 739	170 618	27 275	323 183	
All ships	**1.05**	**4.8**	**21 732**	**237 200**	**26 997**	**404 389**	**3 431**

Source: UNCTAD, based on data provided by MarineTraffic.

Note: Ships of 1,000 GT and above. Not including passenger ships and Ro/Ro vessels.

Port congestion was initially concentrated in three hotspots: China, Northern Europe, and the West Coast of the United States. But as shipping lines redeployed ships to the busier and more profitable United States and China routes other countries suffered even more. Africa and Latin America and the Caribbean, for example, lost more than 10 per cent of their direct liner shipping connections (figure 5). Many developing countries were faced with late arrival of vessels and shortage of containers.

Figure 5 Number of direct calls by region from 2020Q3 to 2022Q2 (percentage change)



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

In addition, carriers seeking greater profitability changed their shipping patterns, stopping calls at certain ports. Since the beginning of the pandemic, schedule reliability has dropped consistently, resulting in losses to shippers totalling $5–10 billion. Shippers have complained about this and the withdrawal of shipping capacity, especially from smaller and vulnerable developing countries, as well as about high charges for demurrage and detention, and called on governments to scrutinize the industry more closely.

Congestion and logistical problems persist in 2022, prompting rerouting and new regional services in Asia

In 2022, the pandemic continued to disrupt supply chains and maritime transport, with many ships stuck in port. Over the period 2016–2019, port congestion had caused around 32 per cent of world

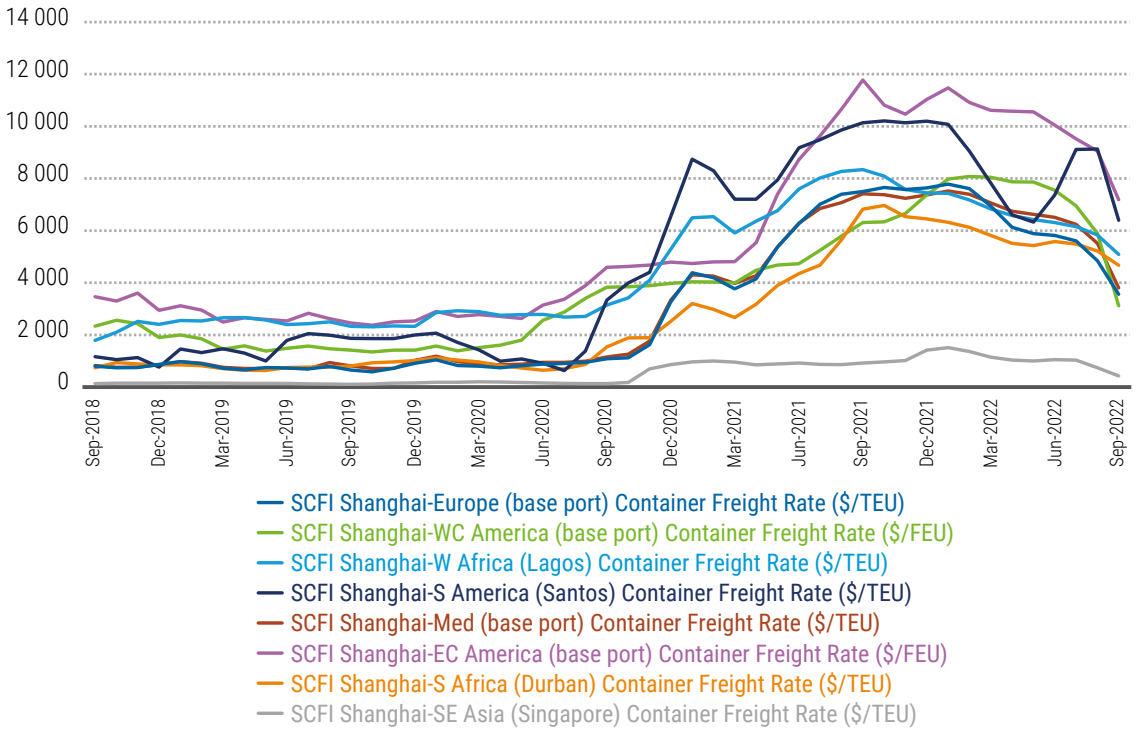
containership fleet capacity to be held up at ports, but by July 2022 the proportion had reached 37 per cent. In spring 2022, China's zero-COVID policy led to lockdowns in Shenzhen and Shanghai, two of its largest manufacturing and commercial centres, requiring carriers to reroute to alternate ports such as Ningbo. To fill the gaps left by the redeployment of ships to the more lucrative East-West trade lanes, Asian regional carriers launched new intra-Asia services or enhanced existing loops to provide additional calls.

Container freight rates reach historic highs

In 2021, the shortage of shipping capacity and continued disruptions caused by COVID-19, combined with a rebound in trade volumes boosted container freight rates to record levels. By mid-2021, rates had peaked at four times their pre-pandemic levels. Container carriers also faced extra expenses, but were able to post record profits.

Spot container freight rates also surged on other routes, including those to developing regions. For example, in 2019 on the China to South America (Santos) route the rates per TEU were around $2,000 but by December 2020 were $6,543, and by December 2021 had reached $10,196. Over the same period, December 2020–December 2021, rates per TEU on the Shanghai to South Africa (Durban) route increased from $2,521 to $6,450 and on the Shanghai to West Africa (Lagos) route increased from $2,521 to $7,452 (figure 6).

Figure 6 Shanghai containerized freight index (SCFI) monthly spot rates, September 2018 to September 2022, selected routes



Source: UNCTAD secretariat, based on data from Clarkson Shipping Intelligence Network.

As of mid-2022, many pandemic-driven conditions were unwinding. Capacity constraints were easing, spot freight rates moderating (but still above the pre-pandemic levels), and volumes were not increasing so fast. Less port congestion frees up more shipping supply and helps dissipate logistics logjams and the supply-chain crunch. Nevertheless, maritime trade conditions and logistics could deteriorate depending on the state of the world economy.

Divergent freight rate pathways with high volatility and uncertainty looming

At the start of 2022, container freight rates remained high and volatile, though they started to drop in the second quarter of the year. Future rates will be driven by a number of factors, working singly or in combination, suggesting greater volatility and an overall downward trend in some segments. These include increased uncertainty regarding demand, the extent of port congestion, potential new supply chain disruptions, and the effects of the war in Ukraine, including increased fuel costs.

By early 2022, freight rates had already started to decline on some routes, and from mid-year there was a drastic downturn. Over four weeks between August and September, there was a double-digit fall. By the third week of September, the Shanghai Container Freight Index had dropped by nearly 60 per cent. Nevertheless, these rates are more than double the pre-pandemic averages.

Container freight rates can be expected to decline further as merchandise trade normalizes and newly built vessels enter the market. But freight rates and their volatility will increasingly be shaped by environmental regulations. In 2023, the IMO's Energy Efficiency Existing Ship Index (EEXI) and Carbon Intensity Indicator (CII) measures will come into force for all vessel types. These will likely reduce shipping capacity as they stipulate slower sailing speeds to save fuel and will require some vessels to be retrofitted or recycled.

For dry bulk shipping, by September 2022 rates had softened as congestion eased and China's economy slowed. Future demand will be affected by a persistent pandemic and its impact on supply chains, a global economic slowdown and volatile commodity prices, while the supply will depend on fleet growth, for which in 2022 deliveries only grew by 3.6 per cent. Dry bulk freight rates are further being disrupted by the war in Ukraine as well as by higher operational costs arising from the energy transition and new environmental regulations.

For oil tankers, freight rates can be expected to increase with a potential rise in oil demand and trade and a reshuffling of global oil flows resulting from the war in Ukraine. There is also likely to be some fall in capacity as the IMO's EEXI and CII regulations take old tankers out of markets.

Digital trade facilitation speeds up customs clearance, and the release of goods, particularly during emergencies

Many supply chain disruptions and logistical logjams can be eased through trade facilitation, especially in the developing and least developed countries, and particularly by digitalization which enhances transparency, speeds up clearance, allows for risk management and pre-arrival processing, and enables more responsive and agile processes. Indeed, had COVID-19 struck a few decades earlier the disruption would have been far worse.

A number of trade facilitation solutions specifically aim to cut waiting and clearance times in ports. Some speed up documentary processes, including pre-arrival processing, with the use of e-documents and electronic payments. Others relate to enabling the separation of release from clearance – where goods can be conveyed directly to warehouses of trusted importers to await subsequent clearance, often not even undergoing physical inspections. Trade facilitation also provides for specific measures for shipments of medical supplies, emergency goods, and perishable cargoes, with expedited procedures.

The war in Ukraine disrupts food and energy supplies and moves shipping into sharp focus

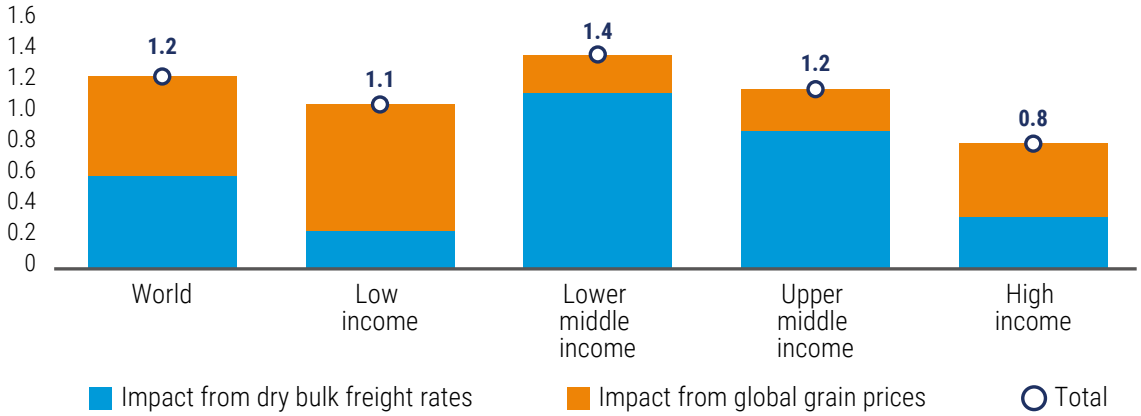
The war in Ukraine, and the related economic restrictive measures, are affecting maritime transport far beyond Europe and the war zone. The war dented global business confidence, amplified uncertainty and increased volatility. The effects rippled across commodity and financial markets, and supply chains, with serious implications for food and energy security as well as for inflation and the cost of living. Inflation had already started rising in 2021 amid high freight rates, but the war in Ukraine further drove up commodity prices and inflation, opening up the prospect of stagflation and a global recession.

Ukraine and the Russian Federation are among the world's breadbaskets; they provide around 30 per cent of the world's wheat and barley, one-fifth of its maize, and over half of its sunflower oil. The Russian Federation is also a major supplier for other critical products: together with Belarus, the country exports around a fifth of the world's fertilizers, and is leading exporter of natural gas and the second-largest exporter of oil. The war thus has serious implications for commodity shipments and food security and has brought shipping and ports to the forefront of public attention.

The war stopped grain shipments through Black Sea ports, with dire consequences for poor countries. In 2021, Ukraine's grain exports had been about 4.2 million tons per month, totalling 50 million tons for the year. By early March 2022 they had dropped to zero. Food prices, which had already been increasing, then soared.

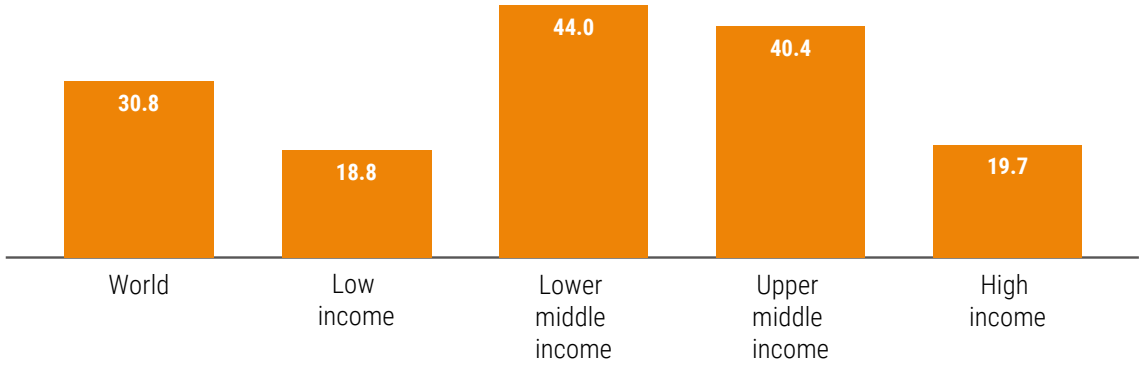
Dry bulk freight rates also increased because of the war in Ukraine, rising energy costs, and the prolonged pandemic. An UNCTAD simulation projects that higher grain prices and dry bulk freight rates can contribute to a 1.2 per cent increase in consumer food prices (figure 7). The price increases will be slightly higher in middle-income economies whose food imports depend more on dry bulk shipping (figure 8). Low-income economies have limited capacity in primary food processing and import more processed food which arrives in containers (figure 9).

Figure 7 Impact of higher dry bulk freight rates and global grain prices on consumer food prices, selected country groups (percentage change)



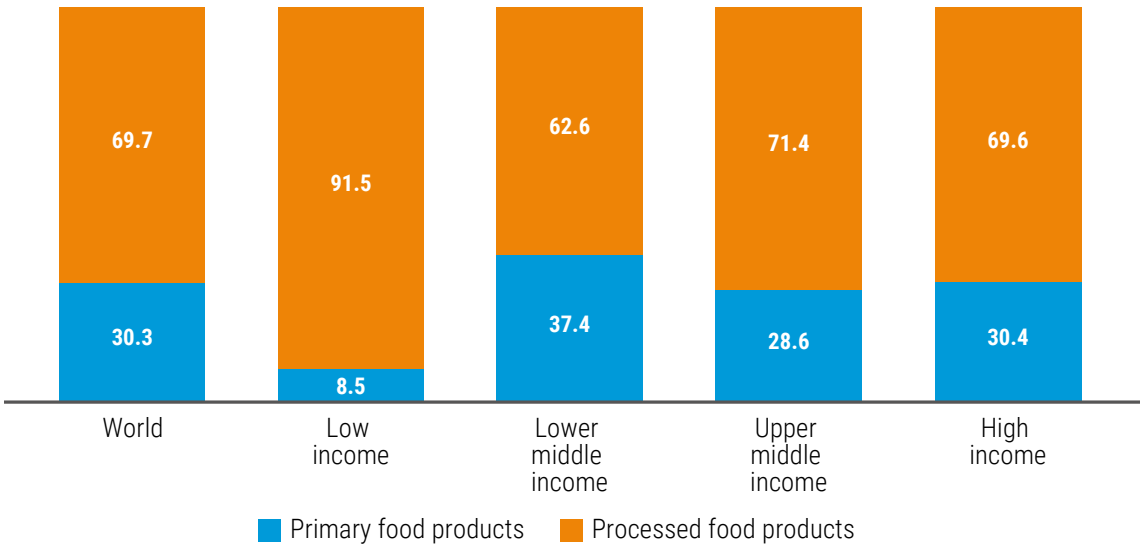
Source: UNCTAD calculations based on data provided by Clarksons Research, Shipping Intelligence Network, the IMF, International Financial Statistics, Direction of Trade Statistics and Consumer Price Index, UNCTADstat, and the World Bank, World Integrated Trade Solution, Commodity Price Data (The Pink Sheet) and A Global Database of Inflation.

Figure 8 Share of grains imported by bulk ships in total food imports, selected country groups, 2019 (percentage)



Source: UNCTAD calculations based on data provided by Sea/ (www.sea.live) and Food and Agriculture Organization, Food Balances.

Figure 9 Share of primary and processed food products in food imports mainly for household consumption, selected country groups, 2020 (percentage)



Source: UNCTAD calculations based on World Bank, World Integrated Trade Solution.

Prospects improved in July 2022 as the United Nations, the Russian Federation, Türkiye and Ukraine agreed the Black Sea Grain Initiative. The initiative allows exports from Ukraine of grain, other foodstuffs, and fertilizers, including ammonia, to resume through a safe maritime humanitarian corridor from three key Ukrainian ports: Chornomorsk, Odesa, and Yuzhny/Pivdennyi, to the rest of the world. A Joint Coordination Centre (JCC) was established in Istanbul to monitor implementation of the deal. Shipments monitored by the Initiative began on 1 August. As of 12 October 7.2 million tons of grains and other foodstuffs had left Ukraine. This freed up some space in Ukraine's silos still full from previous harvests, but more grain needs to be exported to allow for storage of the new harvest. Equally important is resuming fertilizer exports.

One major obstacle for grain-carrying ships from Ukraine's Black Sea ports is insurance. Ships from the Russian Federation also face high vessel insurance premiums.

The war alters trading patterns and disrupts supply chains

Following the war in Ukraine, trade patterns are shifting as buyers seek substitute suppliers, who are usually more distant, adding to ton-miles. Nigeria, for example, is now sourcing potash from Canada, while Egypt is importing wheat from India, as are several East Asian countries. African countries are importing more grain from Brazil, while China is expected to switch its corn sources to Brazil and buy more from the United States. The European Union is also likely to import more corn from Brazil and from the United States.

Oil and gas trades are also being reconfigured as the war deeply challenged global energy supply. Bans on Russian exports are likely to boost global coal demand, while also stimulating investment in renewable electricity, which will in turn boost the demand for minor bulk metals.

There have also been impacts on container shipping. Nine of the top-ten global container lines have suspended operations in the Black Sea region, while other logistics businesses have exited the Russian market. As a result, between the first and second quarters of 2022 Ukraine lost all its liner shipping connections. Over the same period, the Russian Federation lost 50 per cent of its liner services – for its ports in the Black Sea, Baltic Sea and the Far East.

The fall in direct connections to the Black Sea area has affected global logistics, and amplified port congestion in Europe. Moving ahead, the war's impact on container shipping is likely to deepen as a protracted war will dampen global economic growth, cut consumer spending power and reduce demand. It will also increase oil prices, inflation, and the cost of living, and add economic and investor uncertainty.

The Russian Federation and Ukraine are not deeply integrated into global networks for container shipping. Nevertheless, because the two countries supply metals used in the manufacture of cars and renewables the war is amplifying global supply chain disruptions.

In addition, restrictions have made it difficult for shippers and logistics service providers to use the China–Europe rail route which runs through the Russian Federation. They are, however, finding new routes, such as the Middle corridor and the Trans-Caspian International Transport Route.

Seafarers are affected by the lasting pandemic, and by new disruptions

In 2022, based on lessons from the COVID-19 pandemic, governments, seafarers and shipowners agreed amendments to the ILO Maritime Labour Convention, which aimed to strengthen ship health and safety policies and improve seafarer access to medical care ashore and to communications lines with their loved ones. The International Chamber of Shipping also released guidelines for ship operators and shipping companies, covering seafarer health and wellbeing, and vaccination best practices. WHO has issued guidance for the management of COVID-19 on cargo ships and fishing vessels, and has started work towards an international instrument on pandemic preparedness and response.

In April 2022, the IMO adopted a resolution on the evacuation of seafarers from war zones around the Black Sea and the Sea of Azov. The organization has also encouraged continuing efforts to create safe maritime corridors and evacuate seafarers from affected areas, and issued guidance on the impact of the situation in the Black Sea and the Sea of Azov on insurance or other financial security certificates.

Pandemic-related disruptions affect international commercial contracts

With more than 80 per cent of global merchandise trade carried by sea, and much of global commodities trade conducted on cost, insurance, freight (CIF) and free on board (FOB) terms, the pandemic has legal implications for many closely interconnected commercial contracts. In all cases where performance is

disrupted, delayed, or has become impossible, legal consequences and claims arise, involving complex jurisdictional issues and increasing the need for costly dispute resolution.

Commercial risks arising from the pandemic should be fairly allocated through suitably drafted contractual clauses, but considerations will differ depending on the type of contract and the relative bargaining power of the parties. Governments can also provide support, for example by strengthening formal and informal dispute resolution mechanisms and by considering possible mandatory controls on container demurrage accruing at pandemic-affected ports.

MARITIME TRADE IN A RAPIDLY CHANGING AND UNPREDICTABLE WORLD

Maritime transport and trade systems are thus evolving in complex global economic environment and being buffeted by cascading disruptions. But they are also being reshaped by other global factors that can trigger structural shifts. These include climate change and the energy transition, the need for sustainability and resilience, digitalization and e-commerce, and growing market and industry consolidation.

E-commerce expansion outlives the pandemic driven by changing consumer habits and technology

The pandemic resulted in a surge in e-commerce for consumer goods transported in containers. Even as the pandemic eases and the global economy reopens, these trends are continuing. Shippers, retailers and supply chain managers are increasingly adjusting their operations and reassessing their logistics systems.

Major maritime businesses have, for example, been extending their activities by tapping areas such as air freight, final-mile delivery, and e-commerce logistics. In 2021 Maersk, for example, the second world largest container line, acquired various e-commerce logistics companies, including a cloud-based logistics start-up that specializes in technology solutions for B2C warehousing for the fashion industry.

Ecommerce is acutely time-sensitive so shipping and port operators need to speed up their services to remain competitive while also differentiating themselves. This will entail changing shipping patterns and port operations, and extending warehousing capacity. Going forward, digital tools that enable e-commerce growth, collaboration and data sharing will all be important for reaping the full benefits of the growing e-commerce segment.

Digitalization transforms trade and transport

Disruptions are accelerating the use of technology to navigate through the complexities of transport planning and supply chain operations. In a post-COVID, post-war era, higher expectations of rapid delivery put a premium on efficiency, optimization, reliability, visibility, resilience, predictability, and sustainability. If maritime transport operators are to navigate through this new environment, they will need to find innovative business models, and use more advanced digital technologies.

Digitally enabled shopping boosts trade. At the same time, other technologies, such as automation which may reduce the need to offshore production to take advantage of lower labour costs, will probably constrain trade flows. Either way, maritime transport and trade will need to adjust and adapt to technology, and an important part of this is to defend information and communication systems and infrastructure against ever present threats to cybersecurity.

Governments and international organizations must therefore make every effort to close digital divides in transport and logistics and ensure that developing countries can also ride the digitalization wave.

Frequent disruptions and geopolitical risks fuel supply chain reconfiguration debate

The limitations of the just-in-time supply chain model have been exposed not only by the pandemic but by other disruptors observed over the past decade, including, earthquakes, floods, blockage of strategic maritime passages, trade tensions and restrictive trade measures.

In 2022, supply chains were further threatened by the deteriorating geopolitical environment – especially those that relied on one or two suppliers, whether for food, energy or parts and components. These risks were spotlighted by the 2021–2022 semiconductor shortages, whose effects rippled across many industries, notably car manufacturing, electronics, and healthcare.

These developments have reignited the debate over globalization and the future of lean supply chains. Rather than relying on just-in-time models, some companies are therefore revising their operations and considering adopting just-in-case and just-enough business models and seeking other ways to build resilience, supply chain integrity and continuity. Instead of seeking lowest-cost solutions, more companies are pursuing best-cost options that balance manufacturing and transportation costs against factors such as supply chain resilience and environmental sustainability.

While the debate is ongoing, thus far there is no evidence of a mass exodus from distant manufacturing. Reshoring may not be feasible for all manufacturers because domestic suppliers will require the capacity to rapidly scale up operations as well as build the required expertise. In these circumstances, shifts in sourcing are likely to be more gradual.

Authorities need to ensure competitive markets in the face of industry consolidation

Often in response to oversupply of capacity, the container shipping sector has undergone horizontal consolidation through mergers and acquisitions, including outside shipping. Shipping carriers have also pursued vertical integration by investing in terminal operations and other logistics services. They are also working together in consortia and alliances.

As a result, between 1996 and 2022, the top 20 carriers increased their share of container-carrying capacity from 48 to 91 per cent. And over the past five years the four largest carriers increased their market shares so as to control more than half of global capacity (figure 10).

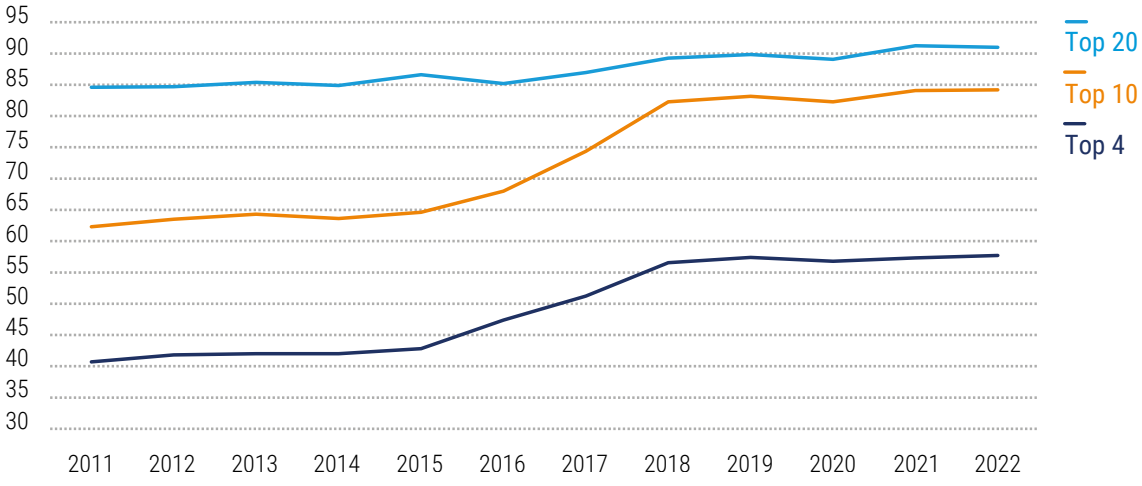
An important consideration is the number of companies that provide services in each country. Generally, this has been falling. As indicated in figure 11, between 2006 and 2022 the average number dropped from 18 to 13. At the same time, the average size of the largest ship arriving in each country almost tripled. As ships expand faster than volumes, this tends to squeeze out smaller competitors. Compared with 2006, the number of companies offering services to importers and exporters rose in 56 countries, but fell in 110 countries, and notably in several small island developing States, where a duopoly of just two carriers dropped to a monopoly of one.

Vertical integration has enabled the four largest container shipping lines to offer more of their own terminal services. Today the two largest container terminal operators, in terms of throughput, are China Cosco Shipping and APM Terminals, both of which are affiliated to two major Chinese and Danish shipping lines.

The most common form of collaboration is strategic alliances. Since 2015, the proportion of global capacity controlled by carrier members of such alliances has increased to more than 80 per cent. Today, the top nine container operators organize their East-West route services through three strategic alliances that include no smaller carriers.

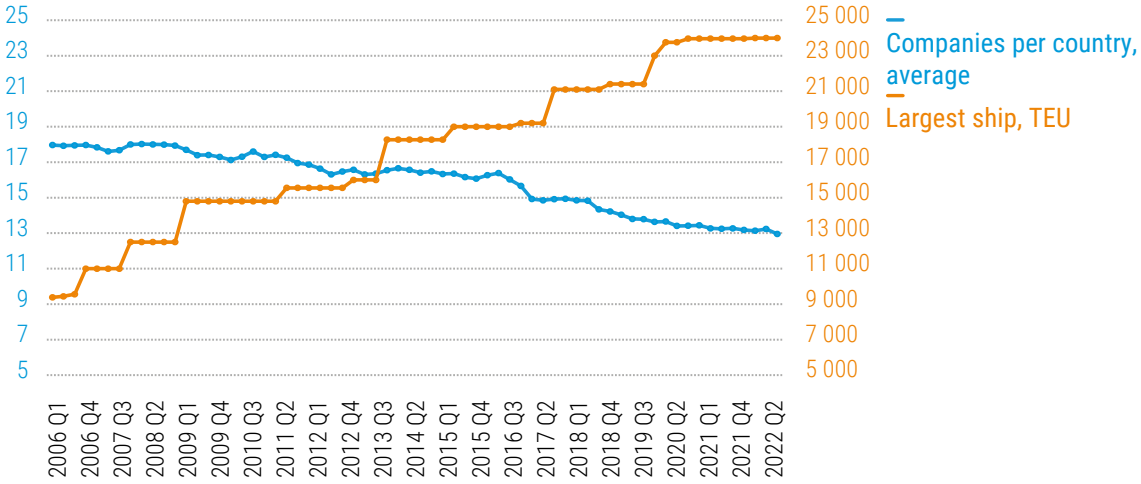
Integration has given carriers and their alliances stronger negotiating and bargaining positions vis-à-vis the port authorities, as they now have two seats at the table – as both tenants of terminals and providers of shipping services.

Figure 10 **Market shares of top four, top ten and top twenty carriers, 2011–2022** (percentage)



Source: UNCTAD, based on data provided by Alphaliner.

Figure 11 Average number of companies providing services per country, and size of the largest ship, Q1 2006–Q2 2022



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

To meet climate goals, shipping and ports look to alternative fuels

Ship owners face more stringent environmental regulations. On 1st January 2023 three new IMO regulations come into force – aiming to reduce maritime greenhouse gas emissions and the environmental impact of ships. One is the CII regulation, on the basis of which 30 to 40 per cent of containerships and dry bulk carriers were considered non-compliant in 2021.

The most immediate way to reduce emissions is slow sailing. But ship owners can also retrofit their ships with energy-efficient technologies so as to use alternative fuels such as LNG, methanol, ammonia, or electricity, or make operational changes. This will drive up costs and affect insurance coverage, as well as future access to investment and capital.

Alternative fuels currently cost two to five times as much as conventional fuel so are not yet commercially viable. Fleet owners can, however, keep their options open with dual-fuel vessels. As of 1 March 2022, almost 40 per cent of the orderbook consisted of ships capable of running on one or more fuels. To scale up the use of alternative fuels, ports need to provide low-emission energy supply infrastructure.

Ports, carriers and everyone involved in maritime supply chains can redefine the competitive landscape for low-emission shipping. This could, however, create a two-tier system of ports and corridors in which only small proportion are alternative-energy-ready. This would limit the number of potential routes.

Climate change mitigation and adaptation in maritime transport: two sides of the same coin

Adapting ports to the impacts of climate change is a growing concern for policymakers and industry alike, but progress on the ground remains slow. There is a growing risk of climate change impacts threatening ports, with important implications for the sustainable development prospects of the most vulnerable nations.

At COP26 in Glasgow the Clydebank Declaration aimed by 2025 to establish six zero-emission green corridors – entirely decarbonized maritime routes between two or more ports. Also at that conference, the Climate Vulnerable Forum, comprising more than 50 developing countries, issued the Dhaka-Glasgow Declaration which included a call for the IMO to work on a mandatory GHG levy on international shipping.

To accelerate efforts on climate change mitigation, the IMO has started work on a revised GHG Strategy for consideration in 2023, as well as on mid-term measures, including some that are market-based. In addition, there are proposals to establish an International Maritime Research and Development Board, and a related fund which could finance the development of zero-GHG technologies to be available to all countries. Other proposals for market-based measures include the use of generated funds for financing climate change adaptation investments, especially in the most vulnerable economies. At the EU level, regulatory proposals are under consideration to extend the EU Emission Trading Scheme to maritime transport activities; if and when adopted, these could have potentially important implications for both intra and extra EU trade.

Reducing pollution from shipping

As well as emitting CO_2, ships are a major sources of air pollution. From 2020, to comply with the International Convention for the Prevention of Pollution from Ships, 1973/1978, ships operating worldwide, have had to use fuels that contain less than 0.5 per cent sulphur. In 2021, the IMO's Marine Environment Protection Committee adopted updated guidelines for exhaust cleaning systems, as well as a resolution urging the voluntary use of cleaner alternative fuels or methods of propulsion that could contribute to the reduction of black carbon emissions from ships operating in or near the Arctic.

Another major form of maritime pollution is associated with bunker oil spills. Work continues at the IMO on developing a claims manual for the Bunker Oil Pollution Convention, 2001 which governs liability for bunker oil spills from vessels other than tankers. Care should be taken in further related work to ensure that the manual effectively responds to the needs and concerns of claimants, including in vulnerable developing countries. In November 2021, reacting to the ever-growing crisis of plastic pollution the IMO adopted a strategy on marine plastic litter from ships. And in March 2022, UNEP adopted a resolution to start work towards an international legally binding instrument to end plastic pollution. Discussions also continue on elaborating the text of an international legally binding instrument under the UNCLOS 1982 on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.

Maritime transport needs to keep pace with change and ensure resilience

Faced with a rapidly changing operating landscape, along sudden disruptions, the maritime trade and transport industry, including shipping, ports, and shippers, has little option but to keep pace with change. Returning to a pre-COVID and pre-war normal seems less and less likely, so maritime trade stakeholders will need to strike balances between a new, and often competing, sets of objectives and priorities.

Already, and largely accelerated by the pandemic, industry stakeholders are shifting focus and revisiting plans and strategies. While the pace of this trend may vary across shipping segments and stakeholders, much of maritime transport industry is putting more priority on customer relations, managing risks, stronger planning, preparedness, resilience and digitalization. They are also increasingly reinventing their own image and service offerings including by tapping new business areas and frontiers with end-to-end control over supply chains.

The maritime industry should also build women's skills and achieve gender equality

The ports industry is still dominated by men. The UNCTAD TRAINFORTRADE Port Performance Scorecard (PPS) gathers data from 58 port entities and in 2021 found that women made up only 17 per cent of the overall port workforce. Most were employed in management where they were 43 per cent of workers, though the proportion was higher in Asia at 60 per cent. But for cargo handling women were only 8 per cent of workers, and for port operations only 6 per cent.

Ports need to conduct more training for both women and men. In 2020–2021, training was only a small proportion of labour costs, partly because ports reallocated funds to managing the pandemic while also switching to cheaper online and distance learning.

PRIORITY ACTION AREAS

1. *Governments should control the pandemic and mitigate its impact on the most vulnerable*

- This calls for better access to vaccines, testing and to therapies, particularly in developing countries. Governments will need to minimize lockdowns and restrictions that could unduly penalize recovery in vulnerable economies.

2. *Support growth, protect the poorest, and enable trade*

- Promote economic growth and strengthen macroeconomic frameworks, while taming inflation and reducing financial vulnerability.
- Help the most vulnerable by promoting food security and reducing poverty.
- Avoid export and import restrictions that compound disruptions.

3. *Tackle supply side infrastructure and services constraints*

- Before investment, carefully assess potential changes in shipping demand.
- Enhance transport infrastructure, improve port performance and productivity, enable connectivity, expand storage and warehousing space and capabilities, minimize labour and equipment shortages, and generally make ports and their hinterland connections more efficient and adequate to handle shifts in demand.
- Develop and upgrade port infrastructure and hinterland connections while involving the private sector.
- Develop regional fleets and shipping services to tackle high transport costs and other challenges faced by developing countries.

4. *Implement transport and trade facilitation solutions at ports and borders*

- Speed up processes through digitalization, particularly pre-arrival processing, electronic payments, and e-documents. Continuously simplify procedures and requirements and remove those no longer needed. For any trade measure, choose the least trade restrictive.
- Adopt smart and green trade logistics systems and remove legal and regulatory obstacles to the use of electronic documents.
- Facilitate crew changes and address the seafarers crew change crisis, through collective action by governments and industry.
- Coordinate efforts, enhance collaboration, share information and prepare for coordinated solutions. Employ real-time, digital platforms and electronic single windows using the AIS/GIS system.

5. *Move to a clean-energy and low-emissions future*

- Establish a predictable global regulatory framework for investing in the energy transition and decarbonization.
- Raise awareness of the new IMO regulations and support implementation and compliance.
- Help ports in developing countries harness the energy transition and decarbonization.

6. *Encourage digitalization and tapping the opportunities from e-commerce*

- Help developing countries expand the use of digitalization and e-commerce, and adopt smart maritime logistics. Provide more training, particularly for the use of new technology.
- Upgrade trade facilitation and logistics infrastructure and services, including last-mile logistics.

7. *Monitor freight rates and charges*

- Monitor industry trends and, when necessary, take action to ensure level playing field that does not exclude smaller players, including stakeholders in developing countries.
- Establish monitoring tools and performance measurements, including regional maritime indices and freight observatories.
- Introduce mandatory controls on demurrage charges for containers at ports, and strengthen formal and informal dispute resolution mechanisms.

8. *Ensure competitive markets*

- Strengthen the capacity of national regulators as well as competition and port authorities, especially in SIDS and LDCs and introduce more transparent indices for freight costs, similar to those available for the main shipping routes.
- Competition and port authorities should work together respond to vertical integration of carriers with measures to protect competition.
- Strengthen international cooperation on cross-border, anti-competitive practices in maritime transport, including on the basis of the UN Set of Competition Rules and Principles, and using the expertise of UNCTAD.

9. *Build resilience*

- Establish a long-term vision and resource mobilization strategy for resilient and sustainable maritime supply chains.
- Help developing countries build capacities to anticipate, prepare for, respond to, and recover from, significant multi-hazard threats, by promoting agile and resilient maritime transport systems.
- Invest in risk management and emergency preparedness for pandemics and other disruptive events in ports and maritime supply chains.
- Upscale capacity-building and affordable infrastructure finance for climate change adaptation and resilience-building of seaports and other critical transport infrastructure in developing countries.
- When reconfiguring supply chains and deciding on where to locate production for more resilient supply chains, options should be carefully assessed to balance efficiency and cost savings, and concerns for national security, autonomy, self-reliance and resilience.
- Employ more women in ports and scale up staff training as a resilience-building strategy.

10. *Revitalize multilateral cooperation*

- Build stronger and more effective multilateral cooperation frameworks that can reduce conflict and disruptions, accelerate a robust and inclusive global recovery, address climate change and its impacts, and move towards low-carbon growth.

1

INTERNATIONAL MARITIME TRADE

International maritime trade flows, which had declined in 2020 by 3.8 per cent, bounced back in 2021 with 3.2 per cent growth, to a total of 11.0 billion tons – only slightly below pre-pandemic levels. The recovery was supported by an easing in the pandemic, with corresponding overall improving economic conditions and increased consumer spending. However, the revival in maritime trade was still constrained, not just by recurring COVID-19 disruptions but also by unprecedented port congestion and a global logistics logjam. Compounded by shortages of equipment and labour, these constraints also resulted in higher freight rates and less reliable services.

In 2022, the fragile recovery lost steam. There was fresh disruption from the war in Ukraine, which contributed to global increases in inflation and the cost of living. At the same time there were new waves of COVID-19 that further disrupted supply chains, particularly in China which had a zero-COVID policy. The world now faces the prospect of recession and stagflation. For 2022, UNCTAD expects maritime trade growth to slow to 1.4 per cent, or lower should the headwinds intensify. The war in Ukraine has also caused shifts in trade patterns and partners, generally extending the distances that goods have to travel – as registered in an increase in total 'ton-miles'.

The pandemic and the war have hardened geopolitical risks and provided further reasons for retreat from globalization, and accelerated other trends in consumer behaviour with more extensive digitalization. The maritime seascape is also being transformed by demands for more resilience and sustainability and the need to decarbonize – requiring stakeholders to adjust rapidly to change while remaining relevant, profitable, and customer-centred.

Policy makers also need to keep their sights on longer-term goals. The immediate disruptions should be seen as opportunities for positive structural change – for maritime transport to embrace digitalization and decarbonization and the transition to alternative sources of energy. In an increasingly unpredictable environment, policy makers can design new forms of resilience and build more secure supply chains that avoid further fragmentation of the world trading system.

A. INTERNATIONAL MARITIME TRADE FLOWS

This chapter reviews international maritime trade flows, covering 2021 and extending until mid-2022. Section A looks at the performance across market segments while Section B considers the disrupted and unpredictable environment and other influences. Section C presents the outlook, and Section D sets out some considerations for the way forward.

1. In 2021, maritime trade surged in response to economic recovery

In 2020, because of the fallout from the COVID-19 pandemic, international maritime trade contracted by nearly four per cent, but in 2021 there was a rebound as the global economy started to recover and continued consumer spending, along with an easing in pandemic-related restrictions. Maritime trade grew by 3.2 per cent to a total of 11 billion tons – only slightly below the pre-pandemic level (tables 1.1 and 1.2, figure 1.1). Nevertheless, the recovery was uneven. Containerized cargo, gas, and dry bulk shipping expanded, while shipments of crude oil declined from 16.0 to 15.5 per cent of maritime trade.

Table 1.1 International maritime trade, selected years
(millions of tons loaded)

Year	Tanker[a]	Main bulk[b]	Other dry cargo[c]	Total cargo
1970	1 440	448	717	2 605
1980	1 871	608	1 225	3 704
1990	1 755	988	1 265	4 008
2000	2 163	1 186	2 635	5 984
2005	2 422	1 579	3 108	7 109
2006	2 698	1 676	3 328	7 702
2007	2 747	1 811	3 478	8 036
2008	2 742	1 911	3 578	8 231
2009	2 641	1 998	3 218	7 857
2010	2 752	2 232	3 423	8 408
2011	2 785	2 364	3 626	8 775
2012	2 840	2 564	3 791	9 195
2013	2 828	2 734	3 951	9 513
2014	2 825	2 964	4 054	9 842
2015	2 932	2 930	4 161	10 023
2016	3 058	3 009	4 228	10 295
2017	3 146	3 151	4 419	10 716
2018	3 201	3 215	4 603	11 019
2019	3 163	3 218	4 690	11 071
2020	2 918	3 196	4 531	10 645
2021	2 952	3 272	4 761	10 985

Source: Compiled by the UNCTAD secretariat based on data supplied by reporting countries and as published on the relevant government and port industry websites, and by specialist sources. Dry cargo data for 2006 onwards has been revised and updated to reflect improved reporting, including more recent figures and a better breakdown by cargo type. Since 2006, the breakdown of dry cargo into "Main bulk" and "Dry cargo other than main bulk" is based on various issues of the Shipping Review & Outlook and Seaborne Trade Monitor, produced by Clarksons Research. Total maritime trade figures for 2021 are estimated based on preliminary data or on the last year for which data were available.

[a] Tanker includes crude oil, refined petroleum products, gas, and chemicals.

[b] Main bulk includes iron ore, grain, coal, bauxite/alumina and phosphate. Starting in 2006, "Main bulk" includes iron ore, grain, and coal only. Data relating to bauxite/alumina and phosphate are included under "Dry cargo other than main bulk".

[c] Other dry cargo includes minor bulk commodities, containerized trade, and residual general cargo.

Table 1.2 International maritime trade, 2020–2021, by type of cargo, country group and region

Country group	Year	Goods loaded				Goods discharged			
		Total	Crude oil	Other tanker trade[a]	Dry cargo	Total	Crude oil	Other tanker trade[a]	Dry cargo
		Millions of tons							
World	2020	10 644.9	1 715.4	1 202.7	7 726.8	10 633.9	1 864.1	1 223.6	7 546.2
	2021	10 985.4	1 700.4	1 252.0	8 033.0	10 975.5	1 846.4	1 273.3	7 855.8
Developed economies	2020	4 820.7	438.7	489.2	3 892.8	4 110.1	878.2	395.9	2 836.0
	2021	4 936.1	428.7	502.8	4 004.5	4 277.9	878.8	429.9	2 969.2
Developing economies	2020	5 824.3	1 276.7	713.5	3 834.0	6 523.8	985.9	827.7	4 710.2
	2021	6 049.3	1 271.6	749.2	4 028.5	6 697.6	967.6	843.3	4 886.6
Africa	2020	736.2	235.1	84.2	417.0	509.9	30.7	107.2	372.0
	2021	762.4	226.4	99.8	436.2	553.2	24.9	118.5	409.8
America	2020	1 372.6	202.0	75.1	1 095.5	589.6	39.1	129.4	421.2
	2021	1 382.7	190.1	70.9	1 121.8	637.7	36.4	128.9	472.3
Asia	2020	3 701.0	838.1	547.2	2 315.7	5 410.5	915.4	586.8	3 908.4
	2021	3 889.3	853.5	574.0	2 461.8	5 492.4	905.6	591.0	3 995.8
Oceania	2020	14.5	1.5	7.1	5.8	13.8	0.7	4.4	8.7
	2021	14.8	1.6	4.5	8.7	14.3	0.7	4.9	8.7

Country group	Year	Goods loaded				Goods discharged			
		Total	Crude oil	Other tanker trade[a]	Dry cargo	Total	Crude oil	Other tanker trade[a]	Dry cargo
		Percentage share							
World	2020	100.0	16.1	11.3	72.6	100.0	17.5	11.5	71.0
	2021	100.0	15.5	11.4	73.1	100.0	16.8	11.6	71.6
Developed economies	2020	45.3	25.6	40.7	50.4	38.7	47.1	32.4	37.6
	2021	44.9	25.2	40.2	49.9	39.0	47.6	33.8	37.8
Developing economies	2020	54.7	74.4	59.3	49.6	61.3	52.9	67.6	62.4
	2021	55.1	74.8	59.8	50.1	61.0	52.4	66.2	62.2
Africa	2020	12.6	18.4	11.8	10.9	7.8	3.1	12.9	7.9
	2021	12.6	17.8	13.3	10.8	8.3	2.6	14.0	8.4
America	2020	23.6	15.8	10.5	28.6	9.0	4.0	15.6	8.9
	2021	22.9	14.9	9.5	27.8	9.5	3.8	15.3	9.7
Asia	2020	63.5	65.6	76.7	60.4	82.9	92.8	70.9	83.0
	2021	64.3	67.1	76.6	61.1	82.0	93.6	70.1	81.8
Oceania	2020	0.2	0.1	1.0	0.2	0.2	0.1	0.5	0.2
	2021	0.2	0.1	0.6	0.2	0.2	0.1	0.6	0.2

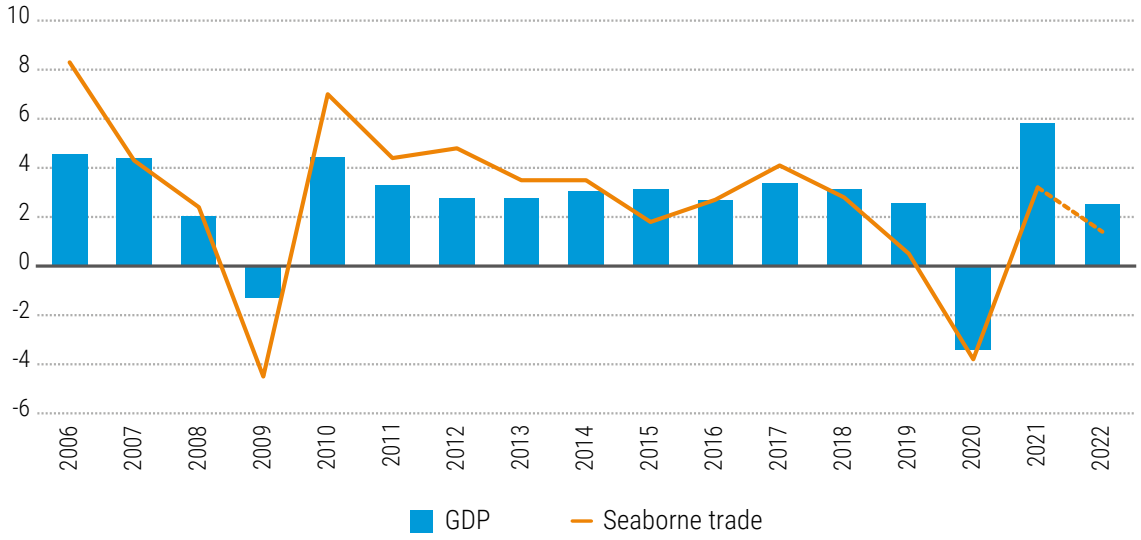
Source: Compiled by the UNCTAD secretariat based on data supplied by reporting countries and as published on the relevant government and port industry websites, and by specialist sources. Dry cargo data for 2006 onwards has been revised and updated to reflect improved reporting, including more recent figures and a better breakdown by cargo type. Total maritime trade figures for 2021 are estimated based on preliminary data or on the last year for which data were available.

[a] Other tanker includes refined petroleum products, gas, and chemicals.

Note: Since March 2021, the category "transition economies" is no longer used by UNCTAD. Economies formerly classified as "transition economies" and located in Europe, are reassigned to the "developed regions" grouping, and the economies formerly classified as "transition economies" and found in Asia, are reassigned to the "developing regions" grouping.

For more extended time series and data before 2021 see UNCTADstat Data Center at http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx?ReportId=32363.

Figure 1.1 International maritime trade and global output, selected years
(percentage annual change)



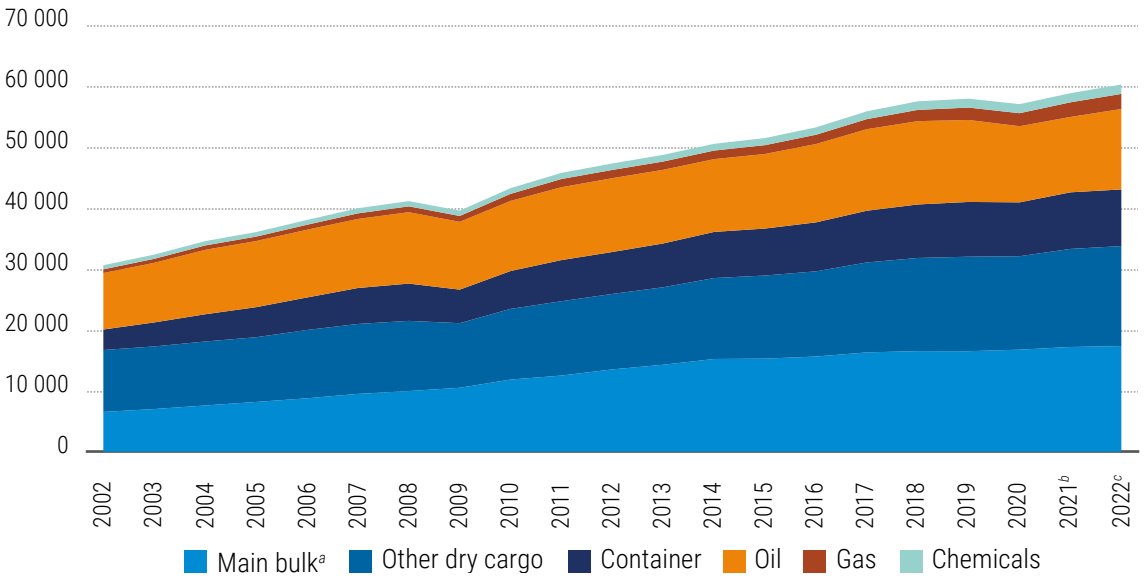
Source: UNCTAD secretariat, based on UNCTADstat data and *Review of Maritime Transport*, various issues. GDP figure for 2022 based on table 1.1, World Output Growth, 1991–2023, UNCTAD Trade and Development Report 2022.

Maritime trade has also been quite volatile. In comparison with the previous year, in January 2021 trade fell three per cent, before increasing by nine per cent in May, then by 0.4 per cent in December.[1]

There was also a revival in trade adjusted for distance travelled. In 2020, according to Clarksons Research, total ton-miles fell by 1.5 per cent but in 2021 increased by 3.1 per cent, to 58,988 billion (figure 1.2).

Growth would have been stronger without recurring waves of COVID-19 and a logistics crunch. Broken global supply chains, with imbalances in demand and supply, created global manufacturing bottlenecks resulting in many shortages, notably for semiconductors and computer chips, with serious ramifications

Figure 1.2 International maritime trade, billions of cargo ton-miles, 2002–2022



Source: UNCTAD secretariat, based on estimates from Clarksons Research (Clarksons Research, 2022b).

[a] Includes iron ore, grain, coal, bauxite/alumina, and phosphate.

[b] Estimated.

[c] Forecast.

Notes: Ton-miles are estimated by Clarksons Research based on its own data on seaborne trade and maritime distances.

Given methodological differences, containerized trade data in tons sourced from Clarksons Research as reflected in figure 1.2 and figure 1.5 of this report, are not comparable with MDS Transmodal data on containerized trade measured in twenty-foot equivalent unit (TEU) and presented in figures 1.6 and 1.7 and tables 1.5 and 1.6.

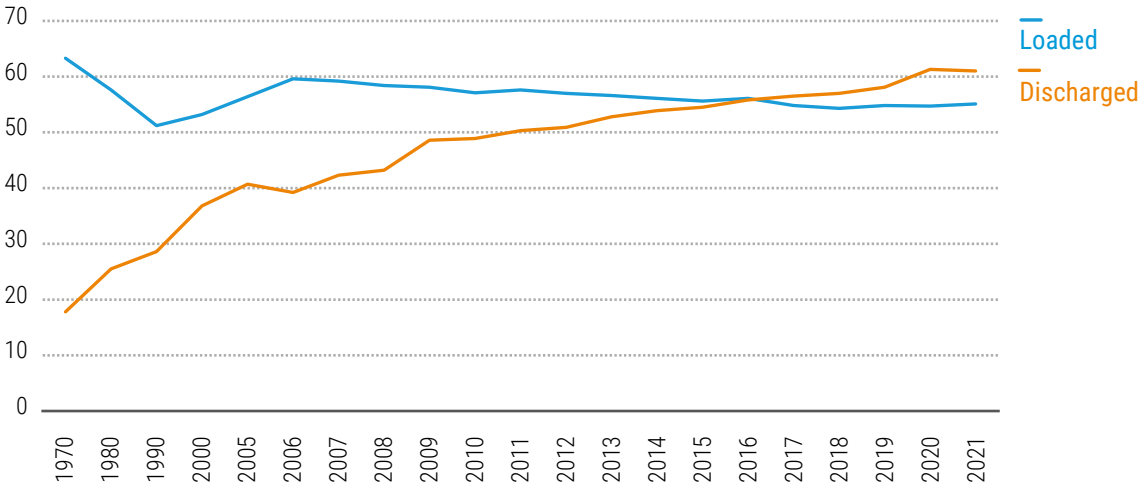
for electronics and car manufacturing.[2] The recovery was also stifled by port congestion and lack of both equipment and labour for both ports and for inland transport, all of which made services less reliable, and raised costs. By mid-2021, container freight rates were four times higher than pre-pandemic levels.[3]

In 2021, the world's leading maritime trade-handling centres were the developing countries, which accounted for 55 per cent of global goods loaded (exports) and 61 per cent of goods discharged (imports) (figure 1.3). Historically, the developing countries have mainly exported raw materials to developed regions. Over the years, however, the patterns have altered as developing countries have increased manufacturing and consumption; since 2017, imports have overtaken exports. The developed countries contributed the remaining 44.9 per cent of exports and just 39 per cent of imports.

Behind these headline figures there are substantial regional differences, with most of the change being driven by countries in Asia, particularly China which have become more closely integrated into global manufacturing networks.

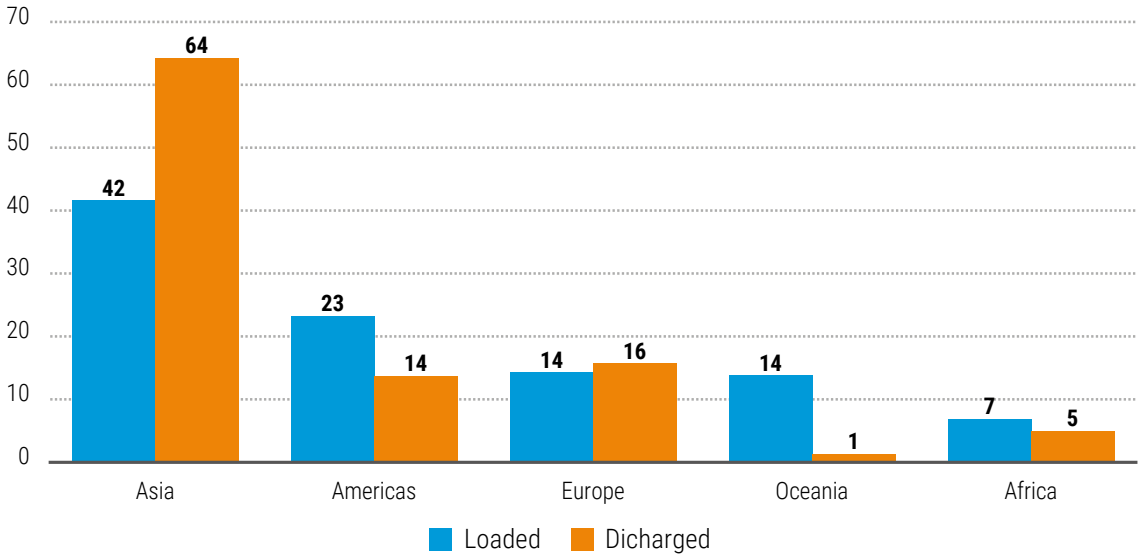
In 2021, Asia remained the world's leading loading and discharge cargo centre (figure 1.4), accounting for 42 per cent of exports and 64 per cent of imports. Then came the Americas, followed by Europe, Oceania and Africa.

Figure 1.3 Participation of developing countries in international maritime trade, selected years (percentage share in total tonnage)



Source: UNCTAD secretariat, based on the *Review of Maritime Transport*, various issues, and table 1.2 of this report.

Figure 1.4 International maritime trade, by region, 2021 (percentage share in world tonnage)



Source: UNCTAD secretariat, based on table 1.2 of this report.

2. Recovery was fuelled by bullish growth in world GDP and trade in goods

Maritime trade recovered in 2021 with the gradual reopening of economies and greater availability of vaccines. After contracting by 3.4 per cent in 2020, world GDP increased by 5.8 per cent in 2021, the fastest growth in more than five decades (table 1.3). The rebound was underpinned by government support measures, estimated at $16 trillion globally,[4] and the release of pent-up consumer demand.

Nevertheless, due partly to variations in vaccination roll-out and the extent of government support, there were notable differences between countries. In the developed countries, economic output expanded by 5.2 per cent: in the European Union GDP increased by 5.4 per cent and in the United States by 5.7 per cent. In developing countries, growth was 6.8 per cent, driven largely by output in Asia: South Asia grew by 6.8 per cent and East Asia by 6.5 per cent. China's growth was 8.1 per cent while India's was 8.2 per cent, despite a second wave of infection in the second quarter of 2021. In Japan the recovery was slower, with GDP expanding in 2021 by only 1.7 per cent. In Western Asia GDP increased by 6.2 per cent. In Latin America and the Caribbean output rose by 6.6 per cent and in Africa by 5.1 per cent, and also recovered in the least developed countries, albeit growing slower than before the pandemic.

In tandem with growth in the world economy and sustained consumer spending, there was a recovery in world merchandise trade – as measured by the average growth for imports and exports. The upturn started in the third quarter of 2020 and gained further steam in 2021. In 2021, world merchandise trade, which had slumped by 5.2 per cent in 2020, grew by 9.7 per cent – faster than before the pandemic (table 1.4). For exports, the recovery was driven by countries in Asia where they increased by nearly 13.3 per cent.

Table 1.3 World economic growth, 2019–2022
(annual percentage change)

Region or economy	2019	2020	2021	2022[a]
World	**2.6**	**-3.4**	**5.8**	**2.6**
Developed economies	**1.8**	**-4.5**	**5.2**	**1.7**
of which:				
United States	2.3	-3.4	5.7	1.9
European Union (27)	1.8	-5.9	5.4	2.0
United Kingdom	1.7	-9.3	7.4	2.6
Japan	-0.2	-4.5	1.7	1.0
Developing economies	**3.7**	**-1.7**	**6.8**	**3.7**
of which:				
Africa	2.8	-2.6	5.1	2.7
East Asia	4.1	0.4	6.5	3.2
of which:				
China	6.0	2.3	8.1	3.9
South Asia	3.1	-4.5	6.8	4.9
of which:				
India	4.5	-6.6	8.2	5.7
Western Asia (excluding Cyprus)	1.5	-3.5	6.2	4.1
Latin America and the Caribbean	**-0.0**	**-7.2**	**6.6**	**2.6**
of which:				
Brazil	1.2	-3.9	4.6	1.8
Caribbean	1.8	-9.6	5.2	4.0
Economies in Transition	**2.6**	**-2.6**	**4.9**	**-6.1**
of which:				
Russian Federation	2.2	-2.7	4.7	-7.4
Least developed countries (LDCs)	**4.2**	**-0.3**	**3.0**	**3.1**

Source: UNCTAD secretariat, based on table 1.1, World Output Growth, 1991–2023, UNCTAD Trade and Development Report 2022.

[a] Forecast.

Note: Calculations for country aggregates are based on GDP at constant 2015 dollars.

Table 1.4 Growth in the volume of merchandise trade, 2019–2022
(annual percentage change)

Group/country	Volume exports				Volume imports			
	2019	2020	2021	2022[b]	2019	2020	2021	2022[b]
World[a]	**0.5**	**-5.2**	**9.7**	**3.5**	**0.5**	**-5.2**	**9.7**	**3.5**
North America	0.4	-8.9	6.5	3.4	-0.6	-5.9	12.6	8.5
Latin America and the Caribbean	-1.3	-4.9	5.6	1.6	-1.8	-10.7	25.4	5.9
Europe	0.6	-7.8	7.9	1.8	0.3	-7.3	8.3	5.4
Commonwealth of Independent States	-0.1	-1.7	0.5	-5.8	8.3	-5.5	9.1	-24.7
Africa	-0.4	-8.1	5.2	6.0	3.1	-14.7	7.7	7.2
Middle East	-1.3	-8.9	1.4	14.6	11.2	-10.1	8.4	11.1
Asia	0.9	0.5	13.3	2.9	-0.4	-1.0	11.1	0.9

Source: UNCTAD secretariat, based on data sourced from WTO Trade Statistics and Outlook. Trade growth to slow sharply in 2023 as global economy faces strong headwinds. Press Release. Press/90. 5 October.

[a] Refers to average of export and imports.

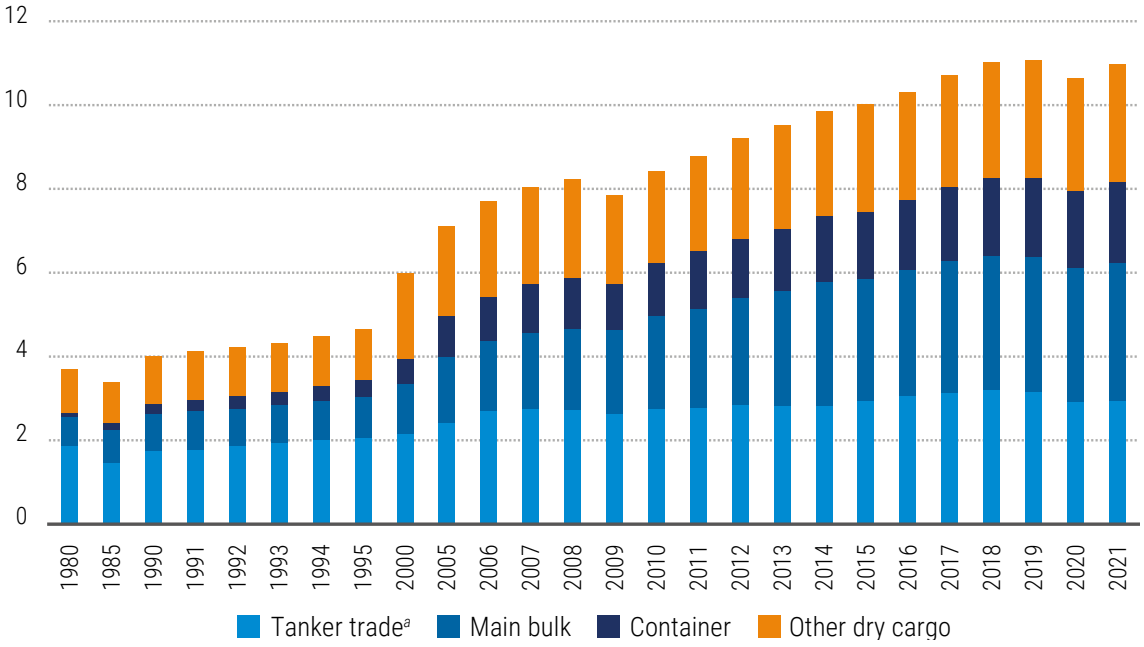
[b] Forecast.

On the import side, North America, Latin America and the Caribbean, and Asia all recorded double-digit growth rates.[5]

3. A multi-paced recovery – with a boom for containerized trade and improvements for dry bulk, but a stall for oil

In 2021, there was steady growth for containerized trade, gas shipments, and for dry bulk commodities – iron ore and grains (table 1.1, table 1.2 and figure 1.5). But crude oil shipments declined – constrained by high oil inventories, oil production cuts, and lower demand for transport fuel as a result of the pandemic, and slowing demand in China.

Figure 1.5 International maritime trade by cargo type, selected years
(billions of tons loaded)



Source: UNCTAD *Review of Maritime Transport*, various issues. For 2006–2021, the breakdown by cargo type is based on Clarksons Research, Shipping Review and Outlook, Spring 2022 and Seaborne Trade Monitor, various issues.

Note: 1980–2005 figures for "Main bulk" include iron ore, grain, coal, bauxite/alumina, and phosphate. Starting in 2006, "Main bulk" includes iron ore, grain, and coal only. Data relating to bauxite/alumina and phosphate are included under "Other dry cargo".

[a] Tanker trade includes crude oil, refined petroleum products, gas, and chemicals.

Containerized trade boosted by restocking and consumer demand

Containerized trade performed well in 2021, boosted by the pandemic-led demand for consumer goods, particularly from East Asia. Volume, which had declined by 1.3 per cent in 2020, rebounded in 2021, reaching 165 million 20-foot equivalent units (TEU) (figure 1.6). This was propelled by improved global economic conditions, combined with released pent-up demand, restocking, and continued spending on consumer goods, increasingly through e-commerce.

In 2021, the top five container exporters, accounting for almost half the traffic, were China, the United States, Viet Nam, the Republic of Korea and Japan. China alone accounted for about 30 per cent.[6] In the United States, the boom on the Transpacific route reflected the impact of stimulus spending.

Around 40 per cent of total containerized trade was on the main East-West routes – between Asia, Europe and the United States (figure 1.7). Non-mainlane East-West routes such as South Asia-Mediterranean accounted for 12.9 per cent, while South-South trades, such as Sub-Saharan Africa to Latin America and the Caribbean, accounted for 12.5 per cent, and North-South, such as Africa to Europe, for 7.8 per cent.

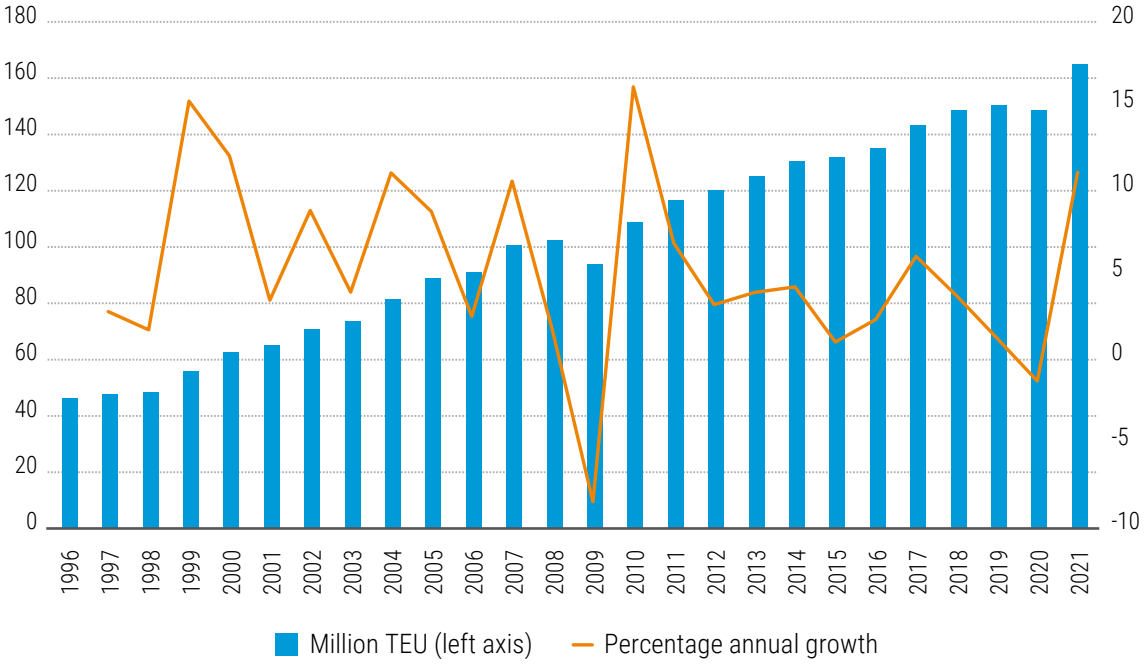
In Asia, which is at the heart of global manufacturing, parts and components of goods cross borders several times and contribute 27 per cent of world containerized trade flows – equivalent to the combined share of non-mainlane East-West, South-South and North-South flows. Other routes accounted for the remaining shares. Non-mainlane East-West routes such as South Asia-Mediterranean accounted for 12.9 per cent, while South-South trades, such as Sub-Saharan Africa to Latin America and the Caribbean, accounted for 12.5 per cent, and North-South, such as Africa to Europe, for 7.8 per cent.

In 2021, all these routes recovered, with more robust performance across the main East-West and non-mainlane East-West and South-South routes (table 1.5). Trade on non-mainlane East-West routes increased by 10.5 per cent, a positive outcome despite a second wave of COVID-19 in South Asia during the second quarter of 2021.

Intra-Asian flows dominated this trade as the region is at the heart of global manufacturing where goods parts and components cross borders several times.

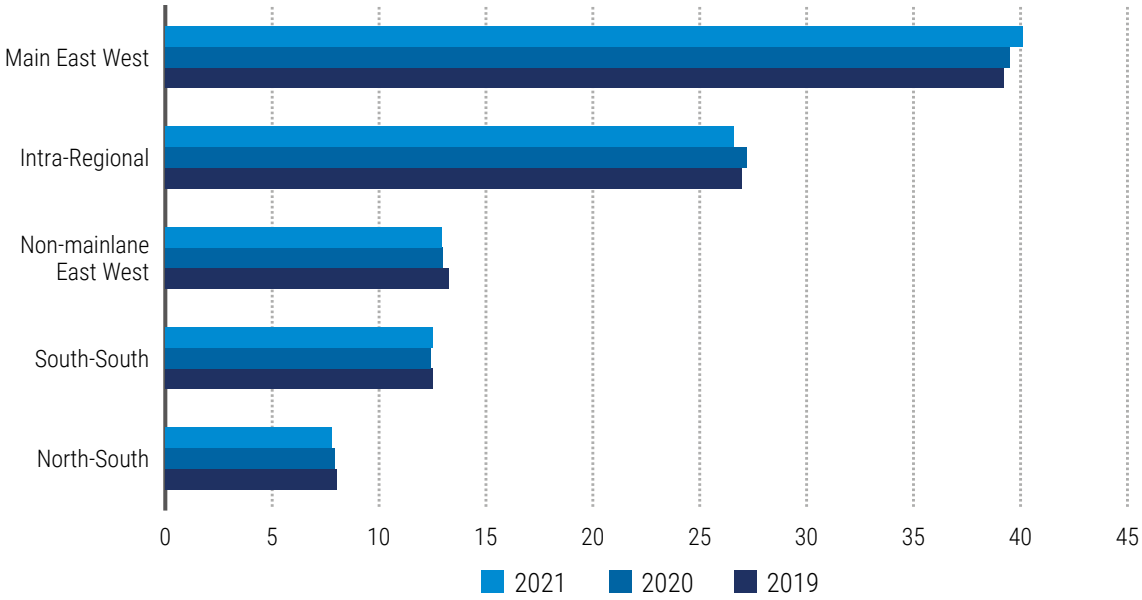
Performance across container shipping lanes also varied depending on the direction of trade –headhaul or backhaul (table 1.6). Volumes on the Transpacific route increased by 15 per cent, reflecting 20 per cent growth on the peak East Asia to North America leg. Meanwhile, trade on the backhaul journey fell

Figure 1.6 Global containerized trade, 1996–2021
(million 20-foot equivalent units and percentage annual change)



Source: UNCTAD secretariat, based on data from MDS Transmodal (MDST), World Cargo Database, September 2022. https://www.mdst.co.uk.

Figure 1.7 Global containerized trade by route, 2019–2021
(market shares in percentages)



Source: UNCTAD secretariat, based on data from MDS Transmodal (MDST), World Cargo Database, September 2022. https://www.mdst.co.uk.

Note:
Non-mainlane Est West: Trade involving Western Asia and the Indian Sub-continent, Europe, North America, and East Asia.
North-South: Trade involving Oceania, Sub-Saharan Africa, Latin America, Europe, and North America.
South-South: Trade involving Oceania, Western Asia, East Asia, Sub-Saharan Africa, and Latin America.

Table 1.5 Containerized trade on main East-West and other containerized trader routes, 2016–2021
(thousand 20-foot equivalent units and percentage annual change)

	2016	2017	2018	2019	2020	2021
	TEU					
Main East-West routes	**54 167**	**57 173**	**59 844**	**59 058**	**58 717**	**66 273**
Other routes	**80 825**	**86 032**	**88 778**	**91 497**	**89 902**	**98 860**
of which						
Non-mainlane East West	17 992	19 043	19 035	19 945	19 282	21 303
North-South	11 105	11 726	12 062	12 102	11 769	12 932
South-South	15 531	16 917	18 173	18 889	18 428	20 715
Intra-Regional	36 197	38 347	39 509	40 561	40 423	43 910
World total	**134 992**	**143 205**	**148 622**	**150 555**	**148 619**	**165 133**
	Percentage change					
Main East-West routes	**3.9**	**5.5**	**4.7**	**-1.3**	**-0.6**	**12.9**
Other routes	**1.40**	**6.5**	**3.2**	**3.0**	**-1.6**	
(Non-main lane)	1.4	6.4	3.2	3.1	-1.7	10.0
Of which						
Non-mainlane East West	2.6	5.8	0.0	4.8	-3.3	10.5
North-South	-0.4	5.6	2.9	0.3	-2.7	9.9
South-South	-1.7	8.9	7.4	3.9	-2.4	12.4
Intra-Regional	2.7	5.9	3.0	2.7	-0.3	8.6

Source: UNCTAD secretariat, based on data from MDS Transmodal (MDST), World Cargo Database, September 2022. https://www.mdst.co.uk.

Note:
Non-mainlane Est West: Trade involving Western Asia and the Indian Sub-continent, Europe, North America, and East Asia.
North-South: Trade involving Oceania, Sub-Saharan Africa, Latin America, Europe, and North America.
South-South: Trade involving Oceania, Western Asia, East Asia, Sub-Saharan Africa, and Latin America.

Table 1.6 Containerized trade on major East-West trade routes, 2014–2022
(million 20-foot equivalent units and percentage annual change)

	Trans-Pacific			Asia–Europe			Transatlantic		
	Eastbound	Westbound		Eastbound	Westbound		Eastbound	Westbound	
	East Asia-North America	North America-East Asia	Total Trans-Pacific	Northern Europe and Mediterranean to East Asia	East Asia to Northern Europe and Mediterranean	Total Asia-Europe	North America to Northern Europe and Mediterranean	Northern Europe and Mediterranean to North America	Total Transatlantic
2008	13.8	5.5	**19.2**	5.0	14.1	**19.1**	2.8	3.1	**5.8**
2009	11.5	5.5	**17.0**	5.0	11.7	**16.7**	2.2	2.5	**4.7**
2010	13.3	6.3	**19.6**	5.5	13.9	**19.4**	2.5	2.9	**5.4**
2011	13.5	6.8	**20.3**	6.1	14.6	**20.7**	2.7	3.1	**5.7**
2012	14.4	6.6	**21.0**	6.0	14.1	**20.1**	2.6	3.3	**5.9**
2013	15.0	7.0	**22.0**	6.1	14.4	**20.5**	2.7	3.4	**6.1**
2014	16.1	7.0	**23.2**	6.3	15.4	**21.8**	2.8	3.7	**6.4**
2015	17.4	6.9	**24.2**	6.4	15.0	**21.3**	2.7	3.9	**6.6**
2016	18.1	7.3	**25.4**	6.8	15.3	**22.1**	2.7	3.9	**6.6**
2017	19.3	7.3	**26.6**	7.1	16.4	**23.5**	2.9	4.2	**7.1**
2018	20.7	7.4	**28.0**	7.0	17.3	**24.3**	3.0	4.5	**7.5**
2019	19.9	6.8	**26.7**	7.2	17.5	**24.8**	2.9	4.6	**7.6**
2020	20.6	6.9	**27.5**	7.2	16.8	**24.0**	2.7	4.5	**7.2**
2021	24.8	6.8	**31.6**	7.2	19.3	**26.5**	2.9	5.3	**8.2**
2022	26.1	6.6	**32.7**	6.6	19.6	**26.3**	3.0	5.8	**8.9**
Percentage annual change									
2008–2009	-16.5%	1.1%	**-11.5%**	0.4%	-17.0%	**-12.5%**	-21.4%	-18.2%	**-19.7%**
2009–2010	15.9%	13.8%	**15.2%**	10.5%	18.6%	**16.2%**	15.5%	14.6%	**15.0%**
2010–2011	1.0%	8.7%	**3.5%**	10.8%	5.0%	**6.7%**	6.3%	6.4%	**6.4%**
2011–2012	6.8%	-3.0%	**3.5%**	-1.8%	-3.4%	**-2.9%**	-2.8%	6.5%	**2.1%**
2012–2013	4.5%	5.2%	**4.7%**	2.1%	2.2%	**2.2%**	2.6%	4.3%	**3.5%**
2013–2014	7.4%	0.9%	**5.3%**	3.2%	7.3%	**6.1%**	2.8%	8.3%	**5.9%**
2014–2015	7.5%	-2.2%	**4.6%**	0.9%	-3.2%	**-2.0%**	-2.8%	5.3%	**1.8%**
2015–2016	4.3%	6.6%	**5.0%**	6.4%	2.4%	**3.6%**	0.3%	1.6%	**1.1%**
2016–2017	6.6%	-0.4%	**4.6%**	4.3%	6.9%	**6.1%**	7.0%	7.6%	**7.3%**
2017–2018	7.1%	1.0%	**5.4%**	-0.9%	5.6%	**3.7%**	4.5%	5.7%	**5.2%**
2018–2019	-3.6%	-7.4%	**-4.6%**	2.8%	1.4%	**1.8%**	-2.5%	3.4%	**1.1%**
2019–2020	3.2%	1.3%	**2.8%**	-0.2%	-4.1%	**-3.0%**	-7.1%	-3.0%	**-4.6%**
2020–2021	20.4%	-1.6%	**14.9%**	-0.4%	14.7%	**10.2%**	6.5%	18.7%	**14.1%**
2021–2022	5.4%	-3.0%	**3.6%**	-7.6%	1.8%	**-0.8%**	4.3%	9.5%	**7.7%**

Source: UNCTAD secretariat, based on MDS Transmodal (MDST), World Cargo Database, September 2022. https://www.mdst.co.uk.

[a] Forecast.

by 1.6 per cent. Trade on the Asia-Europe route increased by ten per cent, supported by growing volumes from East-Asia to Europe (14.7 per cent). Trade on the Transatlantic route increased by 14 per cent, driven by 18.7 per cent growth in volumes shipped from Europe to North America where consumer demand was booming.

However, the surge in containerized trade stumbled against a number of obstacles – unprecedented supply-side capacity constraints, logistical bottlenecks, port congestion and lockdowns. Container shipping and trade entered a perfect storm – tight shipping availability combined with shortages in inland transport and logistics capacity, including equipment, port labour, drivers, storage and warehousing.

Global logistics seized up as container ships were held up in congested ports, mainly in the United States, Northern Europe and China – further highlighting the vulnerability of global supply chains. Between the first quarter of 2020 and last quarter of 2021, average container schedule delays doubled globally, and on the Far East and North America trade they increased from two days to 12.[7]

There were significant deteriorations in cargo dwell time and schedule reliability, as registered in key performance indicators for shippers and supply chain managers, and general trade competitiveness. Since the beginning of the pandemic increasingly unreliable schedules have resulted in a loss to shippers of $5–10 billion.[8] Carriers, on the other hand, have been able to realize record profits.

Dry bulk trade improved but remains exposed to headwinds and shifts in trading patterns

In 2021, dry bulk trade, including major and minor bulks, increased by an annual rate of 3.5 per cent (table 1.7). Total shipments reached about 5.5 billion tons, reflecting a firm economic and industrial recovery in China, improved global macroeconomic trends, released pent-up demand, and boosts from stimulus spending. Much of the growth was driven by strengthened demand for minor bulk commodities (five per cent) and to a lesser extent by demand for major bulks (2.5 per cent).

Trade in iron ore depends heavily on developments in China, and in 2021 grew only marginally, by one per cent, reflecting a softening in China's industrial production and some normalization of import demand. There were also problems in the real estate market which accounts for 15 to 30 per cent of China's GDP.[9] Nevertheless, in 2021, China still accounted for 73 per cent of world iron ore imports – a share above the pre-pandemic level.[10] Future iron ore trade will depend on government policies on steel production,[11] though there could be some support from inventory building.

In 2020, a pandemic-induced drop in power demand led to a 9.1 per cent slump in the coal

Table 1.7 Dry bulk trade 2019–2021 (million tons and percentage annual change)

	2019	2020	2021	Percentage change 2020–2021
Main bulk[a]	**3 229**	**3 198**	**3 277**	**2.5**
of which:				
Iron ore	1 454	1 502	1 517	1.0
Coal	1 296	1 178	1 232	4.6
Grain	479	518	528	1.9
Minor bulk	**2 139**	**2 083**	**2 187**	**5.0**
of which:				
Metals and Minerals	971	948	984	3.8
Agribulks and Softs	405	422	431	2.1
Total dry bulk	**5 368**	**5 281**	**5 464**	**3.5**

Source: UNCTAD secretariat, based on Clarksons Research, *Seaborne Trade Monitor*, Volume 9, No.8, August 2022.

[a] Includes iron ore, coal (steam and coking) and grains (wheat, coarse grain and soybean).

Table 1.8 Major dry bulk: exporters and importers, 2021 (world market shares, in percentages)

Iron ore exporters		Iron ore importers	
Australia	58	China	73
Brazil	24	Japan	8
South Africa	4	Europe	6
Canada	3	Republic of Korea	5
India	2	Other	8
Sweden	2		
Other	7		
Coal exporters		**Coal importers**	
Indonesia	35	China	23
Australia	29	India	16
Russian Federation	13	Japan	14
United States	6	Republic of Korea	10
South Africa	5	European Union	7
Colombia	5	Taiwan Province of China	6
Canada	3	Malaysia	3
Other	4	Other	21
Grain exporters		**Grain importers**	
United States	25	East and South Asia	53
Brazil	21	Africa	12
Argentina	12	Western Asia	11
Ukraine	10	South and Central America	10
European Union and United Kingdom	8	European Union and United Kingdom	8
Australia	7	North America	1
Canada	6	Other	5
Russian Federation	6		
Other	5		

Sources: UNCTAD secretariat, based on data from Clarksons Research *Seaborne Trade Monitor*, Volume 9, No. 8, August 2022 and Clarksons Research, *Dry Bulk Trade Outlook*, Volume 28, No.7, July 2022.

trade, but in 2021 the trade rebounded by 4.6 per cent. Coal has also been affected by Australia-China trade tensions which have increased coal ton-miles as Australia redirects shipments to more distant markets such as India, and China imports more coal from other parts of the world, including the United States and Canada. In the short term, the coal trade should benefit from economic growth and tight gas supply, but in the longer term its prospects are dimmed by the energy transition and the decarbonization agenda.

In 2020, grain shipments increased by 8.1 per cent, boosted by the United States-China trade agreement. In 2021, they increased further, by 1.9 per cent. Major players in dry bulk commodities supply and demand are featured in table 1.8.

Tanker trade is affected by lower demand and cuts in OPEC+ production, while importers drew on stocks

In 2020, total tanker trade dropped by 7.7 per cent, though in 2021 increased by 1.2 per cent to around three billion tons (table 1.9). Other tanker trade, including refined petroleum products and gas, increased by 4.1 per cent, reflecting a 5.6 per cent growth in gas trade, but the trade in crude oil continued to contract, by around one per cent.

Shipments of crude oil in the first half of 2021 were depressed by high prices and inventories, and cuts in production by OPEC+, as well as by recurrent COVID-19-induced restrictions that reduced the demand for transport fuel. Imports were also limited by refinery maintenance, together with higher oil prices that promoted the use of stocks, as well as by quotas that undermined imports by independent refiners.[12]

On the other hand, there was a revival in 'other tanker' trade. This had declined by 7.7 per cent in 2020 but in 2021 grew by 4.1 per cent with a growth in demand for fuel. India upped product exports by 8.3 per cent while the United States eased pandemic lockdowns, increasing the demand for transport and resulting in a jump in imports of 16.7 per cent.[13]

2021 also saw increased exports of liquified natural gas (LNG). Growth increased from 0.4 per cent in 2020 to 5.6 per cent in 2021. This was a result of strong import demand in Asia which grew by 7.6 per cent, led by China at 16.8 per cent. For LNG, the short-term outlook appears positive, given low gas inventories in Europe and continued firm demand in Asia, along with efforts to expand liquefaction capacity. LNG is also expected to benefit from efforts to achieve energy security and diversify sources of supply.

The outlook also looks positive for liquified petroleum gas (LPG). In 2020, volumes had declined by 0.9 per cent, but in 2021 recovered firmly by 6.7 per cent – sustained by demand growth of 25.6 per cent from China and a 15.2 per cent growth in exports from the United States.[14]

Overall, the near-term prospects for the tanker market have improved. There are still ongoing oil supply issues, including troubles with output from Libya, and OPEC+ production targets. Meanwhile, the war in Ukraine and related economic restrictive measures could cause a shift in oil trade flows, while a revival of the nuclear deal with the Islamic Republic of Iran would imply additional crude exports.

Table 1.9 Tanker trade, 2019–2021 (million tons and percentage annual change)

	2019	2020	2021	Percentage change 2020–2021
Crude oil	1 860	1 715	1 700	-0.9
Other tanker trade	1 303	1 203	1 252	4.1
of which				
Gas	479	481	508	5.6
Total tanker trade	**3 163**	**2 918**	**2 952**	**1.2**

Sources: UNCTAD secretariat, derived from table 1.2 of this report. Gas figures are derived from Clarksons Research, *Seaborne Trade Monitor*, Volume 9, No 8, August 2022.
Notes: Tanker trade includes refined petroleum products, gas, and chemicals.

4. In 2022, disruptions from COVID-19 and logistics blockages amid a new war

In 2021, maritime trade recovery was disrupted by supply chain problems, then in 2022 the situation deteriorated further with the onset of a war in Ukraine, the impact of recurrent COVID-19 infections, especially in China, and strikes in the logistics sector in the Republic of Korea, Germany, and the United Kingdom. At the same time, the stimulus benefits were fading while inflationary pressures were growing and monetary policies tightening, with a rising debt burden in many developing countries. Consumers faced increases in prices for energy and other items and greater food insecurity. Add the need for climate action, and all these factors spell trouble for the fragile recovery and could culminate in new crises.

Projections for world economic growth have been revised downward. In 2022, global GDP growth could decelerate to 2.6 per cent – dropping across all regions (table 1.3). While commodity-exporting countries are set to benefit from higher prices others will be hurt by rising prices for grain imports. Growth is also projected to decelerate in the LDCs, where the debt burden further hampers progress towards the Sustainable Development Goals.[15]

Supply chains and global recovery are threatened by COVID-19 infections and China's zero-Covid policy

In the face of recurrent COVID-19 infections in the first half of 2022, the global logistics crunch was compounded by China's zero-Covid policy and lockdowns in two of China's largest manufacturing and commercial centres, Shenzhen and Shanghai. Ports in these cities remained open, but the lockdowns disrupted manufacturing, trucking, and logistics operations. Carriers had to reroute via alternate ports such as Ningbo.

Even as these ports reopened, container lines, trying to restore schedules, continued with blank sailings at Shanghai and Ningbo, while also skipping calls, and redeploying capacity to East-West routes.[16] To fill the gaps some regional carriers offered new intra-Asia services or enhanced existing loops to provided additional calls, while the exporter void from Asia was partially filled by other shippers.[17] Because of these disruptions, between February and April 2022 the proportion of United States imports that came from China fell, though this was offset by rising imports from Viet Nam, the Republic of Korea, Thailand, Taiwan China, Japan, Indonesia, and Malaysia.[18]

Over the period 2016–2019, the proportion of world containership fleet capacity held up at ports averaged 32 per cent. But during the crises this figure rose, and in July 2022 peaked at 37.2 per cent. With continuing congestion and unreliable schedules, from late 2020 to early 2022, global demand exceeded fleet capacity by 10 per cent. And prices remain high: as measured by the Shanghai Container Freight Index (SCFI) they were more than five times their 2019 level (chapter 3).[19] By August 2022, the imbalance between global supply and demand had disappeared, leading to a sharp decline in freight rates – discussed in Chapter 3.[20]

The war in Ukraine further disrupts maritime trade, heightens food and energy insecurity and shifts maritime trade patterns

The war in Ukraine has dented business confidence and heightened uncertainty, as the impacts ripple across commodity and financial markets, and supply chains and globalized production. For consumers this has reduced food and energy security while increasing inflation and the cost of living.

In 2022, the Russian Federation and Ukraine are both expected to suffer declines in economic output, with further spillover effects in Europe and Central Asia. In the Russian Federation output is projected to drop by 7.4 per cent. In Ukraine the economy is projected to shrink by nearly half,[21] while rebuilding the country could cost from €200 to €500 billion.[22]

Ukraine and the Russian Federation are among the world's breadbaskets. They provide around 30 per cent of the world's wheat and barley, one-fifth of its maize, and over half of its sunflower oil.[23] The Russian Federation is also leading natural gas exporter, and the second-largest oil exporter. Together, Belarus and the Russian Federation export around a fifth of the world's fertilizers.[24] Disrupted exports of crude oil, natural gas, grains, fertilizers and metals are expected to slow global trade. Global maritime grain exports alone are projected to decline by 3.2 per cent in 2022.[25]

There has been an immediate impact on commodity prices. By 25 March 2022, Brent crude oil prices surged by more than 40 per cent, reaching $114 per barrel, up from $79 per barrel on 3 January 2022.[26] Gas prices surged to over $50 per million British thermal units (MMBtu) in the first half of March. Although since April prices in Europe subsequently eased, they remained high hovering around the $25–35 per MMBtu range.[27] Meanwhile, grain prices also jumped and pushed up inflation, while rising fertilizer prices drove up the costs of agricultural production. Vulnerable segments of the population in developing countries are particularly exposed to large swings in food and energy supply and prices.[28] Many of these countries are net food importers and people have to dedicate a large share of their incomes to food and energy.

Over the 2010–2020 period inflation had averaged 2.9 per cent, but in 2021 had risen to 5.2 per cent and with the war in Ukraine is projected to reach 6.7 per cent.[29] In March 2022, inflation in the United States reached its highest level in 40 years. By mid-2022, there were fears of potential stagflation and the world economy slipping into recession.

Most seaports in the Black Sea have been closed – stopping grain shipments, with potentially dire consequences for poor countries (box 1.1). In 2021, Ukrainian monthly grain exports fell by 87 per cent in the second quarter of 2022 as compared with the same period in 2021.[30] Cutting Black Sea grain and fertilizer trade is a food security threat.[31]

The pandemic had already been driving up food prices,[32] but as Russian and Ukrainian grain exports were hindered by port disruptions, prices soared.[33] Between January and March 2022, the global food price index increased by about 18 per cent.[34] The costs of transport have also been rising with the combined effect of the war in Ukraine and related economic restrictive measures, energy costs, and COVID-19 disruptions. UNCTAD simulations suggest that high container freight rates observed during the 2021–2022 period will be passed on to consumers and ultimately lead to an additional increase in consumer prices of 1.6 per cent globally.[35]

UNCTAD paints a grim picture. In 2018–2020, 32 per cent and 12 per cent of total African wheat imports were from the Russian Federation and Ukraine, respectively. The least developed countries imported 39 per cent of their wheat from the two countries.[36] Export restrictions that further constrain supply and inflate prices should be avoided. Many countries have responded with export bans, higher tariffs, and other barriers. By the end of June 2022, it has been reported that restrictive measures affected 17 per cent of global food trade, on a caloric basis.[37]

Ukraine has been seeking alternative routes for its grain exports. Most are normally shipped via ports on the Black and Azov Seas – such as Odessa, Yuzhny/Pivdennyi, Chornomorsk, Kherson, Mariupol and Berdyansk.[38] When these were closed, only the Ukrainian ports of Reni, Izmail, and Kiliia on the Danube river were able to start up again, though these cannot operate on the same scale.[39]

Box 1.1 Impacts of the war in Ukraine on the Arab region

Around 50 per cent of Ukraine's wheat exports are destined for the Middle East and North Africa region (MENA). Egypt, Jordan, Lebanon, Libya, Morocco, Oman, Saudi Arabia, Tunisia, and Yemen rely on the Russian Federation and Ukraine for at least one-third of their wheat imports.[40]

Egypt, which is the top importer of wheat worldwide, normally imports 85 per cent of its wheat from the two countries in the Black Sea. Despite efforts to diversify imports, over 70 per cent still originate from the Black Sea and food costs are skyrocketing.[41]

Yemen has an ongoing civil war, and over half the population is facing alarming levels of food insecurity, but since nearly 45 per cent of imports originate in the Russian Federation and Ukraine so prices are rising further. Yemen's agricultural infrastructure is not properly equipped for grain production and high fuel prices are adding pressure on production costs for local farmers.

Lebanon sources 90 per cent of its wheat imports from these two countries. In 2021, with the depreciation of the Lebanon's currency, food prices increased by over 400 per cent.[42]

Some Arab countries may benefit from the oil price increase. Production is likely to increase, especially if economic restriction affecting the Russian Federation are maintained. Higher revenues could be reinvested in the oil and gas sector. However, this could derail efforts towards economic diversification away from oil and gas and disincentivize investment in renewable energy.

Iraq received oil purchase requests from European countries in March and increased its shares in the European market. The increase in oil prices has allowed the Iraqi government to repay foreign debts and resume several projects that were put on hold due to the decline in oil prices in 2020.

Energy importing countries, such as Egypt, Jordan, Lebanon, the Syrian Arab Republic, and Tunisia, are facing high prices that threaten energy security. Tunisia raised its fuel prices by 3 per cent in March 2022, and Lebanon by 13 per cent. Morocco increased prices by 15 per cent for diesel and 33 per cent for gasoline. Higher energy prices are causing disruption across the value chain and putting further pressure on the region's fragile economies.

Tunisia is a net importer of gas and oil; only 50 per cent of its gas comes from national production and purchases from Algeria at market prices. The government of Tunisia has been continuously forced to raise fuel prices on a monthly basis, causing other inflation issues.

Rising energy costs are affecting electricity supplies. Lebanon, Libya and Yemen have reported reduced access to electricity over the past three months and are expecting even less availability in the next six months. For Lebanon, higher energy prices will affect bread prices, electricity, and diesel for powering generators.

Source: UNESCWA, July 2022.

One positive development was in July 2022, when the United Nations, the Russian Federation, Ukraine and Türkiye agreed the Black Sea Grain Initiative. The initiative allows exports from Ukraine of grain, other foodstuffs, and fertilizers, including ammonia, to resume through a safe maritime humanitarian corridor from three key Ukrainian ports: Chornomorsk, Odesa, and Yuzhny/Pivdennyi. A Joint Coordination Centre (JCC) was established in Istanbul to monitor implementation of the deal. Shipments monitored by the Initiative began on 1 August. As of 12 October, 7.2 million tons of grains and other foodstuffs had left Ukraine.[43] Although this freed up some space in Ukraine's silos, these are still full, from previous harvests and more grain needs to be exported to allow for storage of the new harvest. The agreement was valid for 120 days, but renewable. The World Food Programme has also been able to restart purchasing Ukrainian wheat for its humanitarian operations in countries such as Ethiopia and Yemen. Equally important and urgent is the export of fertilizers, including ammonia.[44]

Exports from the Russian Federation are expected to continue, given the tight global markets and the reluctance to impede the flow of foodstuffs. But exports from the Black Sea are affected by vessel insurance premiums.[45] Furthermore, shifting trade patterns imply a more complex operating landscape.[46]

The war is shifting trading patterns and driving up ton-miles. India is expanding its wheat exports, especially to East Asia. Brazil has been increasing wheat shipments to Africa. China is also expected to import from Brazil and from the United States.[47] The European Union is also likely to import more corn from Brazil and the United States.[48] Nigeria is now sourcing potash from Canada.[49]

Limitations and restrictions affecting Russian gas and oil will increase the demand for coal. Moreover, increases in the demand for renewable electricity will boost the demand for minor bulk metals.

The war is also transforming the global oil and gas landscape. In May 2022, the European Union agreed to phase out oil seaborne imports from the Russian Federation by the end of 2022.[50] But diversifying away from Russian gas will not be easy, given the logistical hurdles, pipeline-capacity restrictions, and the need for contract negotiations and developing new import facilities. Continued reliance is evidenced by Europe's purchase of Russian gas since the start of the war. Nevertheless, Europe is exploring floating storage regasification unit options and reviewing proposed onshore LNG terminal plans, for example, in Germany, France, the Netherlands and Poland. Meanwhile, the United States and India have already increased their shipments of oil products to Europe.[51]

The war has had a limited impact on container shipping. Nevertheless, nine of the top 10 global container lines have suspended their operations in the region and other logistics businesses have exited the Russian market. In addition to undermining connectivity in the Black Sea ports, the war has amplified port congestion in Europe and caused longer customs controls. Cargo destined for the Russian Federation requires transhipment in Northern European ports, which were already congested. Moving ahead, the war's impact on container shipping is likely to deepen.

The war has affected inputs to global manufacturing. The Russian Federation accounts for 40 per cent of the world's palladium production.[52] Ukraine supplies 90 per cent of the United States requirements for neon, and 70 per cent of the global supply.[53] All these elements are used as inputs in the production of high-tech products such as semi-conductors and ion batteries.

In addition, the war in Ukraine and the related economic restrictions have affected the rail route between China and Europe. In 2021, as shippers were forced out of heavily congested ports and severely constrained air cargo they turned to the China-Europe rail network where demand jumped more than 30 per cent to nearly 1.5 million TEU.[54] Cargo from China, Japan and the Republic of Korea that uses the trans-Siberian route is impeded. Meanwhile, new routes are emerging such as the Middle corridor of the Trans-Caspian International Transport Route.[55]

B. KEY TRENDS SHAPING MARITIME TRANSPORT

The maritime transport and trade sector has been shaken by a succession of disruptions and is having to adapt to other structural shifts, particularly in response to climate change. The sector needs to reset to a new normal that involves low greenhouse gas emissions (GHG) and clean energy, more resilient supply chains and logistics, digitalization and data-driven business models. It also has to respond to new demand and consumption patterns, and more fragmented, localized, or regionalized operating and trading environments.

1. The energy transition and decarbonization

Only about 6 per cent of the post-COVID stimulus funding was allocated to cutting GHG emissions. Now the war in Ukraine and its impacts could push decarbonization further down the priority list. Indeed, if natural gas is replaced by coal, or if biofuel usage declines, GHG emissions could increase.[56]

In 2021, the European Union imported from the Russian Federation more than 40 per cent of its total gas consumption, 27 per cent of oil imports and 46 per cent of coal imports.[57] Many countries in Europe are seeking alternatives to the Russian Federation and are importing from more distant locations. To do so, however, they will need to address infrastructure bottlenecks in pipelines, storage terminals and tankers. Imports of natural gas could also partly be replaced by oil, coal and nuclear energy. In East and South Asia, Russian oil and gas could also partly displace coal.

The war in Ukraine has also shaken global markets for metals such as nickel that are used for the production of clean-energy products. In the short term this could make the clean-energy transition more difficult. However, in the longer term, investment in energy-efficiency measures, renewable-energy alternatives and low-carbon technologies should ease the transition to low-carbon and cleaner energy paths.[58]

Around 40 per cent of maritime cargo comprises fossil fuels, so the energy transition will alter the demand for shipping, as well as vessel types and sizes, and the fuels used by ports and ships. Sailing patterns and shipping networks will also need to be reorganized – as will the ports servicing such ships.

2. Supply chains are shaped by best-cost versus lowest-cost, and considerations of national security

In 2020 the pandemic induced an initial backlash against globalization. Subsequently global value chains (GVCs) adjusted to the disruption, as reflected in changes in market shares among GVC regions.[59] Nevertheless, the pandemic exposed the limitations of the just-in-time model whose weaknesses had also been tested by other disruptors such as, earthquakes, floods, blockages of canals, trade tensions and restrictive trade measures.

In 2022, the deteriorating geopolitical environment further exposed the risk associated with heavy reliance on one single or a few suppliers – whether for food, energy or parts and components for strategic manufacturing. Over 90 per cent of the world manufacturing capacity for semiconductors is concentrated in Taiwan China,[60] and the effects of the 2021–2022 semiconductor shortage rippled across a range of industries such as car manufacturing, electronics, and healthcare. Developing alternative sources for chip manufacturing is difficult, capital intensive and time-consuming. The crisis in Ukraine has also shaken the food, energy, automobiles and chip-making sectors.

These disruptions have reignited the debate over the future of globalization and the continued relevance of the lean supply chain model, when taking into account self-reliance and national security. Businesses looking for greater resilience and supply chain integrity and continuity are considering whether to bring production back home or closer to home – through reshoring, onshoring, nearshoring or same shoring and end-to-end supply chain management.[61]

A June 2022 survey found that most senior logistics and supply chain executives believed that a major transformation of supply chains was underway.[62] Less than 20 per cent agreed that globalization will lead to new supply chain configurations based on “ally-sourcing”. Nearly half thought that protectionism and reshoring would make supply chains more fragmented and localized.

Nevertheless, there is no evidence of outright re-shoring or of a mass exodus from manufacturing in distant locations. A 2021 survey by the American Chamber of Commerce in China found that only 14 per cent of respondents were interested in relocating, and only half of these had acted. Only 3 per cent of companies planned to move activity to the United States. Instead, they were likely to adopt a ‘China plus one’ strategy. Asian countries remained the most popular ‘plus one’ sources, with far fewer citing

destinations such as Mexico or Canada.[63] Another survey, at around the same time, found that 84 per cent of businesses had no plans to move their manufacturing operations out of China, and 74 per cent intended to continue sourcing from China.[64]

In many cases, reshoring may not be feasible, particularly if domestic suppliers lack the expertise and the capacity to rapidly scale up operations. In the United States in 2021, for example, despite attempts to diversify, imports of containerized goods from China hit a record high, with 42 per cent of all imports sourced from China – the same share as in 2008.[65] China maintained a 56 per cent share of household goods imports. In 2021, imports from China increased by 25 per cent while shipments from Viet Nam grew by 19 per cent. Volumes from other countries such as Cambodia also increased, but from much smaller bases.[66] Where China has lost market share the main beneficiaries have been Viet Nam and India.

Complete deglobalization is unlikely, though further disruptions and geopolitical concerns will probably accelerate efforts to promote resilience, security and predictability. Gradual shifts in sourcing are more likely; instead of seeking the lowest cost, companies are pursuing the 'best cost' – weighing manufacturing and transportation costs against factors like supply chain resilience and environmental sustainability.[67] While there is a long-term goal to move more production out of China and into countries like Brazil and Mexico, the 2021 reshoring index has shown a greater reliance on imports from other countries in Asia.[68]

Globalization is likely to take a step back as countries realign economic and geopolitical partnerships – building new supply chains while also enhancing efficiency.[69] The United States, the European Union and Japan are "friend-shoring" component manufacturing.[70] But for strategic goods such as semiconductors the goal seems to be full repatriation of production.[71] The European Parliament's Committee on International Trade, for example, has called for the shortening of supply chains.[72]

There is the risk, however, that if companies do not manage to relocate production, protectionism could end up restricting trade or fragmenting the world trading system.[73] What is needed is a gradual and flexible approach that will harness collaboration and promote concerted multilateral efforts while using multiple levers including:

- **Diversification** – The goal should be to diversify suppliers and allow the markets to adjust, while balancing the objectives of efficiency and security.[74] Diversifying supply bases can be combined with an element of localizing or regionalizing. Many firms are now dual-sourcing or multi-sourcing and some industries in Europe and India, supported by government efforts to achieve strategic autonomy, are already reinventing their business models.[75]
- **Safety stocks** – Strategic inputs and commodities can be retained as buffers by increasing inventory holding.[76]
- **Vertical integration** – This can involve taking more processes in house. Volkswagen, for example, is creating some in-house battery-making capacity.[77] Or it can be achieved through strategic deals with suppliers. Tesla, for example, has recently struck deals with lithium miners and graphite suppliers and with the Brazilian company Vale for nickel. Other carmakers are hoping to reduce the predominance of China and the Republic of Korea in the business of battery-making and to bring production closer to home. In energy and renewables, the market is also expected to become more regional by sourcing more from allies.[78]
- **Longer-term relationships** – Companies are managing supplier relationships, investing in technology, and adjusting supply chain practices to remain flexible. They are building long-term, collaborative relationships with suppliers, manufacturers and other service providers who have the necessary technology, global reach and capacity.
- **Additional facilities and suppliers** – Companies can supplement rather than replace existing production. Often this means a China-plus-one strategy.[79] Nike, for example, has decreased lead times by transferring some production from Asia to Latin America. GoPro and Universal Electronics are shifting some production from China to Mexico.
- **Using digital technologies** – Supply chain management can be further optimized using frontier technologies to increase capacity and improve logistics.[80]

3. New consumption patterns as e-commerce takes hold

The pandemic accelerated shifts in consumer behaviour and preferences, with more online purchase of consumer goods, which are often transported by container. In 2019, global e-commerce was 15 per cent of total retail sales, but in 2021 had increased to 21 per cent. It could increase from a value of

$3.3 trillion in 2022 to $5.4 trillion in 2026.[81] Shippers, retailers and supply chain managers are already reassessing their logistics, with increasing automation and digitalization. Maritime transport operators have been investing in air freight, final-mile, and e-commerce logistics. A.P- Moller Maersk, for example, acquired various e-commerce logistics companies in 2021, including a start-up for B2C warehousing for the fashion industry.[82] Shipping and port operators can achieve service differentiation and greater competitiveness by leveraging this highly time-sensitive trade segment.

The E-commerce logistics market is also expanding. Estimated at $243 billion in 2020, it is projected to grow at an annual growth rate of 18.9 per cent over 2020–2027, reaching $819 billion by 2027.[83]

This has implications for warehousing inventory management including for safety stocks and buffers. In the first quarter of 2022, global vacancy rates in warehouses were at record lows– averaging 3.2 per cent in the United States and 3.3 per cent in Europe. In Seoul and Tokyo, vacancy rates were less than three per cent. In a time of scarce space capacity, one cost-effective solution is multi-storey warehousing.[84]

These trends entail a change in shipping patterns, port operations, and warehousing as well as for the entire logistics industry and supply chain participants. They also have implications for IT and digital solutions providers – for smart ports, for predictive analytics and port call optimization, and for achieving end-to-end visibility and data sharing.

Box 1.2 Digitalization, e-commerce and logistics

E-commerce relies on extensive last-mile logistics and improved trade facilitation. UNCTAD eTrade Readiness Assessments – eT Ready – conducted in 24 LDCs and eight developing countries or regions, have found last-mile bottlenecks in all countries especially due to the lack of physical addressing systems. Overall UNCTAD noted few new initiatives in trade facilitation and logistics in the past year – probably because of COVID-19 restrictions.[85] Nevertheless, the pandemic has accelerated the integration of e-commerce in the business models of the different players in the postal, delivery and logistics sector. For example:

- **Bangladesh** – Ecom Express has invested in Paperfly, the country's largest third-party e-commerce logistics firm, aiming to build a strategic backbone of e-commerce logistics and ensure home delivery.
- **Malawi** – The Malawi Posts Corporation is introducing PostGlobal, a system already used in 15 countries to track and trace parcels.
- **Uganda** – To improve last-mile delivery, post and courier services, there are now 572 registered pick-up centres. Between the last quarter of 2020 and the first quarter of 2021, mail processing and delivery increased by 18 per cent.
- **Senegal** – In 2020, Project JEGE was started to create a network of pick-up points for e-commerce shipments and ensure more reliable and safer delivery of packages.
- **Togo** – In 2020, the Société des Postes du Togo launched an online marketplace for "Made in Togo" artisanal products, www.assiyeyeme.tg, with last-mile delivery ensured by the SPT logistics network.
- **Zambia** – To improve e-commerce, the Post is introducing an Electronic Postal Management System – eZamPost– to allow access to the postal services as well as multi-channel payments.

UNCTAD's Automated System for Customs Data (ASYCUDA) has helped countries automate customs and other regulatory procedures, and during the pandemic has enabled the use of e-trade permits, paperless processes and the exemption of taxes to facilitate import of medical supplies.[86] Using ASYCUDA's guidelines for customs administrations, Angola, Eswatini, Lesotho, Rwanda, Uganda, Zambia and Zimbabwe have increased the use of paperless procedures from 30 per cent before the pandemic to an average of 82 per cent in 2022.

In recent years, public-private partnerships have been used to upgrade logistics services and infrastructure for domestic and cross-border e-commerce – an area that requires greater attention by both policy makers and industry players.

Source: UNCTAD secretariat, based on eTrade Readiness Assessments available at https://unctad.org/topic/ecommerce-and-digital-economy/etrade-readiness-assessments-of-LDCs.

4. Digitalization

Maritime transport and trade will need to adapt to greater use of technology. Digitally enabled shopping, for example, will boost trade, though other technologies such as automation may reduce the need for offshore production and diminish trade flows, or have mixed outcomes.

Maritime trade itself is also being reshaped by the digitalization of transport and logistics. In the past maritime transport has been slow to adopt digital solutions, but especially since the COVID-19 pandemic it has been playing catch up – as new technologies such as the Internet of Things (IoT), blockchain, big data, and AI start to improve efficiency, sustainability and resilience. TradeLens, for example, a data and document-sharing platform, is making more use of blockchain technology.[87] Ports are improving their operations, security, infrastructure, and management – using smart sensors and the IoT, along with terminal automation, port community systems, and traffic management systems. Between 2022 and 2027, the global smart ports market is projected to increase from $1.9 billion to $5.7 billion.[88] Throughout this process the sector will need to attend to the associated threats to security in the use of IT.

It is also important to address the digital divide between countries. Most developing countries entered the pandemic with relatively low digital capabilities, so found it difficult to mitigate the economic disruption. Many still have low levels of adoption and connectivity, and inadequate trade logistics. Often they lack entrepreneurs with digital skills or the confidence to use digital payments. Poor countries tend to have limited financing mechanisms to support start-ups and small and medium enterprises.

5. Shipping and ports are redefining their roles and adjusting to cope with change

In a fast-evolving operating landscape, maritime transport stakeholders need to strike new balances between competing objectives and priorities. Some carriers have, for example, been expanding their fleets while also offering air freight services and e-commerce, aiming to become logistics service integrators that have end-to-end control over supply chains. Others have altered their networks and opened up new routes – switching from the United States West Coast to the East Coast, or from China to East Asian countries, or incorporating rail transport from China to Europe.

This has resulted in some consolidation. To offer one-stop solutions, shipping carriers such as Maersk and port operators such as DP World are extending into the wider logistics through mergers and acquisitions spanning port terminals, warehouses, freight forwarding, air freight, e-commerce, other logistics services and IT businesses.

Governments too have been reacting to this rapidly changing environment. High freight rates and the profits realized by the liner shipping industry are creating pressures for greater regulatory oversight, as through the United States Federal Maritime Commission.[89]

Shippers have also been adapting to this disrupted environment – negotiating long-term contracts, for example, and securing sufficient space and capacity at good prices. At the same time, they have been considering alternative modes such as air freight which have become more competitive. Between 2019 and 2022, demand for air cargo increased by around 8 per cent and is expected to have increased by 13 per cent in 2022.[90] This trend should continue as disruptions linger and the e-commerce boom demands near-real-time deliveries.

6. Building resilience

To spread risks and reduce exposure of their primary business to disruptions, companies are now diversifying operations, while integrating risk management and preparedness into their operations. In these efforts, they need to look beyond immediate crises and short-term solutions to “resilience by design”.[91] This requires strategic thinking to find new opportunities and business models. Supply chains and their underlying transport and logistics networks should integrate long-term resilience criteria in their plans and structures.[92] For ports, for example, resilience-building should be seen as a strategy and an ongoing process that can gradually be implemented and fine-tuned to each port’s governance, managerial, commercial, and infrastructural context.

Success depends on effective collaboration among all players, at the national and international levels when tackling bottlenecks in ports and along the hinterlands, especially in landlocked, transit and coastal countries. This will require more support to developing countries, in particular the most vulnerable economies – through financial support, technical cooperation and capacity-building.[93]

C. OUTLOOK

1. Gloomy prospects with increasing risks

The recovery in maritime transport and logistics is now at risk from the war in Ukraine, the continued grip of the pandemic, lingering supply-chain constraints, and China's cooling economy and zero-Covid policy, along with inflationary pressures and the cost-of-living squeeze. Ports remain congested but the logjam in logistics will dissolve with the rebalancing of demand and supply forces, as long as developing countries have sufficient vaccination and health measures to contain the pandemic. There are also increasing risks of industrial action in ports and hinterland transport. Faced with rising inflation and increased cost of living and the introduction of automation there is the potential for widespread unrest. Many of these risks interact in complex ways and across different timeframes and horizons.

Maritime trade is likely to lose steam. UNCTAD estimates that maritime trade growth to fall from 3.2 per cent in 2021 to 1.4 per cent in 2022 (table 1.10). Over the medium term, 2023–2027, seaborne trade is projected to grow 2.1 per cent per year, a rate below the historical average of 3.3 per cent.

For many years, containerized trade has been the fastest-growing maritime trade segment, but in 2022 is projected to expand at a tepid 1.2 per cent, and even this may be optimistic. Maritime trade is expected to be slowed by macroeconomic headwinds, and inflationary pressures that constrain consumer spending, and by pandemic-induced lockdowns and developments in China's economy. There could also be some normalizing of demand as consumer spending switches back more to services.

However, as a result of the war in Ukraine, trade is likely to increase in terms of ton-miles. The Russian Federation is seeking alternative markets, and European importers are considering alternative sources of supply. Thus, some substitution of supply is expected in the short-term, although some sectors have more scope for this than others.

Table 1.10 International maritime trade developments forecasts, 2022–2027
(annual percentage change)

	Annual Growth	Years	Seaborne trade flows
UNCTAD	1.4	2022	Total seaborne trade
	1.4	2023	
	2.2	2024	
	2.3	2025	
	2.3	2026	
	2.2	2027	
UNCTAD	1.2	2022	Containerized trade
	1.9	2023	
	3.0	2024	
	3.1	2025	
	2.9	2026	
	3.8	2027	
Clarksons Research	0.9	2022	Total seaborne trade
	2.2	2023	
	-0.1	2022	Containerized trade
	2.4	2023	

Source: UNCTAD secretariat calculations and forecasts published by Clarksons Research.

Note: Projections are based on the estimated elasticities of maritime trade with respect to GDP, export volumes, investment share in GDP as well as monthly seaborne trade data published by Clarksons Research. They also build on the GDP forecast published in the International Monetary Fund, World Economic Output, October 2022.

2. Multiple scenarios for the path to normalization

In a fast-evolving environment, the above projections are subject to considerable uncertainty, well beyond the usual range. To describe the general direction of events, UNCTAD has developed four plausible scenarios. While many factors are at play, only two have been taken into account. First, the global economic output and the geopolitical context in which maritime transport and trade will unfold. Second, the COVID-19 pandemic and the ability of the global maritime supply chain and logistics sector to adjust (figure 1.8).

Scenario 1 – Recovery sustained

The disruption is contained with the war in Ukraine ending in the near future. No military escalation in other regions. Related economic restrictive measures are not escalated and may even be scaled back. GDP growth reverts to its pre-crisis trend. Inflation remains stable. COVID-19 is endemic and no new lethal variants emerge. Freight rates start to fall, though remain higher than pre-pandemic levels until new capacity arrives in 2023–2024. Maritime trade grows at the historical average.

Figure 1.8 Navigating the path to normalization: Selected scenarios

Source: UNCTAD secretariat.

Scenario 2 – Recovery interrupted: The war in Ukraine intensifies, but the pandemic and logistics crunch are contained

The disruption continues with a protracted war in Ukraine. Related economic restrictive measures intensify and affect trade between the West and China. The COVID-19 pandemic is contained and is recognized as endemic. Inflation increases and monetary policy tightens. A cost-of-living crisis unfolds. GDP growth moderates. Energy exports from the Russian Federation to Europe decline or are suspended. There is a search for alternative routes such as the Trans-Caspian International Transport Route Middle Corridor linking Asia to Europe, the Danube River and the Romanian ports. Maritime trade stagnates or declines. Ton-mile trade grows marginally.

Scenario 3 – Recovery interrupted: The war in Ukraine is contained, but the pandemic and logistics crunch intensify

The disruption continues, as new infections and variants of COVID-19 emerge, and lockdowns are implemented sporadically. The war in Ukraine ends sooner than later and related economic restrictive measures do not escalate further and may even be scaled back. Supply chain crunch and logistic logjams intensify. Freight rates and inflationary pressures increase. Use of alternative routes such as air freight and inland transport. Maritime trade marginally declines, reflecting moderated demand due to higher shipping and living costs.

Scenario 4: Recovery derailed

The disruption is exacerbated. COVID-19 continues with more lockdowns. A protracted war in Ukraine. Related restrictive economic measures intensify, affecting also trade between the West and China. GDP growth contracts and merchandise trade declines. Overcapacity in shipping and logistics. Freight rates fall with lower demand. World fragmentation and decelerating globalization. Maritime trade declines. Greater uncertainty about the timing and path to recovery. Pursuit of strategies that promote resilience and self-sufficiency take hold with an impact on global supply chains, especially in strategic sectors such as foods, energy, medicine, batteries, chips.

D. POLICY PRIORITIES AND KEY ACTION AREAS

Beyond the immediate challenges of the war and the pandemic, policymakers will need to cover many fronts and keep sight of longer-term goals – promoting maritime trade while enabling sustainable and resilient transport systems.

1. **Control the COVID-19 pandemic** – Mitigate its impact by widening access to vaccines, testing, and therapies, especially in developing countries. Ensure that additional lockdowns and restrictions do not unduly penalize their economies.
2. **Strengthen macroeconomic frameworks** – Promote economic growth, with accommodative fiscal stances. Alleviate the impact of shocks on the most vulnerable segments of the population, tame inflation, reduce financial vulnerabilities, coordinate international debt relief, and help the most vulnerable by avoiding food insecurity and setbacks to poverty reduction.
3. **Keep trade flowing** – Avoid export and import restrictions. During crises, the need for imports may increase and exports could serve as stabilizers. Facilitate trade and streamline procedures and maintain access to finance and enforce contracts. Enable trade through multilateral and regional frameworks – noting the Regional Comprehensive Economic Partnership (RCEP).[94]
4. **Help the maritime industry transition** – Help companies embrace digitalization, and advance the decarbonization and energy transition agendas, while ensuring preparedness and resilience. Monitor trends in industry structures and services to ensure level playing fields. Ensure that the industry continues to generate value and expand its footprint without undermining smaller players, including shippers in developing countries.
5. **Cooperate multilaterally** – Promote coordinated and multilateral approaches and solutions. Prevent fragmentation in the face of geopolitical risks. Coordinate action on the climate emergency and enable the transition towards low-carbon growth. Multilateral cooperation is also essential for rapidly ending the war in Ukraine.
6. **Build resilience** – Take an integrated and proactive approach to 'resilience by design'. Help developing counties, particularly most vulnerable economies to build stronger systems for transport and logistics. In particular, accelerate their update of digitalization to tap the potential of e-commerce and enable smart maritime logistics.
7. **Reconfigure supply chains** – Strike a balance between efficiency and cost on the one hand, and security, autonomy, self-reliance and resilience, on the other.

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2

MARITIME TRANSPORT SERVICES

In 2021, due to strong market conditions, in terms of value the world shipping fleet increased dramatically, and there was much greater demand for second-hand vessels. During the 12 months to January 2022, however, in a more difficult economic environment, the total fleet of seagoing merchant vessels grew more slowly, by around 3 per cent.

The fleet has also been ageing. Since 2021, the average age of vessels has increased from 20 to 22 years. This is partly because ship owners and operators, uncertain about future fuel and carbon prices, environmental regulations and technological developments, have delayed investment and are keeping older vessels in operation.

Faced with new regulations and fuel types, owners may choose not to recycle existing ships and instead move to new, greener vessels. However, environmental regulations on the production inputs such as steel may raise costs and put a premium on recycling.

During the past year the supply of shipping capacity has been affected by the war in Ukraine, and the COVID-19 pandemic – which have led to chronic port congestion that has removed around 16 per cent of global container ship sailing capacity. These crises have also disrupted shipping schedules leading to ad hoc ship calls and longer dwell times. Shippers have suffered from shortages of vessel space and containers, while carriers have had to consolidate port calls, and ports have been managing logjams. Some of the pressures may, however, be alleviated in 2023–2024.

Faced with these crises, and the prospect of further disruptions, players across the shipping industry are aiming for greater resilience. Vulnerable economies will need to futureproof their ports and their maritime supply chains. Preparing for uncertainty will mean gathering sufficient data and planning different scenarios, while also establishing emergency response protocols to mitigate the impacts.

A. MODERATE FLEET GROWTH IN 2021

In early 2022, the total fleet of seagoing merchant vessels amounted to 102,899 ships of 100 gross tons and above, equivalent to 2,199,107 thousand dwt of capacity. In the 12 months to January 2022, in dwt terms the global commercial fleet grew by 2.95 per cent (table 2.1), an historically moderate growth rate and the second lowest since 2005 (figure 2.1). Over the same period, supported by robust global gas demand, the fleet of liquified-gas carriers continued to grow strongly, by 8.15 per cent.[1]

At the start of 2022, the average age of the global fleet was 21.9 years in terms of number of ships, and 11.5 years in terms of carrying capacity, and in 2022 on both measures the average age continued to increase. In terms of dw tonnage, the youngest vessels were bulk carriers at 10 years, followed by container ships (11 years) and oil tankers (11.2 years) (table 2.2). Newer ships are generally bigger.

Since 2011, the total fleet has aged by 7 per cent, from 20.4 to 21.9 years – growing older for all ship types except for bulk carriers, which since 2013 on average have been the youngest vessels (figure 2.2). The fleet is ageing partly because shipowners and operators, uncertain about future fuel and carbon prices, regulations and technological developments, have delayed investment and are keeping their older vessels in operation.

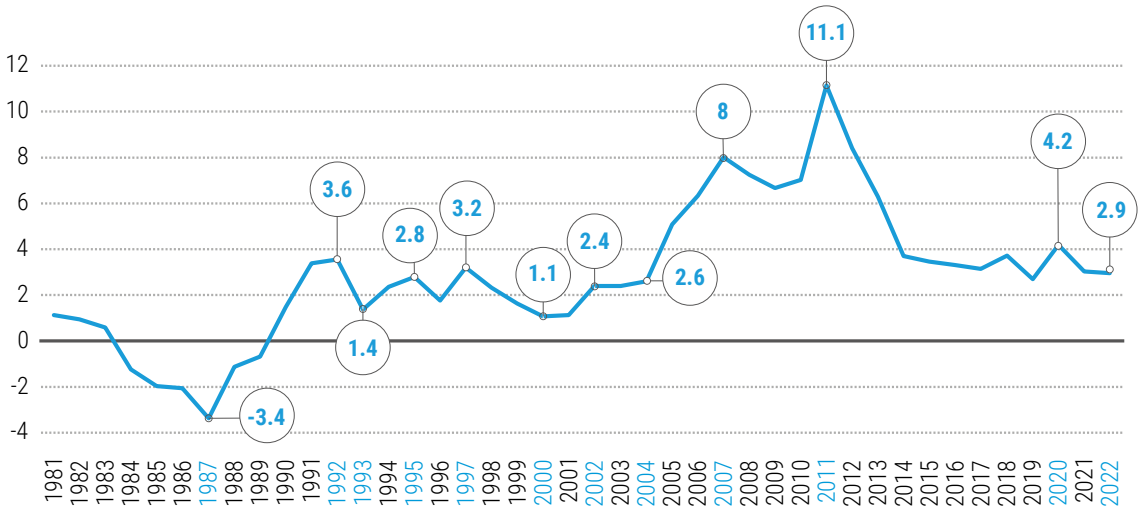
Table 2.1 World fleet by principal vessel type, 2021–2022
(thousand dead-weight tons and percentage change)

Principal types	2021	2022	Percentage change 2022 over 2021
Bulk carriers	913 175	946 135	3.61%
	42.75%	*43.02%*	
Oil tankers	619 331	629 014	1.56%
	28.99%	*28.60%*	
Container ships	281 825	293 398	4.11%
	13.19%	*13.34%*	
Other types of ships	243 949	251 742	3.19%
	11.42%	*11.45%*	
Offshore supply	83 805	84 281	0.57%
	3.92%	*3.83%*	
Liquefied gas carriers	77 458	83 770	8.15%
	3.63%	*3.81%*	
Chemical tankers	49 055	49 662	1.24%
	2.30%	*2.26%*	
Other/n.a.	25 443	25 690	0.97%
	1.19%	*1.17%*	
Ferries and passenger ships	8 188	8 340	1.85%
	0.38%	*0.38%*	
General cargo	77 910	78 819	1.17%
	3.65%	*3.58%*	
World total	**2 136 190**	**2 199 107**	**2.95%**

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

Notes: Propelled seagoing merchant vessels of 100 gross tons and above, as of 1 January 2022.
Dead-weight tons for some individual vessels have been estimated.

Figure 2.1 Annual growth of the world fleet, 1981–2022
(percentage of dead-weight tonnage)



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

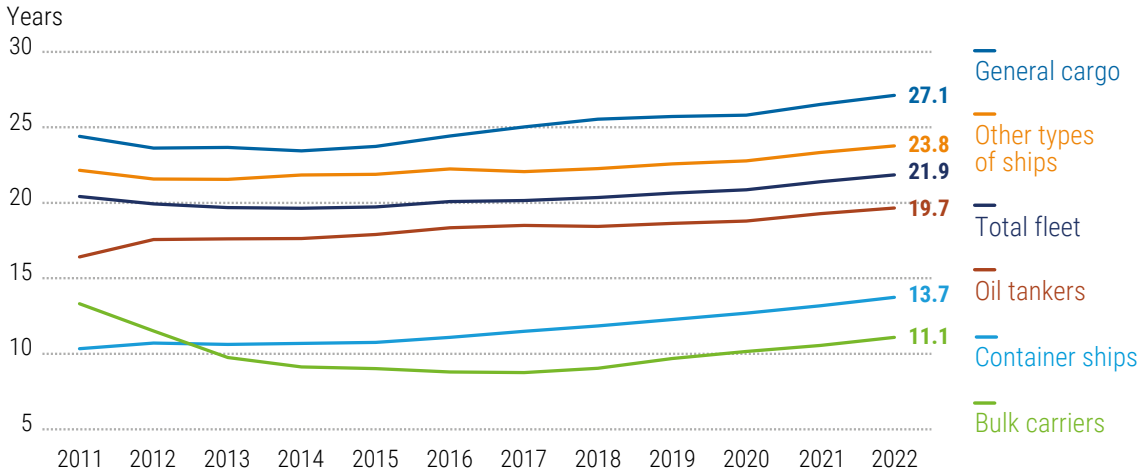
Table 2.2 Age of world merchant fleet, by vessel type and flag of registration, 2022

Vessel type, country grouping by flag of registration and indicator		Years					Average age	
		0–4	5–9	10–14	15–19	More than 20	2021	2022
World								
Bulk carriers	Percentage of total ships	17	31	31	10	11	11	11.1
	Percentage of dead-weight tonnage	21	33	30	10	7	10	10
	Average vessel size (dead-weight tonnage)	91 530	78 801	71 422	71 234	47 812	NA	NA
Container ships	Percentage of total ships	14	18	28	20	19	13	13.7
	Percentage of dead-weight tonnage	20	27	27	17	9	10	11
	Average vessel size (dead-weight tonnage)	73 578	79 436	50 646	43 226	24 776	NA	NA
General cargo	Percentage of total ships	6	9	17	10	58	27	27.1
	Percentage of dead-weight tonnage	8	16	25	12	39	20	20.2
	Average vessel size (dead-weight tonnage)	5 361	6 723	5 824	4 497	2 661	NA	NA
Oil tankers	Percentage of total ships	14	16	21	15	34	19	19.7
	Percentage of dead-weight tonnage	24	19	30	20	8	11	11.2
	Average vessel size (dead-weight tonnage)	91 996	63 518	77 031	74 477	12 425	NA	NA
Other types of ships	Percentage of total ships	10	16	18	10	47	23	23.8
	Percentage of dead-weight tonnage	19	17	23	12	29	16	16.2
	Average vessel size (dead-weight tonnage)	8 658	5 091	6 170	5 967	2 987	NA	NA
All ships	Percentage of total ships	11	16	20	11	41	21	21.9
	Percentage of dead-weight tonnage	21	25	28	14	11	11	11.5
	Average vessel size (dead-weight tonnage)	40 585	33 020	30 308	27 097	5 824	NA	NA
Developing economies								
	Percentage of total ships	11	18	20	11	40	21	20.9
	Percentage of dead-weight tonnage	20	24	25	15	17	12	12.6
	Average vessel size (dead-weight tonnage)	29 751	21 526	19 862	20 572	6 709	NA	NA
Developed economies								
	Percentage of total ships	13	16	21	11	40	21	21
	Percentage of dead-weight tonnage	23	27	31	13	7	10	10.5
	Average vessel size (dead-weight tonnage)	54 300	51 196	44 230	35 411	5 354	NA	NA
Small Islands Developing States								
	Percentage of total ships	14	22	22	11	32	18	18.6
	Percentage of dead-weight tonnage	27	31	23	11	8	10	9.9
	Average vessel size (dead-weight tonnage)	63 325	44 917	33 292	33 324	8 155	NA	NA
Least Developed Countries								
	Percentage of total ships	14	13	8	6	59	28	27.9
	Percentage of dead-weight tonnage	9	13	25	22	31	17	17.4
	Average vessel size (dead-weight tonnage)	6 531	9 935	31 823	37 401	5 412	NA	NA

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

Notes: Propelled seagoing vessels of 100 gross tons and above, as of 1 January 2022.
Dead-weight tons for some individual vessels have been estimated.
The average age of a dwt is calculated as the sum of all products of the age and dwt of a ship, divided by the sum of the dwt of all ships.
The LDC and SIDS country groupings are based on the definitions of the Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UNOHRLLS). Developed and developing country groupings are based in the UNCTADstat classification. For more information see all groups' composition at https://unctadstat.unctad.org/EN/Classifications.html.

Figure 2.2 Average age of merchant fleet, 2011–2022



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

Note: Propelled seagoing vessels of 100 gross tons and above, as of 1 January 2022.

The greatest proportional increase in average age was for container ships, from 10.3 to 13.7 years, followed by oil tankers, from 16.4 to 19.7 years, and by general cargo ships from 24.4 to 27.1 years. For bulkers, on the other hand the average age, which in 2017 was 8.8 years, decreased from 13.3 to 11.1 years.

B. FLEET OWNERS FACE TIGHTER ENVIRONMENTAL REGULATIONS

1. Environmental regulations are tightening

Shipowners faced with new environmental regulations and fuel types may choose to recycle existing ships and move to new, greener vessels. However, for shipbuilders, environmental regulations on the shipbuilding process on inputs such as steel may raise costs and put a premium on recycling.

IMO environmental regulations, which cover issues such as air pollution, ballast water treatment and double hulling of tankers, have continued to influence decisions on the design and construction of ships.[2] On 1st January 2023, three new IMO regulations come into force – aiming to reduce maritime carbon emissions and the environmental impact of shipping. These are:

1. **The Energy Efficiency Existing Ship Index (EEXI)** – This is a framework for determining the energy efficiency of vessels over 400 GT. Ship operators will have to assess their ships' energy consumption and CO_2 emissions against specific energy efficiency requirements. To ensure compliance, ship owners may need to reduce their vessels' emissions. This is a one-time certification.
2. **The annual operational Carbon Intensity Indicator (CII)** – The CII, which applies to ships of 5,000 GT and above, indicates a vessel's performance and efficiency based on annual fuel consumption, using a rating from A to E. The CII will be assessed annually from 2023, and becoming increasingly stringent towards 2030. For ships that achieve a D rating for three consecutive years, or an E rating in a single year, shipowners need to develop a corrective action plan.
3. **The enhanced Ship Energy Efficiency Management Plan (SEEMP)** – The SEEMP is the mechanism for improving CII ratings. It envisages targets and planning, and the new technologies and practices for optimizing ship performance, along with procedures for self-evaluation, verification and company audits.

Governments are pressing to strengthen IMO regulation. The United States and Norway, for example, have jointly announced a Green Shipping Challenge for COP27 and have called on the IMO to adopt a revised greenhouse gas strategy, setting an interim goal for 2030 and zero emissions no later than 2050.

Shipping is also affected by other national and regional environmental policies. The EU, for example in 2021 presented a 'Fit-for-55' package, which charts the path towards 2050 to decarbonize across various sectors, including shipping, and includes changes to the EU Emissions Trading Scheme (ETS). In shipping, the package covers bunkering infrastructure in ports, with related tax incentives, and aims to promote alternative fuels, establishing fuel standards and lifecycle GHG footprint requirements.

The EU Commission foresees a cap-and-trade system that limits GHG emissions for each ship with a mechanism for trading in a secondary market.[3] Revenues generated from the auctioning of maritime allowances would go into a fund to support investments in energy transition.

Companies would have to buy carbon credits for all voyages starting or ending in the EU, and when at berth in EU ports, whichever flag they fly, or wherever the owner of that ship is. The regulation would apply to all ships above 5,000 GT, though there are discussions for lowering the threshold. Ships that do not comply could be detained or denied entry to ports.[4] This is likely to increase the cost of voyages involving EU ports.[5]

At the beginning of 2018, emissions allowances were being traded on the EU ETS at €8 per ton of CO_2 equivalent, but by March 2022 the price had risen to €80 to €90 per ton and is expected to rise further and become increasingly volatile.[6]

2. Increased costs ahead and other implications for ship-owners

The CII will provide an internationally verified and recognized ship rating. A bad carbon intensity rating may, in some cases, affect insurance coverage and charterer's liability. Poorly performing companies could become less attractive to cargo owners in charter markets.[7]

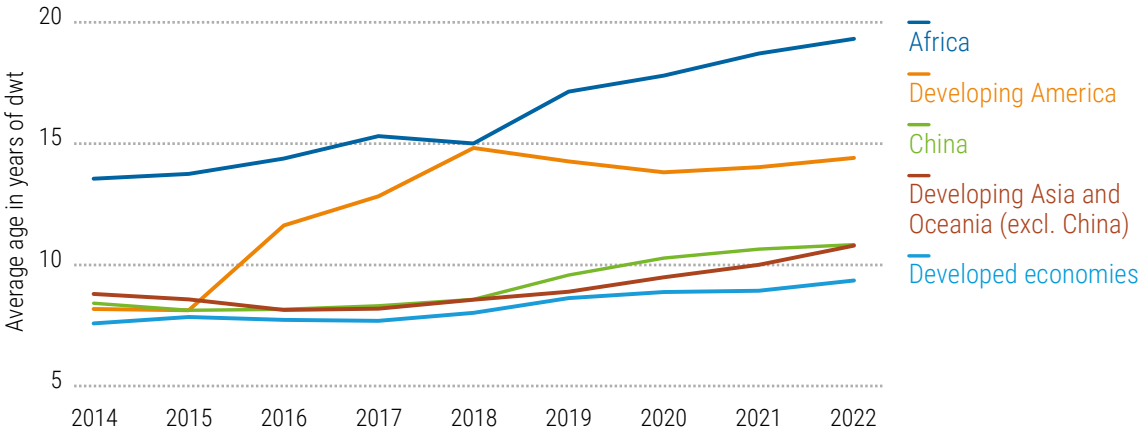
To reduce the carbon intensity and emissions of existing ships they will need to consider alternative, low- or zero-carbon fuels, and ways of optimizing operations, including reducing speeds. They may also need to invest in retrofitting vessels with energy-efficient technology and alternative propulsion techniques.[8]

In addition, companies must comply with new financial regulations such as the EU Sustainable Finance Disclosure Regulation[9] and take into account initiatives such the EU Green Bond principles[10] and the Poseidon principles[11] that address the climate impact of ship finance portfolios. Underperforming companies may struggle to gain access to investors and capital.

In this context, one of the most important considerations is the age of the fleet, which differs from one trading area to another. The region with the oldest bulker, container ship and oil tanker fleets is Africa, followed by developing America for bulk carriers and oil tankers. Developing Asia and Oceania rank joint-third for oil tankers (figure 2.3, figure 2.4 and figure 2.5).

African fleet ownership is limited. Despite efforts over many years to increase African participation in the supply of shipping services, the continent still relies mostly on foreign-owned vessels.[12] Compliance with environmental regulation and competitiveness could make African ownership even more difficult, and along some routes the continent may also face the higher costs associated with the deployment of greener ships.[13] Several countries with well-developed transport infrastructures and the potential to supply alternative energy, such as South Africa, Egypt and Morocco, are already planning for bunkering greener ships.[14]

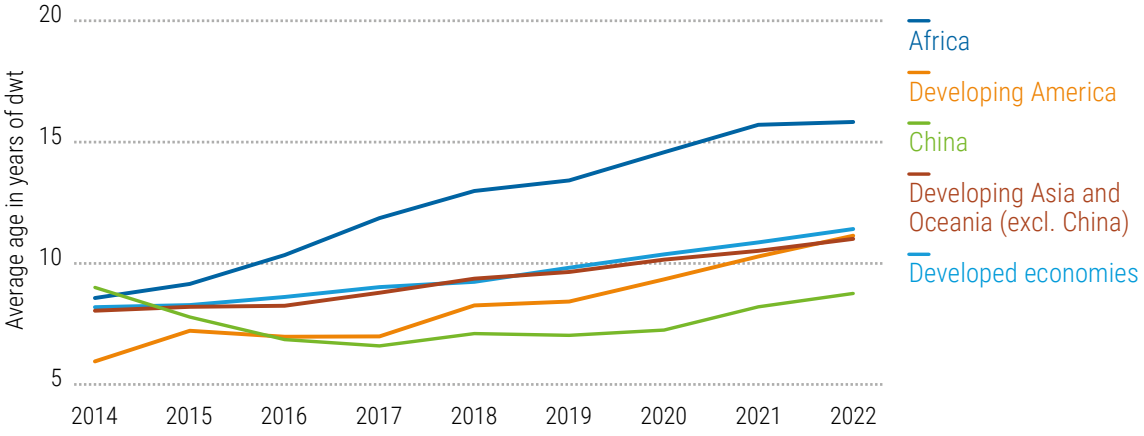
Figure 2.3 Bulk carrier fleet, average age weighted by carrying capacity by ship type and beneficial ownership, 2014–2022



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

Notes: See composition of all country groupings at: https://unctadstat.unctad.org/EN/Classifications.html.
The average age of a dwt is calculated as the sum of all products of the age and dwt of a ship, divided by the sum of the dwt of all ships.

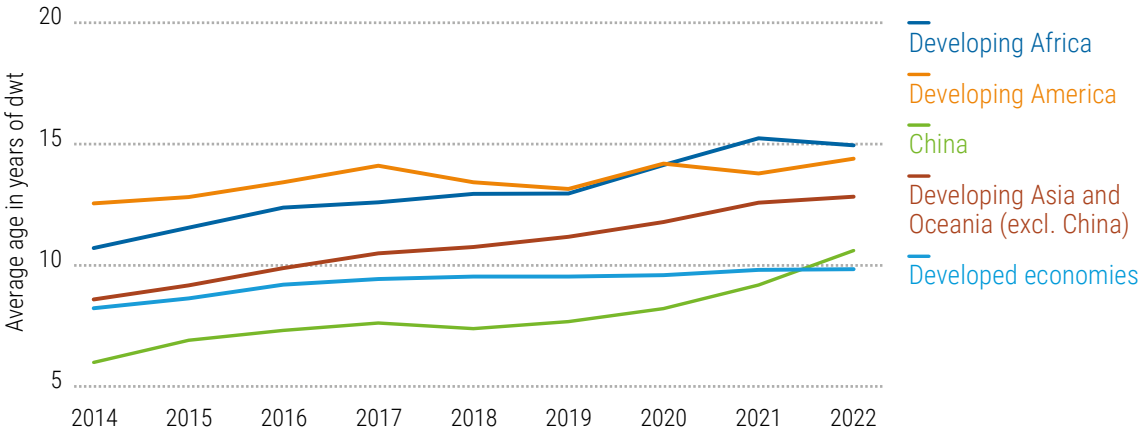
Figure 2.4 Container ship fleet, average age weighted by carrying capacity by ship type and beneficial ownership, 2014–2022



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

Note: See composition of all country groupings at: https://unctadstat.unctad.org/EN/Classifications.html.
The average age of a dwt is calculated as the sum of all products of the age and dwt of a ship, divided by the sum of the dwt of all ships.

Figure 2.5 Oil tanker fleet average age weighted by carrying capacity by ship type and beneficial ownership, 2014–2022



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

Note: See composition of all country groupings at: https://unctadstat.unctad.org/EN/Classifications.html. The average age of a dwt is calculated as the sum of all products of the age and dwt of a ship, divided by the sum of the dwt of all ships.

3. Older smaller ships and maritime transport networks

Larger ships tend to be newer and thus more modern and energy efficient. However, the modernity of the structure of the vessel or the structure and equipment on board depends not just on age but on type of trade, distance to be sailed, and the owner's willingness to invest. As illustrated in table 2.3, which is based on the thresholds considered in the EEXI and CII regulations, the age differences across ship sizes are highest for tankers and container ships.

In recent years, newbuild ships have tended to be bigger, which further reduces the average age based on tonnage.[15] Faced with uncertainties about future fuel and carbon prices, regulations, and technological developments, many ship owners and operators are delaying investment and keeping vessels for longer. But they are likely to dispose of older ships that are more difficult to upgrade to meet energy-efficiency and carbon-intensity regulations.

To comply with new environmental rules older ships may have to sail more slowly.[16] Smaller container ships tend to be deployed along secondary trading routes or used as feeders in the hub-and-spoke models of liner shipping networks. Here, older and smaller ships sailing slower will further reduce capacity and service reliability.[17]

Table 2.3 Average age by ship type and size class of 400 GT and above

	Small ships over 400 GT			Medium Ships						Large ships			Very Large Ships		
	400–499 GT			500–4,999GT			5,000–24,999GT			25,000–59,999GT			Above 60,000GT		
	# of ships	% of ship type	AVG age	# of ships	% of ship type	AVG age	# of ships	% of ship type	AVG age	# of ships	% of ship type	AVG age	# of ships	% of ship type	AVG age
Bulk carriers	-	-	-	-	-	-	1 313	10%	14.7	5 352	42%	12.3	6 049	48%	9.2
Containers	-	-	-	213	4%	21.9	2 100	38%	15.3	1 475	26%	13.6	1 801	32%	11.1
Oil tankers	215	2%	34.9	4 193	36%	27.6	1 432	12%	16.4	2 131	18%	11.8	2 994	26%	11.2

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

Note: Propelled seagoing vessels of 100 gross tons and above, as of 1 January 2022.

C. SHIP OWNERSHIP AND REGISTRATION

1. The list of top ship-owners and registries is (almost) unchanged

Ship ownership

As of 1 January 2022, the top three ship-owning countries, in terms of both dead-weight tonnage and of commercial value, were, as in previous years, Greece, China, and Japan (table 2.4 and table 2.5). Greece leads in terms of tonnage and China in terms of commercial value.

In the 12 months to 1 January 2022, among the top 25 ship-owning countries, Switzerland recorded the highest increases in tonnage at 17 per cent, followed by China at 13 per cent. Over the 2014–2022 period, the top-12 countries remain unchanged though Greece has pulled further ahead while China had overtaken Japan (figure 2.6).

In 2021, the world shipping fleet increased dramatically in value. Strong market conditions pushed vessel prices upwards, with the greatest increases for container ships.[18] At the same time there has been greater demand for second-hand vessels – fuelled by disruptions to world trade, shortages of new cargo vessels, and the war in Ukraine.[19]

The ranking of fleet ownership and registration is more volatile in terms of commercial value than in tonnage. China registered the highest increase in share, of 1.09 percentage points, followed by Switzerland, Hong Kong China, and the Republic of Korea whose fleets have a higher proportion of container ships.

Table 2.4 Ownership of the world fleet, ranked by commercial value (million US$), 2022, main vessel types

	Country or Territory of Ownership	Container Ships	Bulk Carriers	Oil Tankers	Offshore vessels	Ferries & Passenger Ships	Gas Carriers	General Cargo Ships	Chemical Tankers	Other/NA	Total
1	China	45 104	56 487	14 948	11 457	5 219	4 630	9 026	3 857	4 098	154 827
2	Greece	30 051	55 797	35 608	228	2 280	22 432	297	932	533	148 157
3	Japan	34 010	51 558	10 105	5 145	3 264	18 420	3 670	5 270	13 036	144 477
4	United States	5 230	5 385	5 056	14 119	50 999	1 553	1 626	963	1 035	85 966
5	Germany	52 934	8 072	1 800	666	10 100	1 572	5 211	762	533	81 649
6	Singapore	21 249	19 553	12 942	4 274	12	4 844	1 393	5 406	809	70 481
7	United Kingdom	17 232	5 717	4 095	14 218	5 507	7 212	1 016	1 552	3 788	60 336
8	Hong Kong, China	29 066	15 475	7 160	124	2 075	1 619	1 305	266	1 613	58 704
9	Norway	4 297	5 573	5 436	20 251	3 423	8 224	1 397	2 488	5 235	56 325
10	Republic of Korea	13 801	11 854	6 994	403	524	6 029	701	1 587	4 035	45 929
11	Switzerland	25 913	917	535	2 896	10 546	196	227	168	5	41 404
12	Denmark	26 742	1 858	3 439	1 675	1 169	2 170	903	825	152	38 932
13	Taiwan Province of China	22 435	10 703	1 410	128	71	351	550	223	112	35 983
14	Bermuda	4 727	6 842	6 637	3 062		8 311		107	98	29 784
15	Netherlands	854	989	416	11 221	452	623	4 705	2 058	2 616	23 935
16	France	13 906	438	91	5 151	1 879	388	206	117	131	22 307
17	Italy	21	1 077	1 949	5 042	10 097	205	2 310	393	1 131	22 225
18	Brazil	1 370	253	830	13 843	61	108	38	74	2	16 580
19	Monaco	3 837	3 064	6 688		26	1 630		25	47	15 317
20	Türkiye	2 675	5 319	1 502	705	323	342	2 623	1 173	45	14 706
21	Indonesia	3 154	1 920	2 500	1 201	2 062	965	1 637	449	66	13 953
22	Russian Federation	395	410	3 467	1 542	156	1 834	2 647	629	1 821	12 901
23	United Arab Emirates	1 652	3 253	3 123	2 392	37	857	169	632	235	12 350
24	Belgium	853	2 180	3 559	334		983	873	208	2 021	11 011
25	Malaysia	528	236	355	6 266	32	2 183	263	126	170	10 158
	Others	14 572	22 592	21 229	24 729	13 727	14 821	11 135	4 435	2 633	129 874
	World total	**376 606**	**297 523**	**161 873**	**151 071**	**124 041**	**112 504**	**53 929**	**34 724**	**46 000**	**1 358 270**

Source: UNCTAD calculations, based on data from Clarksons Research, as of 1 January 2022 (estimated current value).

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

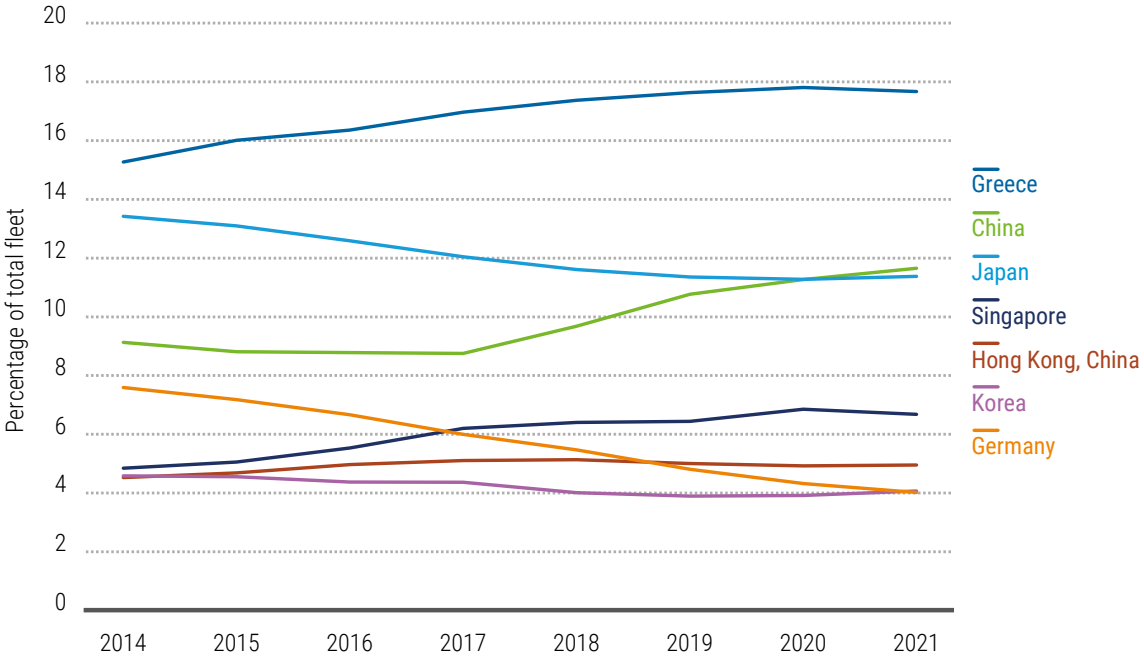
Table 2.5 Ownership of the world fleet, ranked by carrying capacity in dead-weight tons, 2022, national- and foreign-flagged fleet

	Country or territory of ownership	Number of vessels			Deadweight tonnage				
		National flag	Foreign flag	Total	National flag	Foreign flag	Total	Foreign flag as a % of total	Total as a % of world
1	Greece	620	4 246	4 870	55 715 512	328 703 344	384 430 215	85.51	17.63
2	China	5 357	2 599	8 007	113 035 546	163 977 083	277 843 335	59.19	12.74
3	Japan	933	3 070	4 007	35 970 817	200 656 470	236 638 365	84.8	10.85
4	Singapore	1 371	1 400	2 799	67 869 137	68 312 248	136 243 709	50.16	6.25
5	Hong Kong, China	861	948	1 822	72 061 117	39 473 538	111 587 729	35.39	5.12
6	Republic of Korea	804	867	1 680	14 767 539	77 501 218	92 302 014	84	4.23
7	Germany	185	2 036	2 221	6 976 526	72 616 389	79 592 915	91.23	3.65
8	Bermuda	2	505	507	26 137	63 381 136	63 407 273	99.96	2.91
9	Norway including Svalbard and Jan Mayen Islands excluding Bouvet Island	982	1 002	1 987	18 980 244	40 945 002	59 931 039	68.33	2.75
10	United Kingdom of Great Britain and Northern Ireland including Channel Islands and Isle of Man	363	1 014	1 380	9 376 891	49 222 876	58 746 865	84	2.69
11	United States of America including Puerto Rico	774	1 001	1 783	10 193 014	44 123 048	55 113 272	81.23	2.53
12	China, Taiwan Province of	150	856	1 014	6 590 724	48 326 874	54 974 072	88	2.52
13	Denmark	414	430	844	20 484 167	20 152 955	40 637 122	49.59	1.86
14	Monaco	0	393	393	0	38 011 632	38 011 632	100	1.74
15	Switzerland	17	480	497	911 905	29 975 783	30 887 688	97.05	1.42
16	Türkiye	406	1 175	1 583	5 768 553	24 653 060	30 433 830	81.04	1.4
17	Belgium	99	244	343	9 141 427	20 304 520	29 445 947	68.96	1.35
18	Indonesia	2 283	121	2 411	24 763 544	4 050 071	29 065 796	14.06	1.33
19	United Arab Emirates	124	954	1 087	631 741	26 597 771	27 363 741	97.68	1.26
20	India	874	197	1 076	16 165 552	9 302 885	25 979 620	36.53	1.19
21	Russian Federation	1 516	309	1 833	9 250 551	15 044 248	24 317 936	61.92	1.12
22	Iran (Islamic Republic of)	244	10	255	18 608 833	830 667	19 441 051	4.27	0.89
23	Netherlands	665	524	1 189	5 392 304	12 519 434	17 911 737	69.9	0.82
24	Saudi Arabia	160	108	269	13 619 108	3 738 256	17 358 885	21.54	0.8
25	France, Metropolitan	173	252	425	4 356 779	10 978 404	15 335 183	71.59	0.7
26	Italy	453	177	630	9 040 908	6 237 878	15 278 786	40.83	0.7
27	Viet Nam	959	167	1 133	11 358 301	3 562 368	14 934 404	23.88	0.69
28	Brazil	295	84	384	4 672 784	9 077 925	13 773 954	66.02	0.63
29	Cyprus	124	227	353	4 435 287	9 272 007	13 758 739	67.64	0.63
30	Canada	207	174	383	2 491 394	7 342 722	9 835 479	74.67	0.45
31	Oman	4	64	69	5 558	9 326 443	9 332 147	99.94	0.43
32	Malaysia	453	163	629	6 597 645	2 344 395	8 985 167	26.22	0.41
33	Nigeria	203	73	282	3 521 990	3 976 535	7 520 054	53.03	0.34
34	Qatar	53	74	127	733 693	6 475 247	7 208 940	89.82	0.33
35	Kuwait	44	7	51	4 805 336	446 848	5 252 184	8.51	0.24
	Subtotal, top 35 shipowners	**22 172**	**25 951**	**48 323**	**588 320 562**	**1 471 461 279**	**2 062 880 823**	**71.44**	**94.63**
	Rest of the world unknown	*3 173*	*2 558*	*6 714*	*33 495 841*	*56 785 576*	*117 177 484*	*48.46*	*5.37*
	World	**25 345**	**28 509**	**55 037**	**621 816 403**	**1 528 246 855**	**2 180 058 307**	**71.08**	**100**

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

Notes: *Propelled* seagoing vessels of 1,000 gross tons and above, as of 1 January 2022.
For the purposes of this table, ships registered under national flag are any ship where the registration and ownership are in the same country or territory of ownership. Ships in second registries of Brazil, China, Denmark, France and Norway are considered to be under the national flag if they are owned in their respective country. Ships registered in Isle of Man are considered as being registered under national flag if they are owned anywhere in a greater territory of United Kingdom including the Isle of Man and the Channel Islands. Likewise, for the purpose of determining national flag, Madeira and mainland Portugal are considered as one unit.
The totals for a country or territory of ownership includes vessels for which the flag is unknown. Thus, the sum of national and foreign flags does equal the total. Foreign flag as a percentage of total is calculated as share of vessels with known flag.
For a complete listing of nationally owned fleets, see http://stats.unctad.org/fleetownership.

Figure 2.6 Beneficial ownership of the global fleet, percentage share, top 7 ship-owing countries, 2014–2021, deadweight tonnage



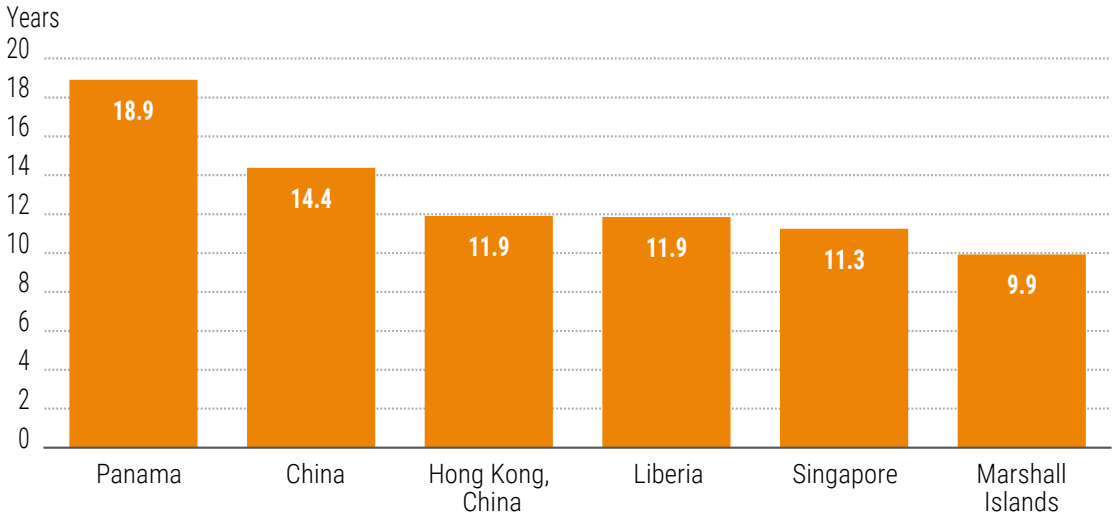
Source: UNCTAD calculations, based on data from Clarksons Research.

Vessel registration flags

As of 1 January 2022, in terms of dead-weight tonnage and commercial value, the top three flags of registration were those of Panama, Liberia and the Marshall Islands (table 2.6 and table 2.7). Among the top registries, Viet Nam recorded the highest increases in dead-weight tonnage. The Liberian flag registered the highest increase in the share of fleet value, of 2.2 percentage points, whereas as the Bahamas flag had the largest decrease, 1.5 percentage points. Iran, Israel and Madeira recorded the highest increase in percentage of global fleet value between 2019 and 2022.[20]

Among the top six registries, the highest average age of total fleet was for ships registered in Panama, followed by China. The lowest was for the Marshall Islands, followed by Singapore (figure 2.7). Differences in age reflect differences in registries policies, pricing structure and specialization in different ship types.

Figure 2.7 Average fleet age in the top six registries, by deadweight tonnage, as of 1 January 2022



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

Table 2.6 Leading flags of registration by dead-weight tonnage, 2022

	Flag of registration	Number of vessels	Share of world vessel total (percentage)	Dead-weight tonnage (thousands dead-weight tons)	Share of total world dead-weight tonnage (percentage)	Cumulated share of dead-weight tonnage (percentage)	Average vessel size (dead-weight tonnage)	Growth in dead-weight tonnage 2021 to 2022
1	Panama	8 025	7.8	350 401	15.9	15.9	43 664	1.7
2	Liberia	4 311	4.2	335 114	15.2	31.2	77 735	11.9
3	Marshall Islands	4 042	3.9	289 781	13.2	44.3	71 693	5.7
4	Hong Kong, China	2 661	2.6	207 816	9.5	53.8	78 097	1.4
5	Singapore	3 227	3.1	131 369	6.0	59.8	40 709	-3.6
6	China	7 309	7.1	114 952	5.2	65.0	15 727	6.0
7	Malta	2 047	2.0	114 910	5.2	70.2	56 136	-0.9
8	Bahamas	1 307	1.3	72 998	3.3	73.5	55 851	-1.8
9	Greece	1 234	1.2	61 817	2.8	76.4	50 095	-4.3
10	Japan	5 590	5.4	40 263	1.8	78.2	7 203	2.4
11	Cyprus	1 030	1.0	33 461	1.5	79.7	32 487	-1.7
12	Indonesia	11 015	10.7	29 332	1.3	81.0	2 663	1.1
13	Danish Int'l Register	612	0.6	26 061	1.2	82.2	42 583	5.6
14	Madeira	672	0.7	25 863	1.2	83.4	38 486	13.7
15	Norwegian Int'l Register	695	0.7	21 300	1.0	84.4	30 648	-3.1
16	Isle of Man	291	0.3	20 661	0.9	85.3	71 002	-6.1
17	Iran (Islamic Republic of)	942	0.9	20 195	0.9	86.2	21 439	-2.6
18	India	1 810	1.8	16 934	0.8	87.0	9 356	-1.1
19	Republic of Korea	2 063	2.0	15 635	0.7	87.7	7 579	-0.6
20	Saudi Arabia	413	0.4	13 887	0.6	88.3	33 625	1.6
21	United States of America including Puerto Rico	3 636	3.5	12 526	0.6	88.9	3 445	-0.1
22	Viet Nam	1 975	1.9	12 331	0.6	89.5	6 244	19.4
23	United Kingdom excl. Channel Islands and Isle of Man	881	0.9	11 292	0.5	90.0	12 817	-3.8
24	Russian Federation	2 917	2.8	11 039	0.5	90.5	3 784	1.1
25	Italy	1 266	1.2	9 969	0.5	90.9	7 875	-11.4
26	Belgium	199	0.2	9 791	0.4	91.4	49 200	1.6
27	Malaysia	1 790	1.7	9 269	0.4	91.8	5 178	-9.6
28	Bermuda	135	0.1	7 888	0.4	92.2	58 430	-2.0
29	Germany	591	0.6	7 096	0.3	92.5	12 007	-9.8
30	China, Taiwan Province of	450	0.4	6 755	0.3	92.8	15 011	-5.4
31	Netherlands	1 175	1.1	6 661	0.3	93.1	5 669	-2.2
32	Türkiye	1 237	1.2	6 257	0.3	93.4	5 059	-2.3
33	Antigua and Barbuda	638	0.6	6 219	0.3	93.7	9 747	-2.8
34	Philippines	1 853	1.8	6 201	0.3	93.9	3 346	-1.3
35	Cayman Islands	139	0.1	6 070	0.3	94.2	43 671	-11.8
	Top 35	**78 178**	**76**	**2 072 117**	**94.2**	**94.2**	**37 001**	**5.5**
	World total	**102 899**	**100**	**2 199 107**	**100**	**100**	**21 372**	**2.9**

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

Notes: Propelled seagoing merchant vessels of 100 gross tons and above, as of 1 January 2022. For a complete listing of countries, see http://stats.unctad.org/fleet.
Dead-weight tons for some individual vessels have been estimated.

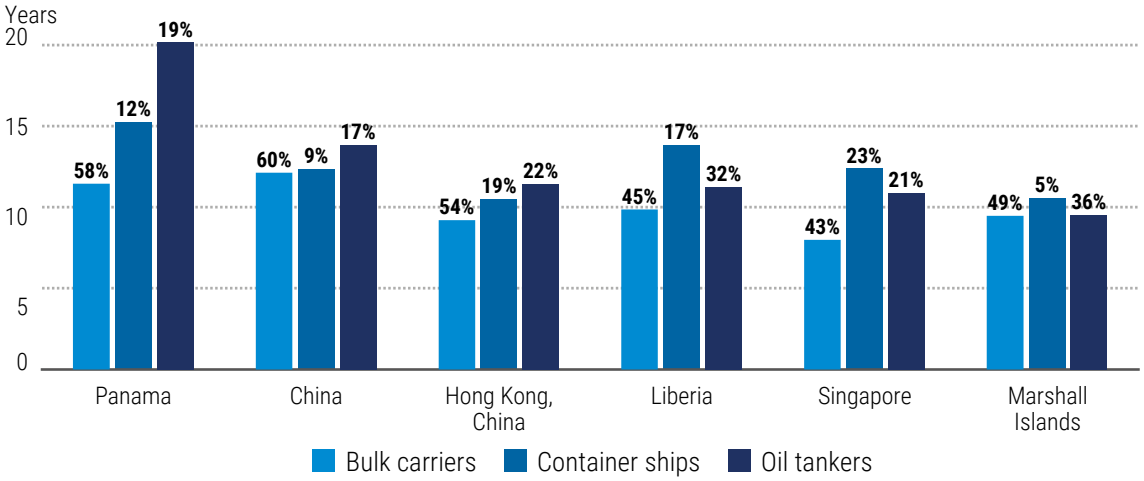
Table 2.7 Leading flags of registration, ranked by value of total tonnage, 2022 (million US dollars) and principal vessel types

	Flag of Registration	Container ships	Bulk carriers	Oil tankers	Offshore vessels	Ferries and passenger ships	Gas carriers	General cargo ships	Chemical Tankers	Other/NA	Total
1	Panama	47 425	62 889	13 858	14 205	11 033	11 589	5 153	5 178	10 215	181 546
2	Liberia	71 702	44 053	25 441	10 163	415	7 092	1 639	3 766	2 175	166 446
3	Marshall Islands	20 459	48 411	29 977	12 368	1 315	17 173	780	4 561	2 480	137 524
4	Hong Kong, China	53 034	33 170	10 979	263	42	6 620	2 101	1 658	168	108 035
5	Singapore	41 489	17 641	10 492	6 647		9 990	1 074	3 708	1 818	92 860
6	Malta	32 893	12 374	10 097	3 718	16 904	10 389	2 216	1 705	1 670	91 967
7	Bahamas	1 927	7 218	6 522	26 189	29 324	12 333	104	36	3 724	87 378
8	China	14 819	27 417	8 774	8 050	4 315	816	5 188	1 794	3 887	75 061
9	Madeira Int'l Register	18 201	3 057	903	16	306	93	1 507	446	183	24 711
10	Danish Int'l Register	17 323	417	2 769	665	876	911	616	576	126	24 279
11	Italy	492	458	926	496	16 167	172	2 296	299	1 102	22 408
12	Japan	3 732	4 487	2 645	436	3 121	2 313	1 813	127	3 692	22 366
13	Greece	476	3 849	8 741	72	1 294	6 994	63	95	25	21 609
14	Cyprus	6 717	5 965	768	1 587	2 136	1 552	1 394	374	943	21 437
15	Norwegian Int'l Register		2 562	3 163	4 963	1 403	2 997	653	1 884	1 735	19 360
16	Bermuda	587		305	471	7 307	6 782		151		15 604
17	United Kingdom	5 341	1 006	81	2 091	4 244	461	636	429	283	14 573
18	Indonesia	2 413	2 007	2 010	2 127	2 048	1 028	1 634	488	68	13 824
19	United States	3 983	69	1 162	3 040	1 755		1 084	42	1 266	12 401
20	Netherlands	467	157	178	1 065	3 899	499	4 669	262	1 121	12 316
21	Isle of Man Int'l Register	471	3 287	1 267	3 612	230	2 677	269	179	48	12 039
22	Republic of Korea	4 392	1 288	368	172	298	635	532	1 183	1 497	10 366
23	Russian Federation	156	120	1 348	1 749	153	243	2 670	630	1 832	8 901
24	Germany	7 145	16	92	454	332	27	181	20	128	8 394
25	Malaysia	556	228	664	4 707	23	1 640	75	107	216	8 215
	Subtotal top 25	**356 200**	**282 145**	**143 531**	**109 327**	**108 941**	**105 027**	**38 348**	**29 698**	**40 402**	**1 213 619**
	Other	***20 406***	***15 377***	***18 342***	***41 744***	***15 100***	***7 477***	***15 581***	***5 026***	***5 598***	***144 652***
	World total	**376 606**	**297 523**	**161 873**	**151 071**	**124 041**	**112 504**	**53 929**	**34 724**	**46 000**	**1 358 270**

Source: UNCTAD calculations, based on data from Clarksons Research, as of 1 January 2022 (estimated current value).
Note: Value is estimated for all commercial ships of 1,000 gross tons and above.

In January 2022, among these registries, Panama, at 18.9 years, has the highest average age across most ship types except bulk carriers, which represented 58 per cent of its registered fleet.[21] For the China flag, almost 60 per cent of the fleet are bulkers, and among these six registries, the China flag has the highest average age for bulkers, at 12.1 years (figure 2.8).

Figure 2.8 Average of the bulk carrier, container ship and oil tanker fleets in the top 6 flag of registration by dwt and percentage of each ship type in the total fleet, as of 1 January 2022



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

2. War in Ukraine disrupts supplies and renews interest in local and regional fleets

Because of the war in Ukraine some customers have suspended cargo bookings, and international shipping companies have adjusted their schedules and rerouted shipments – increasing shipping distances, transit times and costs.[22] In addition, associated risks have significantly increased the cost of insurance: before the beginning of the war in Ukraine, premiums to enter the broader Black Sea were 0.025 per cent of the ship's value, but by August 2022 they had risen to as much as 5 per cent.[23] [24]

The war in Ukraine has also added complexity to container shipping logistics. Cargos destined for the Russian Federation often require transhipment through Northern European ports – adding to congestion and resulting in container shortages. For shipping companies, insurers and other maritime operators, economic and other restrictive measures can be confusing. Restrictions on finance, trade, shipping and immigration, change frequently and are not always synchronized across regimes. In the United Kingdom in March 2022, for instance, difficulties in verifying the origin and ownership of vessels increased port congestion.[25]

Economic and other restrictive measures relate to Russian-owned or -flagged vessels calling or refuelling at ports (European Union and United States); to marine insurers providing cover from Russian cargoes (European Union); and to nationals broking, chartering or selling vessels to persons connected with the Russian Federation (United Kingdom). In addition, the United States has imposed export controls on technologies and equipment used in maritime transport and on the Russian Maritime Register of Shipping and the United Shipbuilding Corporation.[26]

Concerned about economic and other restrictive measures, many shipping companies have halted bookings to and from Russia, as have other companies across the maritime supply chain, including engine and other marine equipment manufacturers, maintenance companies, classification societies and insurers.[27]

In addition, the war in Ukraine has affected crewing. Seafarers from Ukraine and the Russian Federation represent around 15 per cent of the global maritime workforce.[28] Ukraine port closures have made crew changes in the region more difficult. Many seafarers unable to return home have faced extended tours of duty. In addition, crew payments have been made more difficult by economic and other restrictive measures on banks.[29]

The disruption and high freight rates resulting from the war in Ukraine, the COVID-19 pandemic, and port congestion have prompted official responses. Several governments have initiated national discussions, announced plans, or passed legislation to help sustain service frequency and quality at competitive rates for all traders (box 2.1). These initiatives also need to address the broader maritime ecosystem including workforce skills and port efficiency, and competition surveillance and the options for public-private collaboration.

Box 2.1 Policy debates and initiatives on regional fleets

Overdependence for shipping and associated services on foreign-owned, foreign seafarers or foreign flags can be a source of vulnerability. To build resilience, some countries are aiming to enhance the contributions of local or regional operators.

- **Western Australia** – In March 2022, the government of Western Australia established a task force to strengthen the State's supply chains and reduce freight rates. This could include developing a coastal fleet of tankers, general cargo ships and ro-ro ships, as well as relaxing the cabotage regime to enhance links between Western and Eastern Australia and with international customers. There could also be measures to upgrade the skills of the maritime workforce and support the local shipbuilding industry. But some stakeholders have expressed reservations about government involvement in the commercial management of shipping lines and the high costs of operating under the Australian flag.
- **Bangladesh** – The 2019 Flag Vessels Protection Act provided for 50 per cent of cargos to be carried by local vessels, which would have VAT exemption and berthing priority at local ports. The aim was to promote investment by local entrepreneurs, increase transport supply capacity and relieve bottlenecks in trading operations in key export routes. In 2020, the national fleet grew in dwt, by 18 per cent, and in 2021 by 19 per cent. The growth in container ships was particularly significant, though other stakeholders believed that while the measures had been effective for bigger shippers, they had made processes more burdensome for smaller traders.
- **Viet Nam** – In 2022, aiming to reduce transport delays and freight rates the Ministry of Industry and Trade proposed several measures aimed at easing supply chain issues along intra- Asian routes and reducing the burden on traders. These included tax incentives to attract foreign investment in new ships and to encourage private-sector investment in key infrastructure upgrades, as well as measures to encourage fleet renewal and the development of a coastal fleet management programme. More container ships are needed to meet higher demand. The Viet Nam Logistics Association has estimated investment needs of $1.5 billion to acquire new ships and to rent and purchase containers.
- **East Africa** – Kenya, through Mombasa, and Tanzania, through Dar es Salaam, have ports that compete as entry points to East Africa. Both States have passed policy frameworks and taken initiatives to develop infrastructure and shipbuilding capabilities as well as national shipping lines, and attract investment in multimodal connections. They also hope to harness the potential of the oceans economy and regional trading opportunities. However, national shipping lines have not been successful and in 2022 announced the need to dispose of vessels. Some stakeholders believed this was due to a lack of capacity to compete with international lines. International lines have subsequently announced plans for direct services from key ports, including Mombasa and Dar es Salaam, to Asia, while also providing services for local freight, clearing, warehousing and last-mile delivery.

Sources: Curtis (2022); Government of Western Australia (2022); Shipping Australia Limited (2022); Illius et al. (2021); UNCTADstat; Maritime Gateway (2021); Nguyen (2022); Maritime Executive (2022): the East African (2015), Kitimo et al (2022), Container News (2022) and VOA (2022).

D. HIGH LEVELS OF SHIPBUILDING AND LESS RECYCLING

1. Shipbuilding and new orders

In 2020, due to the COVID-19 pandemic, shipbuilding contracted. In 2021, deliveries increased by 5.2 per cent, reaching 60,779,648 GT, but were still lower than in the 2014–2017 period and in 2019.

Maritime ship supply continues to be dominated by three countries – China, the Republic of Korea, and Japan – which in 2022 together had 94 per cent of the market. Over the past year, shipbuilding increased in China by 15.5 per cent and in the Republic of Korea by 8.3 per cent, but in Japan declined by 16.4 per cent.

In 2021, as in 2020, most of the tonnage delivered was of bulk carriers, oil tankers, container ships and gas carriers (table 2.8). Newbuilt tonnage increased most in offshore vessels by 142 per cent, in general cargo ships by 74 per cent, and in gas carriers by 54 per cent. In contrast, there were declines for bulk carriers, of 21 per cent, oil tankers of 12 per cent and chemical tankers of 4 per cent.

In the past year, orders for container ships surged by 129 per cent to a record high. In 2021, the liquefied gas carriers orderbook continued its upward trend, increasing by 26 per cent, while the tankers orderbook continued its downward trend, contracting by 13.5 per cent. For bulkers, the orderbook had its first increase for three years, of 4 per cent (figure 2.9). For tankers the 2021 ordering level was the lowest for 25 years, and for bulkers it was close to an 18-year low – as a result of weaker market conditions and higher newbuild prices.[30]

In 2021, contracting was largely for medium-size ships (12,000–16,999 TEU) but over the past year has involved both larger and smaller vessels. This corresponds to the surge in orders for container ships as well as for ships below 3,000 TEU due to expected feedering developments in Asian intra-regional trade.[31]

For 2023, Clarksons projects fleet growth of 1.7 per cent in terms of dwt, maintaining overall moderate growth observed this past year. Despite new supply coming live in 2023, tonnage availability will be constrained by the new environmental regulations which will often require lower speeds.

Owners are still uncertain about the most cost-efficient alternative fuels and the best ways of reducing greenhouse emissions so, despite greater demand, are holding off buying new ships and are maintaining existing fleets, especially in the wet and dry sectors.[32]

The uptake of alternative fuels is advancing slowly. In recent years investment has surged in the transitional (fossil) fuel LNG.[33] In the year from August 2022, the proportion of the fleet that was LNG-capable increased from 2.0 to 2.4 per cent, though in terms of the dead-weight tonnage on order from 21 to 31 per cent.[34]

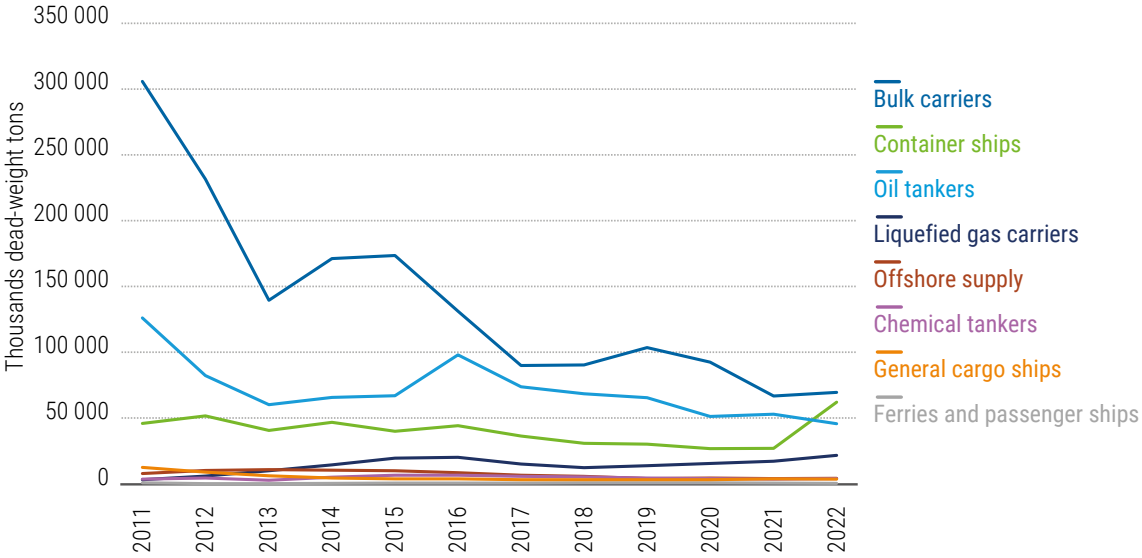
Table 2.8 Deliveries of newbuilds by major vessel type and country of construction, 2021
(thousand gross tons)

	China	Republic of Korea	Japan	Philippines	Rest of the world	Total	Percentage
Bulk Carriers	13 764	960	5 730	624	73	**21 151**	35%
Oil Tankers	4 791	6 376	2 064		358	**13 589**	22%
Container ships	4 170	4 675	1 954		131	**10 929**	18%
Gas Carriers	918	7 052	159		10	**8 138**	13%
Ferries and passenger ships	390	50	83	20	1 567	**2 110**	3%
General cargo ships	1 017	56	223		256	**1 552**	3%
Offshore vessels	641	402	9		317	**1 370**	2%
Chemical tankers	662	109	226		50	**1 047**	2%
Other	510	6	278		97	**892**	1%
Total	**26 863**	**19 687**	**10 726**	**643**	**2 859**	**60 780**	
Percentage	*44%*	*32%*	*18%*	*1%*	*5%*	***100%***	

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

Notes: Propelled seagoing merchant vessels of 100 gross tons and above.
For more data on other shipbuilding countries, see http://stats.unctad.org/shipbuilding.

Figure 2.9 World tonnage on order, selected ship types, 2011–2022
(dead-weight tons)



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

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

However, the war in Ukraine and the current energy crisis are creating price pressures, raising doubts about the role of LNG in the energy transition, and concerns about LNG infrastructure. And, taking into account the regulations for emissions control, the outlook appears volatile.

Although LNG is the preferred alternative fuel, there are increasing orders for ships that are also methanol- and ammonia-ready.[35] Short-sea segments and ferries are also looking to electrification. To keep their options open, owners are turning to dual-fuel vessels. As of March 2022, almost 40 per cent of the orderbook was of vessels capable of running on alternative fuels.[36] In June 2022, the main four economies ordering alternative fuel-capable ships were the Republic of Korea at 70 per cent of their orders, China at 26 per cent, Europe at 58 per cent, and Japan at 17 per cent.[37]

Alternative fuels currently cost two to five times more than conventional fuels, so are not yet commercially viable. Arising from the Clydebank Declaration, there have been a number of public-private initiatives to address these issues, involving ports, carriers and maritime supply chain stakeholders. The aim is to scale up the supply of alternative fuels by strengthening low-carbon energy supply infrastructure in ports and producing decarbonized fleets and establishing "green corridors" (see chapter 7).

These initiatives could redefine the competitive landscape for low-carbon shipping. They will be testing grounds for alternative energy and technology, and partnerships for infrastructure, as well as for policies and regulation in diverse value chains. But they have mostly engaged actors in the Northern hemisphere, and since only a small proportion of ports are alternative-energy-ready, there is the prospect of a two-tier port system. This highlights the need for mobilizing finance and collaboration to replicate best practices.

The energy transition should involve more assistance to developing countries. UNCTAD is seeking to address these issues for three African countries, with a project to make ports smart and sustainable and able to use alternative energy and new technology.[38] The project encompasses port assessments, as well as assistance in strategy development and capacity building, promoting cooperation among countries and exchanging experiences.

2. Ship recycling

In 2021, more than half the world's recycling by tonnage was in Bangladesh which, with Pakistan, India and Türkiye, accounted for 96 per cent of ship recycling (table 2.9).

In the 12 months to January 2022, recycling volumes declined by 11 per cent, from 17,207,838 to 15,328,713 GT. Although this decline was mostly due to strong markets that encouraged owners to retain vessels, there were also other factors such as limits on imports of vessels (Bangladesh and Pakistan) on letters of credit to protect foreign reserves (Bangladesh),[39] as well as COVID restrictions.

Table 2.9 Reported tonnage sold for ship recycling by major vessel type and recycling country, 2021
(thousands of gross tons)

Vessel type	Bangladesh	Pakistan	India	Türkiye	China	Rest of the world	World total	Percentage
Oil tankers	4 565	2 200	1 044	318	42	45	**8 213**	53.6
Bulk carriers	2 011	477	133	112	60	22	**2 815**	18.4
Offshore vessels	160	116	470	274	37	125	**1 182**	7.7
Liquefied gas carriers	703		35	7		7	**751**	4.9
Ferries and passenger ships	101	178	316	148	1	6	**748**	4.9
Chemical tankers	150	13	430	9		3	**604**	3.9
General cargo ships	113	62	41	82		190	**489**	3.2
Container ships	42		101			27	**170**	1.1
Other	182		80	86		8	**356**	2.3
Total	**8 025**	**3 045**	**2 649**	**1 036**	**140**	**433**	**15 329**	**100.0**
Percentage	*52.4*	*19.9*	*17.3*	*6.8*	*0.9*	*2.8*	***100.0***	

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

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

In 2021, recycling increased most for chemical tankers, by 143 per cent, and for oil tankers, by 331 per cent which accounted for more than half of the recycled volumes. Owners of other vessel types were more likely to hang on to their existing tonnage in view of potential profitability. As a result, recycling declined by volume for container ships by 92 per cent and for bulk carriers by 70 per cent.

E. PORT AND LOGISTICS SERVICES

1. More container port activity

In 2021, according to Drewry Maritime Research, world container port traffic increased by 6.8 per cent, taking total volumes to 857 million TEUs (table 2.10). Asia continued to play a leading role, with the region's ports accounting for 62.5 per cent of world container port throughput (figure 2.10). Nine of the world's top 10 ports by throughput were in Asia, led by Shanghai, Singapore and Ningbo-Zhoushan (figure 2.11).

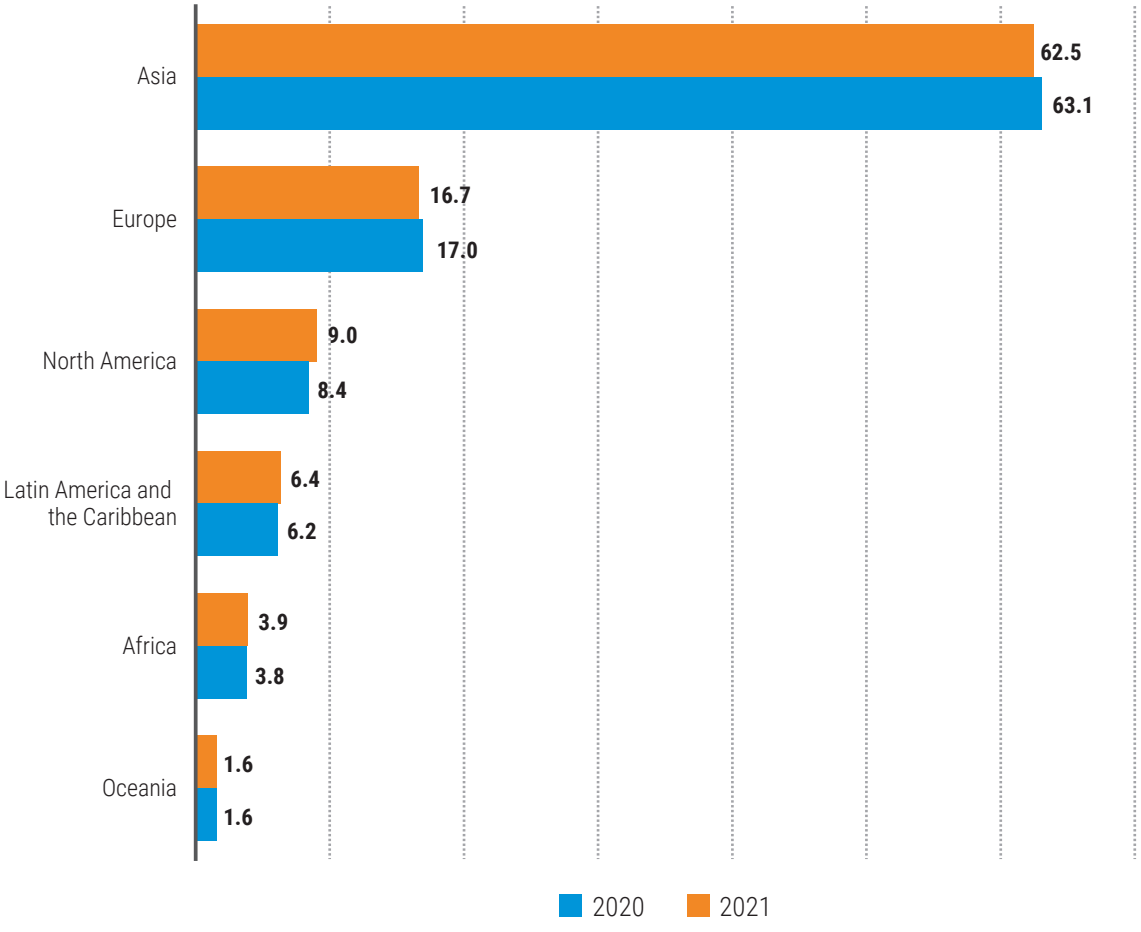
Throughput also expanded rapidly at ports in North America, by 14.4 per cent. Europe increased container port throughput by 5 per cent. In Rotterdam, volumes increased by 7.7 per cent, but in Antwerp volume growth was flat as terminals struggled with disrupted schedules. In Africa, ports had firm growth at 9.5 per cent, while in Australia and New Zealand growth was similarly robust at 7.7 per cent. In Latin America and the Caribbean, cargo handling by container ports increased by 10.5 per cent (box 2.2).

Table 2.10 World container port throughput by region, 2020–2021
(millions of 20-foot equivalent units and annual percentage change)

	20-foot equivalent units		Annual percentage change 2020–2021
	2020	2021	
Asia	506	535	6%
Europe	136	143	5%
North America	67	77	14%
Latin America and the Caribbean	49	55	11%
Africa	30	33	10%
Oceania	13	14	8%
World total	**802**	**857**	**7%**

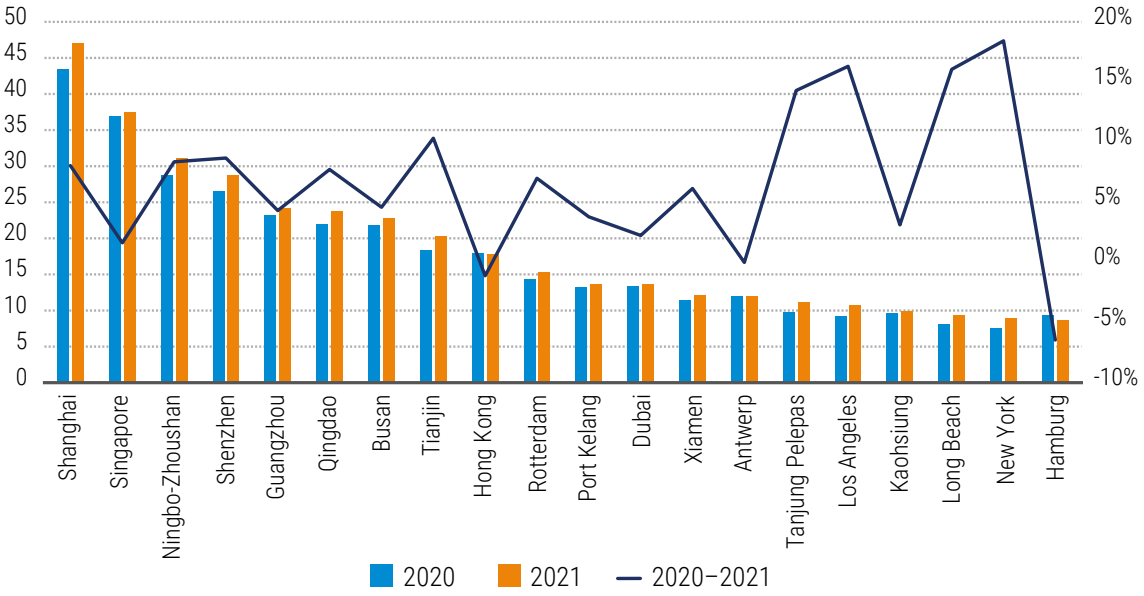
Source: UNCTAD secretariat based Drewry Maritime Research. Container Forecaster. Second Quarter.

Figure 2.10 World container port throughput by region (in 20-foot equivalent units), 2020–2021, percentage share in total



Source: UNCTAD secretariat calculations, derived from table 2.10 of this report.

Figure 2.11 Leading 20 global container ports, 2020–2021
(millions 20-foot equivalent units, and percentage annual change)



Source: UNCTAD based on data reported published on Hamburg Port Authority website (www.hafen-hamburg.de/en/statistics/top-20-container-ports), Accessed July 2022.

Box 2.2 Subregional port throughput in Latin America and the Caribbean

The COVID-19 pandemic seriously disrupted containerized seaborne trade, and exports and imports in Latin America and the Caribbean (LAC). During the first half of the pandemic international seaborne container trade fell globally by 7 per cent, but in LAC the drop was 12.2 per cent making this the worst-hit region.[40]

Although the region is set for recovery, not all subregions have yet reached that stage (table 2.11). In the first half of 2022, most LAC subregions had growth in containerized exports. However, exports from the Gulf Coast of Mexico remained flat[41] while exports from the East Coast of South America (ECSA) and the Pacific coast of Panama fell.

The results were less positive for imports. Between January and June 2022, imports to ECSA, the Pacific coast of Central America, and the Gulf coast of Mexico were lower than in the same period in 2021. In Panama, for the Pacific coast, imports increased did not recover to the 2019 levels, and for the Caribbean coast there was also recovery in imports.

In the first half of 2022, throughput for regional container ports was mostly similar to 2020.[42] The main exception was the Mexican Pacific coast, which showed greater dynamism. During the pandemic there were more transhipments through the region's large hub ports, so the recent lower dynamism could signal a return to pre-pandemic levels.

Source: Inputs provided by UN-ECLAC Secretariat.

2. Navigating unprecedented port congestion

During the past year, ports worldwide have faced chronic congestion – which between September and December 2021 is estimated to have removed around 16 per cent of global container ship sailing capacity.[43] Between the January 2016–February 2020 and March–July 2022, the proportion of container ship capacity waiting in ports rose by 5 per centage points to 37 per cent.

For the same period, the proportion of deep-sea – Capesize and Panamax – bulk-carrier fleet capacity waiting in ports was around 30 per cent. The proportion peaked at 35 per cent during the periods October– November 2021 and January–June 2022, the highest levels recorded since 2016.[44]

Ports were congested around the world although the extent of the congestion, and the ensuing delays, differed between countries.[45] Congestion was exceptionally high in export hubs in China, such as Shanghai, Qingdao and Tianjin, mainly due to China's zero-Covid policy. It was also high in the United States around the ports of Los Angeles and Long Beach which are major gateways on the west coast trade line and cannot be circumvented. In Asia or Europe, on the other hand, if waiting times are too high carriers can usually skip congested ports.[46]

Table 2.11 Trends in containerized trade and container port throughput January–June 2022 year-on-year variation
(percentage change)

Coast	Ports and total representation by coast	Export variation	Import variation	Throughput variation
East Coast South America	Brazil (total), Uruguay (total), and Buenos Aires port zone, Zárate and Rosario in Argentina (97.8%)	-3.0%	-6.9%	-0.8%
West Coast South America	Callao in Peru, San Antonio, Talcahuano/San Vicente and Valparaíso in Chile, and Guayaquil in Ecuador (77.7%)	11.0%	6.2%	2.0%
Caribbean	Cartagena Bay, Barranquilla and Santa Marta in Colombia, Kingston in Jamaica, Port of Spain and Point Lisas in Trinidad and Tobago (64.7%)	8.2%	7.2%	2.1%
Central America, Caribean coast	Puerto Barrios and Santo Tomás de Castilla in Guatemala, Puerto Castilla and Puerto Cortés in Honduras, Arlen Siu in Nicaragua and Limón-Moín (APM) in Costa Rica (100.0%)	5.3%	11.6%	4.0%
Central America, Pacific coast	Acajutla in El Salvador, Puerto Quetzal in Guatemala, San Lorenzo in Honduras, Corinto in Nicaragua and Puerto Caldera in Costa Rica (100.05)	8.1%	-4.0%	0.7%
Mexico, Gulf coast	Veracruz, Altamira and Tampico in Mexico (90.0%)	0.2%	-2.9%	-1.9%
Mexico, Pacific coast	Manzanillo and Lázaro Cárdenas in Mexico (90.0%)	10.9%	13.5%	15.3%
Panama, Caribbean coast	Colon Container Terminal (CCT), Manzanillo International Terminal (MIT) and Cristótal in Panama (97.1%)	14.2%	10.4%	3.2%
Panama, Pacific coast	Balboa and Rodman (PSA) in Panama (100.0%)	-18.5%	14.8%	-6.6%

Source: United Nations Economic Commission for Latin America and the Caribbean (UN-ECLAC), with data based on official port data from operators and port authorities.

Notes: The total representation of ports by coast are indicated in parenthesis calculated by 2021 level of representation of port throughput in the whole Latin America and the Caribbean, measured in TEU; Some data are provisory; Tables in blue and yellow represent positive variation, and tables in red represent negative variation.

In the first quarter of 2020, average global container schedule delays doubled, but they increased far more for the Far East and North America trade, from 2 to 12 days.[47] For 2021, Drewry estimated effective container ship capacity at about 17 per cent below its potential, and expected a similar outcome for 2022.[48]

Congested ports also suffered from ad hoc ship calls, off-schedule vessel arrivals and longer dwell times. This resulted in severe shortages of labour and equipment at ports and across their hinterland connections. In China, Ningbo's Meishan terminal closed in August 2021 due to COVID-19 infections. In Northern Europe, carriers diverted vessels from the most-congested terminals, increasing delays for shippers, as barge and feeder services struggled to keep up with demand.[49] Congestion reduced port productivity and undermined the reliability of schedules.

Carriers responded by consolidating port calls. In Europe, over the period January-May 2022 compared with 2021, average call sizes were up – by 30 per cent at Felixstowe, 26 per cent at Gdansk, 20 per cent at Rotterdam, and 10 per cent at both Antwerp and Hamburg.

Across North Europe, the productivity of container terminals could have significantly deteriorated. A major issue has been increases in cargo exchanges which have created problems similar to those from vessel upsizing. For deep-sea vessels, in the first five months of 2022 compared with 2021, average port hours across North Europe hubs increased by 20 per cent, to 52 hours, while the average anchorage hours increased by 38 per cent.[50]

Shippers using congested ports suffered from shortages of vessel space and containers. But they also faced capacity constraints in the port/inland interface as a result of shortages of chasses, and of inland transport capacity, storage, warehousing space and operational capabilities, all of which reduced service levels and increased costs.[51]

Ports took a number of steps to manage the logjams – extending working hours and the number of shifts, and adjusting regulations on stacking heights. For their part, shippers committed to moving containers out of terminals more quickly and at weekends. The logjams will take time to resolve. And further costly disruption to supply chain operations can be anticipated as a result of strikes in the Republic of Korea and Germany where workers are facing rising living costs.

Some of the pressures may be alleviated in 2023–2024 by the delivery of new ships, which will reduce the need for port skipping for repositioning containers. But landside operations and the logistics sector also need to play their parts, by tackling the availability of labour and warehousing, and the turnover of trucking equipment.

3. Different visions of resilience-building

Players across the maritime supply chain are adjusting to the new trends and aiming for greater resilience. Confronted with soaring costs, shippers have been negotiating longer contracts or turning to other modes of transport such as air and rail.

Shipping companies and ports have also been expanding their fleets and extending their services to include air freight, final-mile transport, and e-commerce. Shipping companies have thus been acquiring companies specializing in freight forwarding, logistics, and e-commerce so as to have greater control over the supply chain. In addition, they have been moving further inland, getting closer to customers, and offering integrated door-to-door logistics. Maersk and CMA CGM have bought air fleets to offer air services.

Ports are also aiming for greater control over supply chains – through cross-border mergers and acquisitions and deploying end-to-end logistics. In 2021, PSA International, the world's largest port operator, acquired BDP, an American supply chain company with end-to-end logistics capabilities, officially embarking on becoming a full-service logistics provider. In 2021, DP World purchased North American and South African logistics companies to gain more control over the supply chain.[52] [53] In Europe in April 2022, the ports of Antwerp and Zeebrugge completed their merger.[54] And to take advantage of the congestion crisis in Sri Lanka, India is planning to deepen the channel of Cochin Port.[55]

The UNCTAD Guidebook for building the capacity and resilience of ports[56] recommends five actions:

i. Identifying hazards from a wide range of natural and anthropogenic disruptions that are specific to the port being considered.

ii. Assessing vulnerability and potential impacts by identifying port-specific risks, levels of exposure to risks, and the potential consequences of a hazard.

iii. Elaborating response and mitigation measures involving port infrastructure and processes related to port management and operations. These measures can aim for prevention and preparedness, or be responsive and adaptive and aiming to speed up recovery.

iv. Prioritizing response and mitigation measures, such as cost-benefit analysis and resource allocation for finance, labour and other resources.

v. Implementing response and mitigation measures. A review process should then assess their effectiveness and make any requisite adjustments.

F. CONCLUSIONS AND POLICY CONSIDERATIONS

In 2021, the world fleet grew modestly. Shipbuilding and orderbooks were higher than in previous years but many owners were uncertain about fuel choices or the best ways to reduce GHG emissions, so were hesitating to invest and instead were sticking to their ageing fleets. Owners are turning to alternative fuels and dual-fuel capability, but only slowly.

This is producing an ageing fleet. Since 2011, the average age of the total fleet has increased by 7 per cent, from 20 to 22 years – making it more difficult to comply with increasingly stringent environmental regulations. Reducing shipping emissions will require significant investment in technical and operational improvements and new processes, all of which will increase costs for operators and ultimately for shippers.

In the past year there have been public-private initiatives involving ports, carriers and diverse maritime supply chain stakeholders for scaling up both the demand for, and supply of, alternative fuels, and creating decarbonized fleets. This could redefine the competitive landscape for low-carbon shipping, but could also create a two-tier system of ports, in which only a small proportion are alternative-energy-ready. It will be important therefore to help ports in developing countries replicate best practices and harness the opportunities offered by the energy transition.

At the same time, the shipping industry has faced many forms of disruption, most recently from the war in Ukraine, all of which have increased costs. This has underlined the importance of building resilience and of future-proofing both shipping and logistics.

Many countries have been seeking to reduce vulnerability by encouraging local supply of shipping and associated services by changing legislation and incentives as to strengthen national registries and make their cabotage regimes more flexible. However, sustaining high quality local services at competitive rates also requires upgrading the whole maritime ecosystem and investing in infrastructure, workforce skills and port efficiency.

Prompted by recent disruptions and related economic and other restrictive measures, carriers and ports are rethinking their roles and functions. Seeking to gain greater control over supply chains, operators are investing in port and shipping assets as well as in non-shipping assets – increasingly blurring the boundaries between different modes of transport.

Vulnerable economies that depend heavily on maritime transport networks and access to the global marketplace also need to prepare for, respond to and recover from significant multi-hazard threats. To achieve agile and resilient maritime transport systems they need to futureproof ports and the broader maritime supply chains by investing in risk management and emergency response.

To anticipate, plan, prepare, forecast, and integrate for uncertainty, they will need to gather data and intelligence, and plan scenarios. They also need emergency response protocols to mitigate the impacts, enable recovery, and adapt to each new normal.

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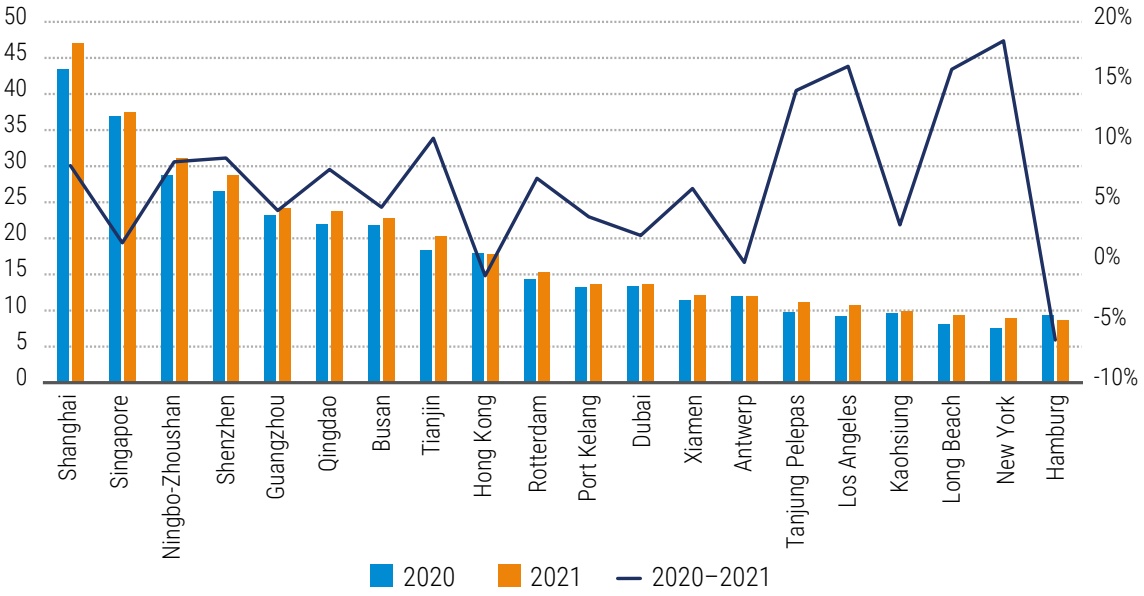
Figure 2.11 Leading 20 global container ports, 2020–2021
(millions 20-foot equivalent units, and percentage annual change)



Source: UNCTAD based on data reported published on Hamburg Port Authority website (www.hafen-hamburg.de/en/statistics/top-20-container-ports), Accessed July 2022.

Box 2.2 Subregional port throughput in Latin America and the Caribbean

The COVID-19 pandemic seriously disrupted containerized seaborne trade, and exports and imports in Latin America and the Caribbean (LAC). During the first half of the pandemic international seaborne container trade fell globally by 7 per cent, but in LAC the drop was 12.2 per cent making this the worst-hit region.[40]

Although the region is set for recovery, not all subregions have yet reached that stage (table 2.11). In the first half of 2022, most LAC subregions had growth in containerized exports. However, exports from the Gulf Coast of Mexico remained flat[41] while exports from the East Coast of South America (ECSA) and the Pacific coast of Panama fell.

The results were less positive for imports. Between January and June 2022, imports to ECSA, the Pacific coast of Central America, and the Gulf coast of Mexico were lower than in the same period in 2021. In Panama, for the Pacific coast, imports increased did not recover to the 2019 levels, and for the Caribbean coast there was also recovery in imports.

In the first half of 2022, throughput for regional container ports was mostly similar to 2020.[42] The main exception was the Mexican Pacific coast, which showed greater dynamism. During the pandemic there were more transhipments through the region's large hub ports, so the recent lower dynamism could signal a return to pre-pandemic levels.

Source: Inputs provided by UN-ECLAC Secretariat.

2. Navigating unprecedented port congestion

During the past year, ports worldwide have faced chronic congestion – which between September and December 2021 is estimated to have removed around 16 per cent of global container ship sailing capacity.[43] Between the January 2016–February 2020 and March–July 2022, the proportion of container ship capacity waiting in ports rose by 5 per centage points to 37 per cent.

For the same period, the proportion of deep-sea – Capesize and Panamax – bulk-carrier fleet capacity waiting in ports was around 30 per cent. The proportion peaked at 35 per cent during the periods October– November 2021 and January–June 2022, the highest levels recorded since 2016.[44]

Ports were congested around the world although the extent of the congestion, and the ensuing delays, differed between countries.[45] Congestion was exceptionally high in export hubs in China, such as Shanghai, Qingdao and Tianjin, mainly due to China's zero-Covid policy. It was also high in the United States around the ports of Los Angeles and Long Beach which are major gateways on the west coast trade line and cannot be circumvented. In Asia or Europe, on the other hand, if waiting times are too high carriers can usually skip congested ports.[46]

3

FREIGHT RATES AND TRANSPORT COSTS

This chapter covers 2021 and the first half of 2022, tracking freight rates and changes in demand and supply across key shipping markets. It considers the immediate outlook for freight markets and examines the impact on food prices of recent development in the bulk dry market.

In 2021, the COVID-19 pandemic continued to cause substantial fluctuations in demand, severely disrupting logistics for global supply chains, increasing port congestion and vessel waiting times and slowing hinterland transportation. Consequently, in 2021 there was a steep rise in freight rates in the container and dry bulk markets thus leading to a surge in carriers' earnings. In the tanker market on the other hand, freight rates were weak as a result of slow vessel supply and demand.

In 2021, supply disruptions led to an increase in the number of blank sailings. Carriers favoured the most profitable services and skipped certain ports, while also adding demurrage and detention charges, and thus had huge earnings. As a result, there have been calls for greater oversight of the global ocean shipping industry.

Higher dry bulk freight rates are likely to increase food prices for the middle-income economies which tend to rely more on dry bulk shipping for food imports.

In the first half of 2022, container and dry bulk market freight rates started to fall – though remained above pre-2019 levels. In the tanker market however, freight rates soared because of the war in Ukraine.

A. IN 2021, CONTAINER FREIGHT RATES ARE SKY-HIGH, BUT IN 2022 FALL AGAIN

In 2021, there was an enormous surge in global container shipping freight rates which peaked in January 2022. Rates subsequently fell yet remained above pre-2019 levels.

1. 2021 sees strong demand frustrated by logistics constraints

Throughout 2021, demand and supply conditions in the container shipping freight market were unusual. On the one hand, there was an 11 per cent increase in global containerized trade volumes, – a rebound that put additional pressures on carriers and ports. At the same time there was an increase in freight prices – a consequence of low growth in fleet supply and disruptions in supply chains, caused mainly by COVID-19, with greater port congestion and landside problems that reduced global container and logistics capacities. Global container fleet capacity expanded by only 4.5 per cent, much less than the growth in demand (figure 3.1). Nevertheless, due to the various disruptions the effective capacity decreased significantly – by more than 15 per cent at some times.

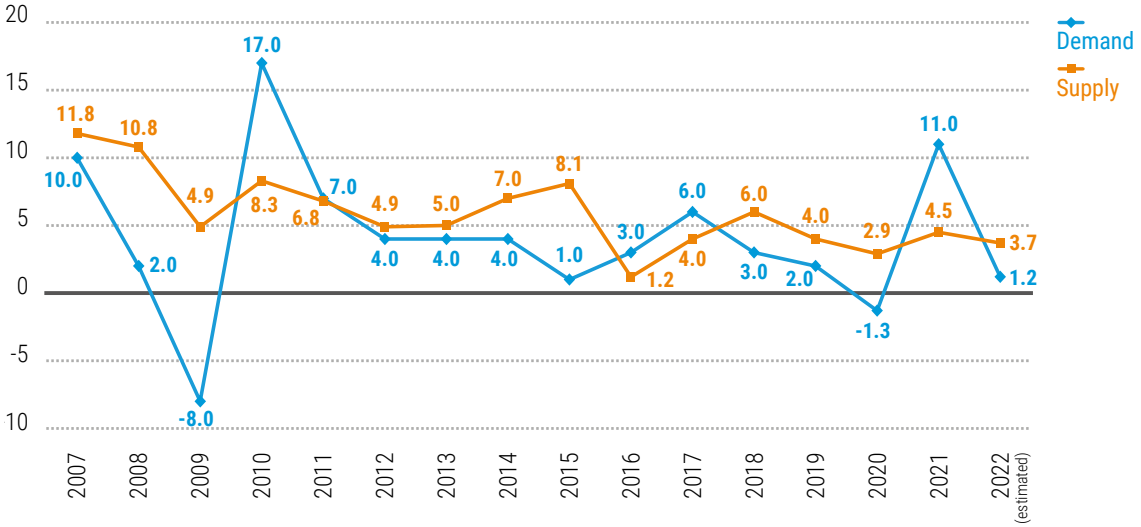
From late 2020, spot container freight rates started to rise spectacularly, reaching new highs at the at the end of 2021. This was reflected in the Shanghai containerized freight index (SCFI), which tracks rates on the major trade routes from Shanghai. In December 2019, the SCFI stood at 898 points, but by December 2020 was 2,455 and by in December 2021 was nearly 5,000 (figure 3.2).

In September 2019, on the Shanghai to New York (Asia – North America East Coast) route, the cost of shipping a large container per 40-foot-equivalent unit was $2,325 and by September 2021 it surpassed $10,000/FEU, reaching $11,778.

Spot freight rates also surged across routes in developing regions. On the China to South America (Santos) route in December 2019, the average rate per TEU was less than $2,000, but by December 2020 it had risen to $6,543 and by December 2021 was $10,196. Similarly, between December 2020 and December 2021, on the Shanghai to South Africa (Durban) route the rate per TEU increased from $2,521 to $6,450, and on the Shanghai to West Africa (Lagos) route from $5,291 to $7,452.

Overall freight levels for China's export container transport market, including spot and contractual rates, are reflected in the broader China containerized freight index (CCFI). In December 2019, this stood at 848 points, but by December 2020 had reached 1,492 points, and by December 2021 was 3,265 points (figure 3.3).

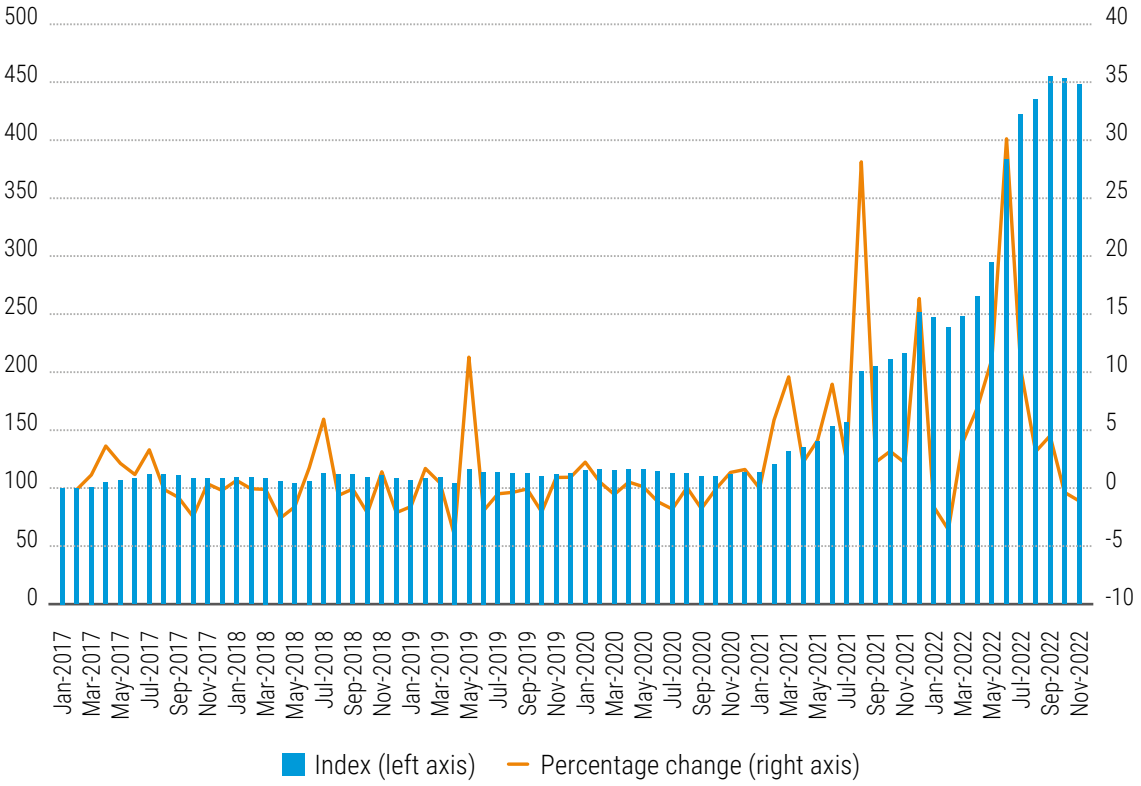
Figure 3.1 Growth of demand and supply in container shipping, 2007–2022, percentage change



Source: UNCTAD secretariat calculations. Demand is based on data from chapter 1, and supply is based on data from Clarksons Research, Container Intelligence Monthly, various issues.

Notes: Supply data refer to total capacity of the container-carrying fleet, including multipurpose and other vessels with some container-carrying capacity.

Figure 3.6 Xeneta Shipping Index (XSI) – Global



Source: UNCTAD, based on data provided by www.xeneta.com.

5. Amid continuing uncertainties, container freight rates remain volatile

In the first two months of 2022, container freight rates continued to increase, but from March 2022, they started to fall, primarily due to slower demand and the impacts of COVID-19 lockdowns in China, compounded by the effects of the war in Ukraine. In January 2022, the SCFI index set a new high record at 5,067 points before falling back, but was still higher than the pre-COVID average (figure 3.2). The lower spot rates also helped to bring down longer-term contract rates. Container ship charter rates followed the same pattern. In March 2022, the ConTex index for container ship chartering had reached a high of 3,525 points before experiencing downtrend as of April 2022 (figure 3.4).

The war in Ukraine has led to higher fuel costs and marine bunker prices. Prices for very low sulphur fuel oil, which in February 2022 were $730 per ton, reached record highs of more than $1,000 per ton in June 2022. Prices also rose for heavy sulphur fuel oil, which is used by the 30 per cent of container ships that are fitted with scrubbers[29] – increasing from an average of $571 to $712 per ton (figure 3.5). In response container shipping lines increased fuel surcharges by around 50 per cent, and could increase them further.[30]

Looking ahead

Future prospects are uncertain, depending on changes in demand, congestion at ports and other supply-chain disruptions, as well as the fallout from the war in Ukraine with economic and other restrictive measures on Russia-related cargoes, and the need to reposition ships and containers. All these uncertainties either singly or in combination, would evidently influence freight rates development in one way or another, very much depending on the scenarios discussed in chapter 1.

In 2021, the container ship orderbook grew by 121 per cent. More vessels entering the market may push down freight rates, but effective supply can be reduced by operational and logistical problems. In addition, the IMO's Energy Efficiency Existing Ship Index (EEXI) regulation and Carbon Intensity Indicator (CII) measures will come into force in 2023.[31] This will require retrofitting and recycling of vessels, and lower average sailing speeds which will reduce capacity.

The resulting congestion reduced global container shipping capacity, which between December 2021 and September 2020 fell by 16 per cent.[1] Delays were longer and more persistent in some parts of the world than others.[2] Chinese export hubs such as Shanghai, Qingdao and Tianjin, were exceptionally congested, mainly due to China's zero-COVID policy. Congestion was also high at the United States import hubs, at Los Angeles and Long Beach, which are major gateways on the west coast trade lane, and cannot be circumvented – unlike in Asia or Europe, where carriers can skip congested ports.[3]

With container carriers unable to load and unload effectively, services and schedules became less reliable. Between the first quarter of 2020 and the last quarter of 2021 average global container schedule delays doubled.[4] The delays meant that more ships were needed to maintain schedules and to respond to shippers who wanted to ensure their cargo was loaded on ships on time, for which they had to pay surcharges. In July 2021, capacity on the two main East-West trade lanes represented 41.4 per cent compared to 34.6 per cent in the previous year. Between July 2020 and July 2021 the capacity on Far East to North America trade grew by 31 per cent, and the Far East to Europe trade by 20 per cent.[5]

Adding more ships further increased congestion since ports and storage, along with the hinterland connections, trucks, and trains, could not readily adapt to increases in traffic. Between the first quarter of 2020 and the last quarter of 2021 container schedule delays on the Far East and North America trade route increased from two days to 12.[6]

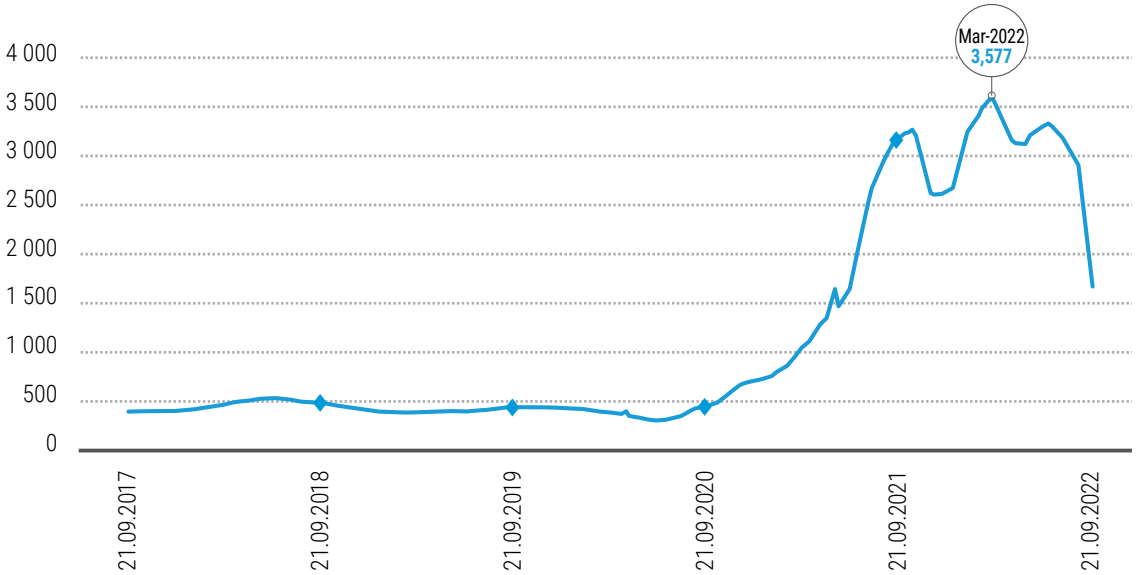
To address problems in the more profitable lanes, carriers withdrew capacity and empty containers from the smaller trade routes – with corresponding knock-on effects. In Africa, for example, between July 2020 and July 2021 average capacity fell by 6.5 per cent. This contributed to the increase in container freight rates, with one-way China-to-Africa rates increasing from $2,000–2,500 to $4,000–5,000 per TEU.[7] For Asia to Cameroon, the rate for 20-foot containers increased by 340 per cent, and for 40-foot containers by 244 per cent.[8]

These market dynamics in 2021 propelled freight rates to historic highs, with a severe impact on exports including those of many developing countries.[9]

Record highs for container ship charter rates, with new players entering the market

A surge in demand and limited vessel capacity also pushed container ship charter rates to record highs. In 2020, the New ConTex index for container ship chartering averaged 432 points, but in 2021 rose to an average of 1,974 and peaked in early 2022, at an all-time high (figure 3.4).

Figure 3.4 New ConTex Index, September 2017–September 2022



Source: UNCTAD secretariat, based on data from the New ConTex index for container ship chartering produced by the Hamburg Shipbrokers Association. See http://www.vhss.de (Accessed on 24 October 2022).

Notes: The New ConTex is based on assessments of the current day charter rates of six selected container ship types, which are representative of their size categories: Type 1,100 TEUs and Type 1,700 TEUs with a charter period of one year, and Types 2,500, 2,700, 3,500 and 4,250 TEUs with a charter period of two years.
Index base: October 2007 – 1,000 points.

Higher demand and a shortage of vessels pushed up time charter rates. At the end of 2020, the guideline of a 6–12 month time charter for a 4,400 TEU 'old Panamax' stood at $25,000 per day, but by the end of 2021 it had reached $100,000 per day.[10] In addition, contract fixture periods also lengthened, and in 2021 averaged 24 months, further reducing the availability of vessels.

Faced with a severe shortage of charter ships throughout the year, most container liner operators were unable to meet their tonnage requirements or start new services. To address this situation several shipping lines purchased their own vessels. MSC, for example, bought over 140 ships, and CMA CGM bought around 50.[11] This extraordinary situation also prompted logistics companies and shippers to charter ships directly –as with Home Depot, Walmart, Costco, Target, and Ikea. This was generally on a short-term basis and for vessels less than 5,000 TEU.[12]

Complaints about high shipping charges prompt government action

In the three months to September 2021, eight of the largest carriers increased their demurrage and detention fees by 50 per cent in the United States, compared to the previous three-month period, to a total of $2.2 billion.[13] Globally, for standard containers these fees increased by 39 per cent, and were sometimes charged even when shippers could not get access to their containers to move them. The fees declined in 2022 in many ports as global supply chains started to recover, but were still 12 per cent higher than in 2020.[14]

Shippers and governments have been concerned about other practices by carriers, such as blank sailings and cancelling port calls. These were due not to a lack of demand but because carriers concentrated on the more profitable Asia-to-North America routes and often chose not to call at ports in European or Sub-Saharan Africa, or in Oceania where between 2019 and 2021 container ship port calls saw a double-digit percentage decrease.[15]

Complaints about these practices led to government action. In June 2022, aiming to promote an ocean transportation system that is efficient, competitive, and economical, the United States Congress passed the Ocean Shipping Reform Act.[16] Also in 2022, in response to excessive freight rates, the Korea Fair Trade Commission filed anti-monopoly lawsuits against dozens of shipping companies, large and small, including HMM.[17] In Europe, ten organizations representing shippers, freight forwarders, terminal operators, and others have demanded an immediate review of the European Union's Consortia Block Exemption Regulation which exempts container shipping lines from many of the checks and balances of EU competition law and permits them to exchange commercially sensitive information that enables them to manage the number and size of ships deployed and the frequency and timing of sailings on trade routes around the world.[18] The Regulation was last renewed in April 2020 and will expire in April 2024. In China, following repeated complaints from shippers, consultations have been held with shipping lines to assess the justification for surcharges. And shipping companies in the Common Market for Eastern and Southern Africa, have been questioned about the way they have raised freight rates in a concerted manner.[19]

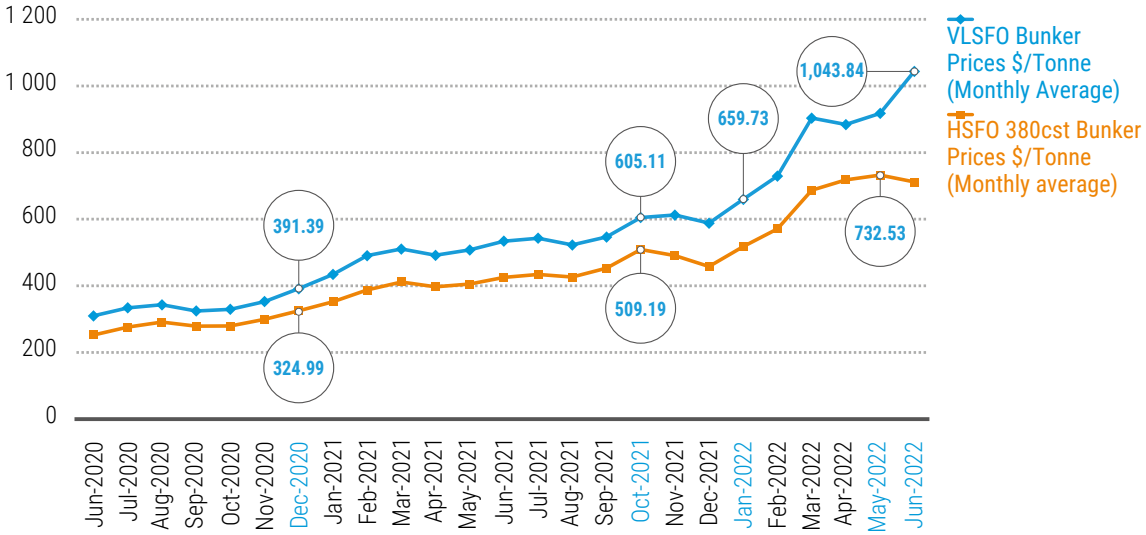
Greater regulation and monitoring of shipping and carriers' behaviour will support transparency, fairness and competitiveness. But the fundamental cause of high freight rates and transport costs is inefficiency and a lack of resilience along supply chains.[20]

2. Despite higher costs, container carriers made astronomical profits in 2021

Since the beginning of the pandemic, container carriers have had to deal with logistical constraints and higher fuel prices (figure 3.5), but have benefited from massive hikes in freight rates which have boosted their profits. Overall in 2021, carriers moved similar volumes to the previous year, nevertheless the industry's full-year operating profits (earnings before interest and taxes, EBIT) soared to around $240 billion (table 3.1).[21] Between 2020 and 2021, the Danish-based shipping company, A P Moller-Maersk, for example, increased its volume by only 3.6 per cent but its revenues by 56 per cent, from $39.7 billion to $61.8 billion, and its EBIT by 370 per cent from $4.2 billion to $19.7 billion.[22]

Similarly, the French ocean carrier, CMA CGM, increased its volume by five per cent but its revenue by 78 per cent, to $56 billion, and its EBIT by more than 400 per cent, to $19.6 billion.[23] And the Singapore-based container carrier, Ocean Network Express (ONE), increased its volume by only 0.4 per cent but doubled its revenue to $30 billion and boosted its profits from $3.8 billion to $17.2 billion.[24]

Figure 3.5 Bunker prices, heavy fuel oil and very low sulphur fuel oil, monthly averages, from June 2020 to June 2022



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

Table 3.1 Revenues, profits, and volumes, selected container shipping lines, 2021

Carrier	Revenue 2021	Revenue 2020	*Change*	EBITDA 2021	EBITDA 2020	*Change*	EBIT 2021	EBIT 2020	*Change*	Volume 2021	Volume 2020	*Change*
	Billion ($)		*(%)*	Billion ($)		*(%)*	Billion ($)		*(%)*	Million (TEU)		*(%)*
A P Moller – Maersk	61.8	39.7	*55.7*	24	8.2	*193*	19.7	4.2	*369.0*	26.2	25.2	*3.6*
CMA CGM	56	31.5	*77.8*	23.1	6.1	*279*	19.6	3.6	*444.4*	22.0	21.0	*5.0*
Hapag-Lloyd*	26.4	14.6	*80.1*	12.8	3.1	*313*	11.1	1.5	*640.0*	11.9	11.8	*0.3*
Hyundai Merchant Marine (HMM)**	12.1	5.4	*124.1*	N. A.	N. A.		6.4	831	*670.2*	3.8	3.9	*-2.1*
Ocean Network Express (ONE)	30.1	14.4	*109.0*	18.3	4.9	*274*	17.2	3.8	*352.6*	12	11.9	*0.4*
COSCO Shipping***	49.1	24.6	*99.6*	9.2	1.9	*384*	19.8	2.1	*842.9*	26.9	26.3	*2.3*
Evergreen Marine Corp**	17.7	7.5	*136.0*	N. A	N. A		10.3	1.3	*692.3*	N. A	N. A	

Source: UNCTAD, based on various companies' financial reports, and various statistics, sector specialized and news websites.

Abbreviations: EBITDA: earnings before interest, taxes, depreciation and amortization and EBIT: Earnings before interest and taxes.

Note:

* Original Value in EUR – Conversion rate 31 December 2021.
** Assumption: EBIT = Operating Income (for HMM & Evergreen Marine Corp).
*** Original Value in Chinese Yuan – Conversion rate 31 December 2021.

3. Independent regional container operators enter the main East-West trade lanes

High freight rates on the East-West trade lanes attracted smaller regional container operators into the market, including the Chinese regional carriers CULines, BAL Container Line, and Shanghai Jin Jiang Shipping (SJJ), which started ad hoc Asia-North America, Asia-Europe, Asia-South America or Asia-Australia services.[25]

This resulted in a drop in market share for three main container shipping alliances, 2M (Maersk and MSC), the Ocean Alliance (CMA CGM, COSCO Shipping and Evergreen Marine Corp.), and THE Alliance (Hapag-Lloyd, HMM, Ocean Network Express/ONE and Yang Ming).

On the Asia-North America West Coast non-alliance services amounted to around 30 per cent of all deployed capacity – higher than for 2M and THE Alliance shares and nearly as much as that of the Ocean Alliance.[26] Non-alliance services were less significant on the Asia-North America East Coast trade route with only a 10 per cent market share, and on the Asia-Europe routes with less than 1 per cent.

These groups varied in terms of schedule reliability. Overall, 2M were likely to offer more reliable schedules than non-alliance services. But non-alliance services were more reliable than those of Ocean Alliance and THE Alliance on the transatlantic westbound trade lane.[27]

While these companies boost competition, this may not last. Given market uncertainties and volatile freight rates, the niche carriers may not remain competitive on long-haul trades, as their smaller ships are far less cost-effective than the larger ones of the alliance carriers.

4. Surging spot rates boost contracted rates

Between 2020 and 2021, there were significant variations in freight rates across different routes (table 3.2).[28] For the Asia-Europe leg, contracted rates increased more than 70 per cent, for the Asia-North America routes by 41 per cent, and for the intra-Asia routes by 46 per cent. These increases were driven by greater demand for container shipping and equipment, shortages of carrying capacity at Asian ports, temporary blockages of the Suez Canal, and COVID-19-related disruption at major Chinese ports.

These variations are also reflected in the Xeneta shipping index (XSI) that indicates what shippers are paying for long-term contracts (figure 3.6).

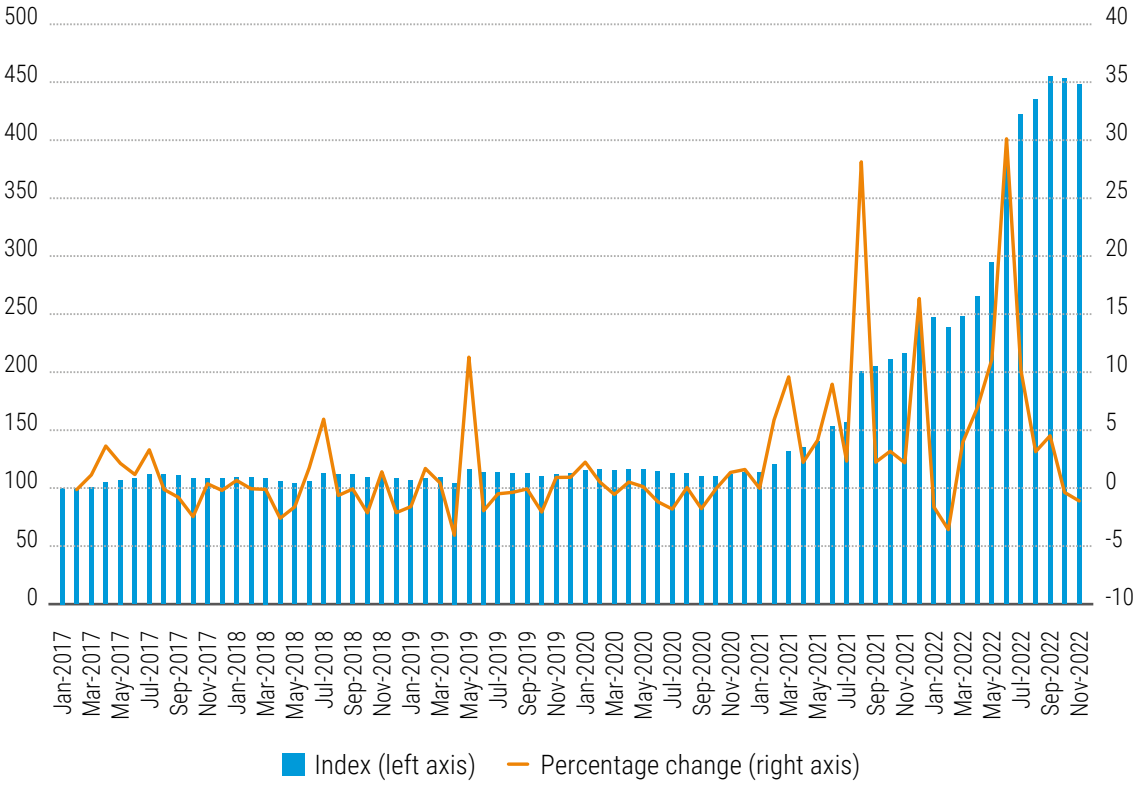
Table 3.2 Contract freight rates, inter-regional, 2018–2021, $ per 40-foot container (FEU) (July rates)

From	To	2018	2019	2020	2021	2020/19	2020/18	2021/2020	2021/2018
Africa	Africa	1 812	1 849	1 924	2 013	4.1%	6.2%	4.6%	11.09%
	Asia	748	750	775	664	3.2%	3.6%	-14.3%	-11.19%
	Europe	1 431	1 643	1 747	1 487	6.3%	22.1%	-14.8%	3.96%
	South America	2 010	1 860	1 979	1616	6.4%	-1.5%	-18.3%	-19.59%
Asia	Africa	1 800	1 927	2 112	2 733	9.6%	17.4%	29.4%	51.89%
	Asia	737	747	821	1 194	9.8%	11.4%	45.5%	62.00%
	Europe	1 782	1 847	1 916	3 285	3.8%	7.5%	71.4%	84.39%
	North America	2 426	2 603	2 711	3 820	4.1%	11.8%	40.9%	57.48%
	Oceania	1 770	1 790	1 850	2 800	3.4%	4.6%	51.3%	58.24%
	South America	2 290	2 075	2 230	3 589	7.5%	-2.6%	61.0%	56.74%
Europe	Africa	1 595	1 650	1 858	1 727	12.6%	16.5%	-7.1%	8.23%
	Asia	967	870	1 004	1 225	15.4%	3.8%	22.0%	26.61%
	Europe	804	881	976	1 077	10.7%	21.3%	10.3%	33.84%
	North America	1 518	1 742	2 256	2 304	29.5%	48.7%	2.1%	80%
	Oceania	1 996	1 933	2 077	2 319	7.4%	4.1%	11.7%	16.18%
	South America	1 019	1 302	1 376	1 465	5.6%	35.0%	6.5%	43.79%
North America	Africa	2 890	3 112	2 981	2 639	-4.2%	3.2%	-11.5%	-8.66%
	Asia	1 009	1 111	1 269	1 385	14.2%	25.8%	9.17%	37.29%
	Europe	858	1 109	1 323	1 053	19.3%	54.2%	-20.4%	22.75%
	North America	1 534	1 429	1 584	1 362	10.8%	3.2%	-14.0%	-11.22%
	Oceania	2 538	2 634	2 996	2 475	13.8%	18.1%	-17.4%	-2.47%
	South America	1 254	1 318	1 486	1 064	12.7%	18.5%	-28.4%	-15.15%
South America	Africa	1 778	1 951	2 000	2 187	2.5%	12.5%	9.3%	22.99%
	Asia	1 623	1 963	1 802	1 841	-8.2%	11.0%	2.2%	13.42%
	Europe	1 313	1 977	1 961	1 767	-0.8%	49.3%	-9.9%	34.52%
	North America	1 521	1 882	1 745	1 969	-7.3%	14.7%	12.9%	29.50%
	South America	1 349	1 699	1 539	1 243	-9.4%	14.1%	-19.2%	-7.84%

Source: UNCTAD, based on data provided by Transporeon/TIM Consult Market Intelligence data, www.transporeon.com.

Note: The data set provides regional averages for forty-foot container dry cargo freight, as negotiated for routes where rates were available for at least five shippers and at least 500 TEU per year on port-pair basis.
Rates are "gate-in gate-out", i.e., including terminal handling charges and all charges and surcharges of ocean transport. Not included are pre- and on-carriage as much as classical administrative services of forwarders (customs clearance, booking and invoice control fees, etc.).
The average is unweighted, based on representative main ports.

Figure 3.6 Xeneta Shipping Index (XSI) – Global



Source: UNCTAD, based on data provided by www.xeneta.com.

5. Amid continuing uncertainties, container freight rates remain volatile

In the first two months of 2022, container freight rates continued to increase, but from March 2022, they started to fall, primarily due to slower demand and the impacts of COVID-19 lockdowns in China, compounded by the effects of the war in Ukraine. In January 2022, the SCFI index set a new high record at 5,067 points before falling back, but was still higher than the pre-COVID average (figure 3.2). The lower spot rates also helped to bring down longer-term contract rates. Container ship charter rates followed the same pattern. In March 2022, the ConTex index for container ship chartering had reached a high of 3,525 points before experiencing downtrend as of April 2022 (figure 3.4).

The war in Ukraine has led to higher fuel costs and marine bunker prices. Prices for very low sulphur fuel oil, which in February 2022 were $730 per ton, reached record highs of more than $1,000 per ton in June 2022. Prices also rose for heavy sulphur fuel oil, which is used by the 30 per cent of container ships that are fitted with scrubbers[29] – increasing from an average of $571 to $712 per ton (figure 3.5). In response container shipping lines increased fuel surcharges by around 50 per cent, and could increase them further.[30]

Looking ahead

Future prospects are uncertain, depending on changes in demand, congestion at ports and other supply-chain disruptions, as well as the fallout from the war in Ukraine with economic and other restrictive measures on Russia-related cargoes, and the need to reposition ships and containers. All these uncertainties either singly or in combination, would evidently influence freight rates development in one way or another, very much depending on the scenarios discussed in chapter 1.

In 2021, the container ship orderbook grew by 121 per cent. More vessels entering the market may push down freight rates, but effective supply can be reduced by operational and logistical problems. In addition, the IMO's Energy Efficiency Existing Ship Index (EEXI) regulation and Carbon Intensity Indicator (CII) measures will come into force in 2023.[31] This will require retrofitting and recycling of vessels, and lower average sailing speeds which will reduce capacity.

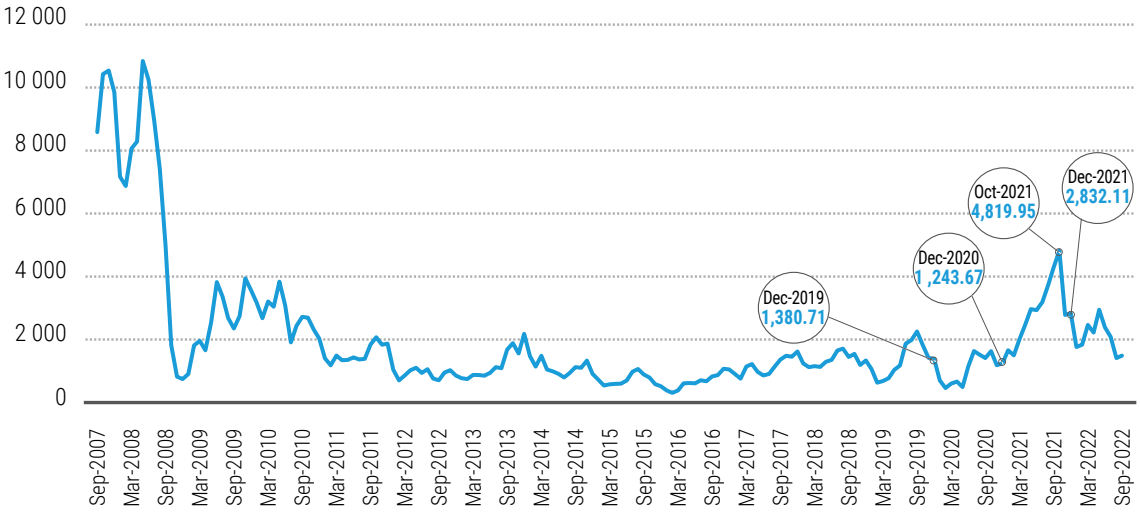
B. DRY BULK FREIGHT RATES REACH RECORD HIGHS

1. Market changes and congestion push dry bulk freight rates to new levels

Robust demand and limited supply have driven up dry bulk freight rates. Steady economic recovery and fiscal stimuli have boosted industrial activity and increased demand for most dry bulk commodities such as grains, iron ore and coal. But vessel availability has been constrained by COVID-19 restrictions and port congestion. In 2021, the time spent in port increased by 2.3 per cent for dry bulk carriers and 2.1 per cent for dry breakbulk carriers. There was also a 21 per cent decline in the delivery of new vessels.[32]

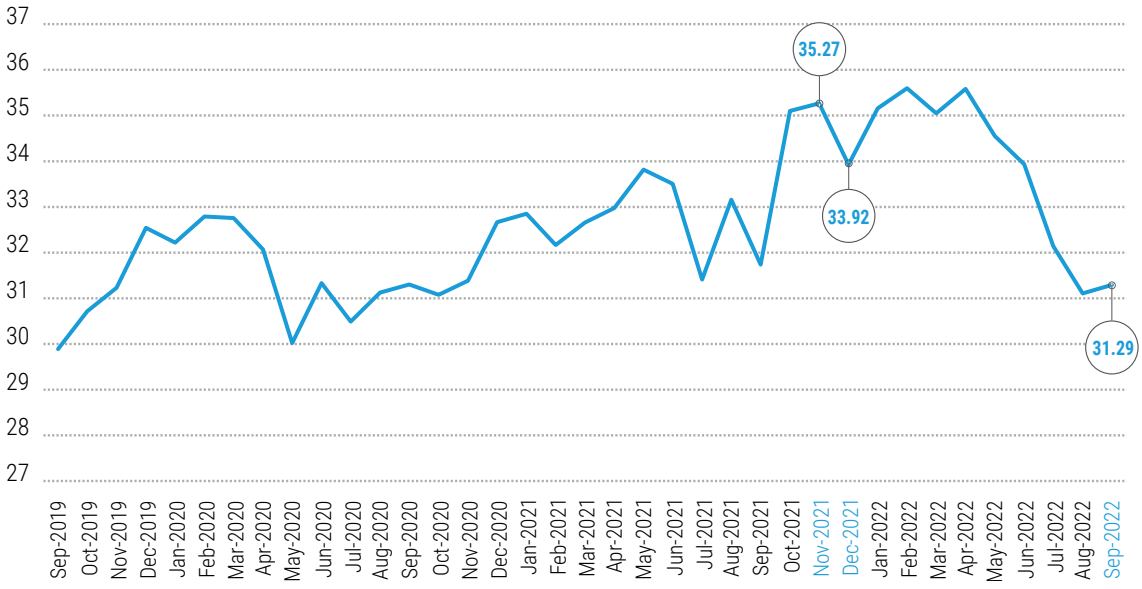
The average cost to ship raw materials such as grains, coal and iron ore is tracked by the Baltic Exchange dry index (BDI) which from October 2019 to October 2021 tripled to a record high of almost 5,000 points (figure 3.7). The surge in freight rates in October coincided with the growth in coal demand and prices. Ports also became more congested as a result of quarantine requirements and the ban on the import of Australian coal by the Government of the China which blocked coal-carrying vessels at China's ports for months.[33] In October 2021, the Clarksons dry bulk port congestion index increased to 35 per cent (figure 3.8).[34]

Figure 3.7 Baltic Exchange dry index, September 2017–September 2022



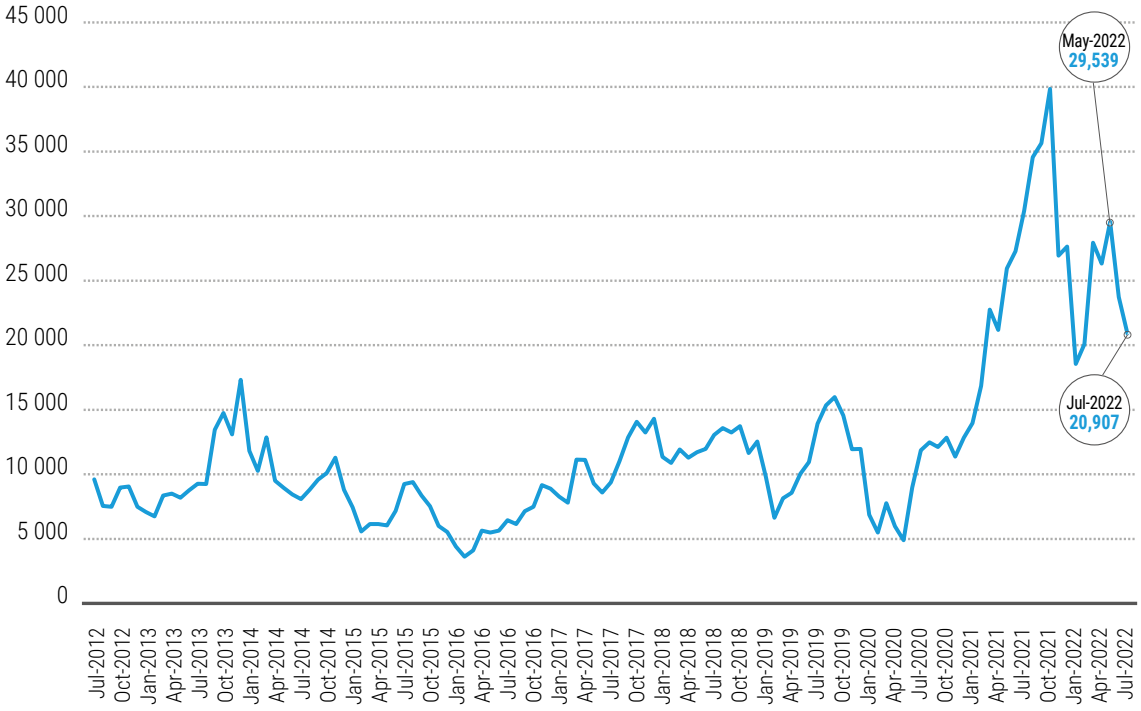
Source: UNCTAD, based on data from Clarkson Shipping Intelligence Network.

Figure 3.8 Clarksons port congestion index – percentages of deep-sea cargo bulk carriers in port, September 2019–September 2022



Source: UNCTAD, based on data from Clarkson Shipping Intelligence Network.

Figure 3.9 Average weighted earnings all bulkers ($/day), July 2012–July 2022



Source: UNCTAD, based on data from Clarkson Shipping Intelligence Network.

Dry bulk freight markets were further affected by severe weather events in Asia and North America which pushed up prices. In the United States at the end of August 2021, hurricane Ida caused severe disruption to exports and loading operations.[35] In Asia in early September 2021, typhoon Chanthu forced the temporary closure of China's two largest ports.

As a result, dry bulk vessel earnings jumped across all vessel sizes, reaching $39,850 per day (figure 3.9). Smaller bulkers were also in demand for container cargo transportation due to capacity shortages in the container ship market.

2. Dry bulk rates face volatility at the end of 2021 and into 2022

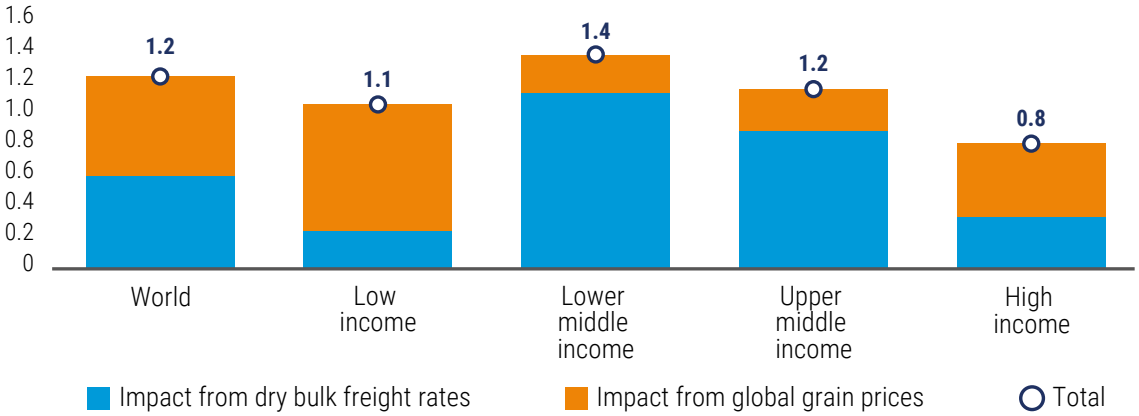
Towards the end of 2021 bulker freight rates fell steeply – reflecting seasonal variations, and the economic situation in China as well the spread of COVID-19. From the end of October 2021 to the end of December 2021, the BDI declined by 40 per cent to 2,832 points and in January 2022 fell to 1,760 points, with the downturn continuing through the early months of 2022. Port congestion remained an issue, with the dry bulk port congestion index still at around 35 per cent. Since then, the markets have seen increasing demand. Lower shipments of grain because of the war in Ukraine were offset by increased grain exports from Brazil, and by exports of coal from Indonesia when the export ban was lifted and demand from Europe increased.[36] By May 2022, the BDI was up to 2,943 (figure 3.7).

Increased dry bulk freight rates and consumer food prices

Grain prices and shipping costs have been on the rise since the onset of the war in Ukraine. Between February and May 2022, the BDI increased by 60 per cent. Since then it has declined but in July 2022 was still 13 per cent higher than in February 2022. According to UNCTAD, the increase in global dry bulk freight rates and grain prices will increase consumer food prices by 1.2 per cent globally (figure 3.10).[37] Food price increases are expected to be slightly higher in middle-income countries whose economies rely more on dry bulk shipping (figure 3.11). Smaller, low- income economies which have less food processing capacity tend to import processed foods which are mainly transported by container (figure 3.12).

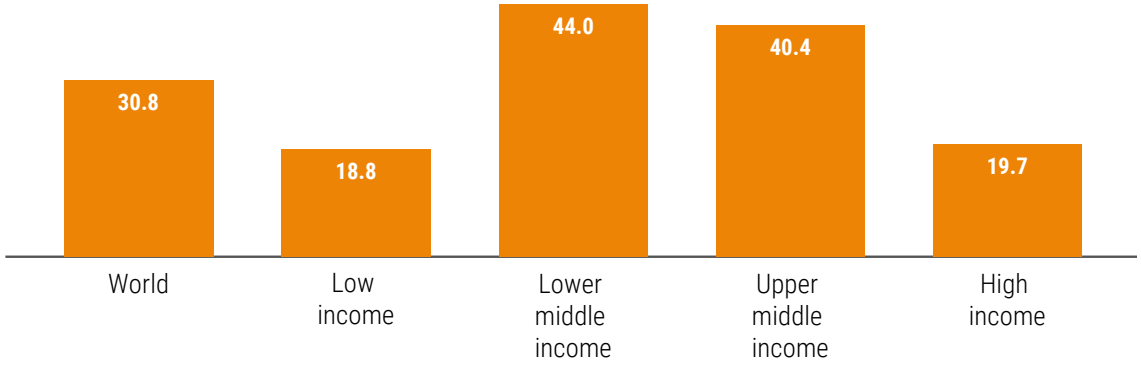
UNCTAD has estimated that consumer prices would be 1.5 per cent higher in 2023 than they would have been without the container freight rate surge.[38] Higher freight rates overall hit hardest at the least developed countries and small island developing states which rely more on imports of containerized goods.

Figure 3.10 Impact of higher dry bulk freight rates and global grain prices on consumer food prices, selected country groups
(percentage)



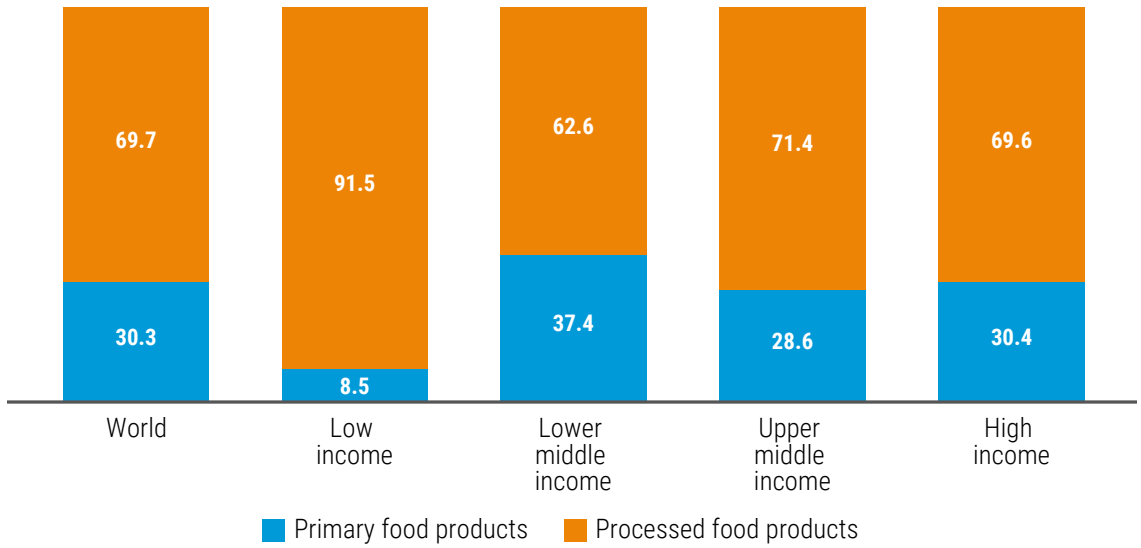
Source: UNCTAD calculations based on data provided by Clarksons Research, Shipping Intelligence Network, the IMF, International Financial Statistics, Direction of Trade Statistics and Consumer Price Index, UNCTADstat, and the World Bank, World Integrated Trade Solution, Commodity Price Data (The Pink Sheet) and A Global Database of Inflation[39] (accessed August 2022).[40]

Figure 3.11 Share of grains imported by bulk ships in total food imports, selected country groups, 2019



Source: UNCTAD calculations based on data provided by Sea/ (www.sea.live) and Food and Agriculture Organization, Food Balances.

Figure 3.12 Share of primary and processed food products in food imports mainly for household consumption, selected country groups, 2020



Source: UNCTAD calculations based on data provided by World Bank, World Integrated Trade Solution.

Looking ahead

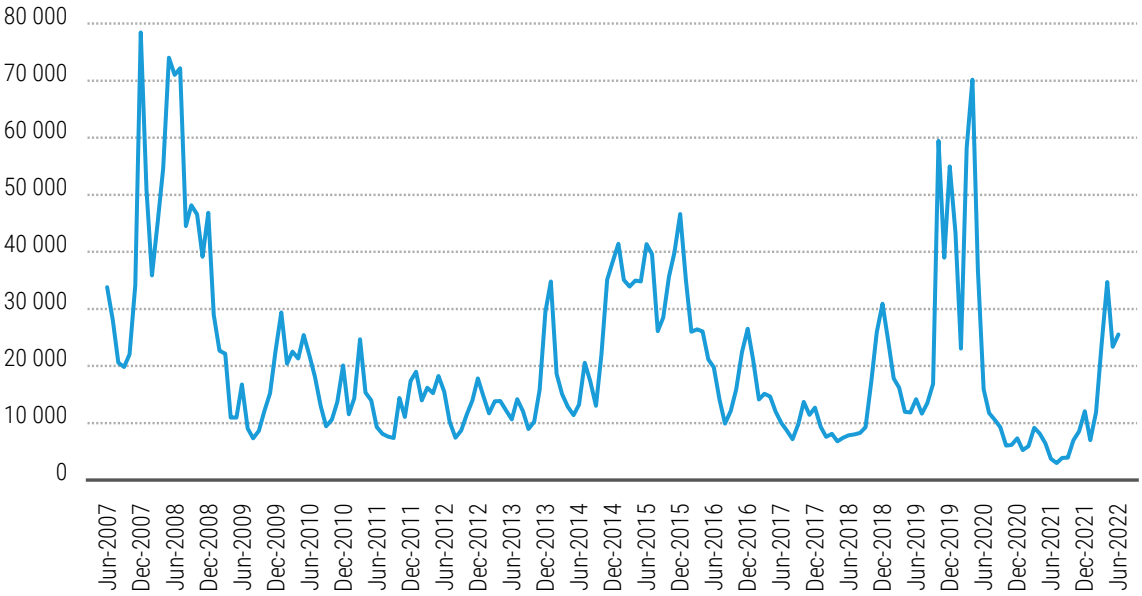
The dry bulk freight market will continue to be affected by the war in Ukraine and the COVID-19 pandemic, especially in China which accounts for around 35 per cent of global dry bulk cargo demand. Demand will also be affected by a slower global economic recovery, commodity price fluctuations, and limited fleet deliveries which for 2022 are estimated at only 3.6 per cent.[41]

The war in Ukraine could in addition affect port calls and dry bulk shipping patterns and the use and positioning of vessels.[42] Moreover, sourcing cargos from further afield will increase transport ton-miles, all of which add to freight rates.[43] Similar to container shipping, vessel supply and operating costs will be affected by energy and sustainability factors, including the IMO regulations.

C. TANKER FREIGHT RATES WEAK IN 2021 BUT RISE IN 2022

In 2021, seaborne oil-trading volume remained below pre-pandemic levels, with a sharp decline in long-haul crude oil exports from the Middle East and the United States.[44] But at the same time, tanker supply continued to grow, with more vessels delivered than scrapped, particularly for larger crude carriers. As a result, there has been a steep fall in freight rates. Between 2020 and 2021, average annual daily tanker earnings fell from $24,877 to $6,416, the lowest level ever, though they started to rise towards the end of the year with increases for crude oil (figure 3.13).[45]

Figure 3.13 Average earnings, all tankers, June 2007–June 2022
($ per day)



Source: UNCTAD, based on data from Clarkson Shipping Intelligence Network.

Compared with the market for crude oil tankers, the markets for oil product tanker freight were better. During the first half of 2021, exports from China were robust, while in India long-haul product exports also increased temporarily during the second quarter of 2021 as lockdowns severely reduced domestic consumption. In 2021, supply capacity was reduced by increased scrapping.[46]

The war in Ukraine boosts tanker freight rates

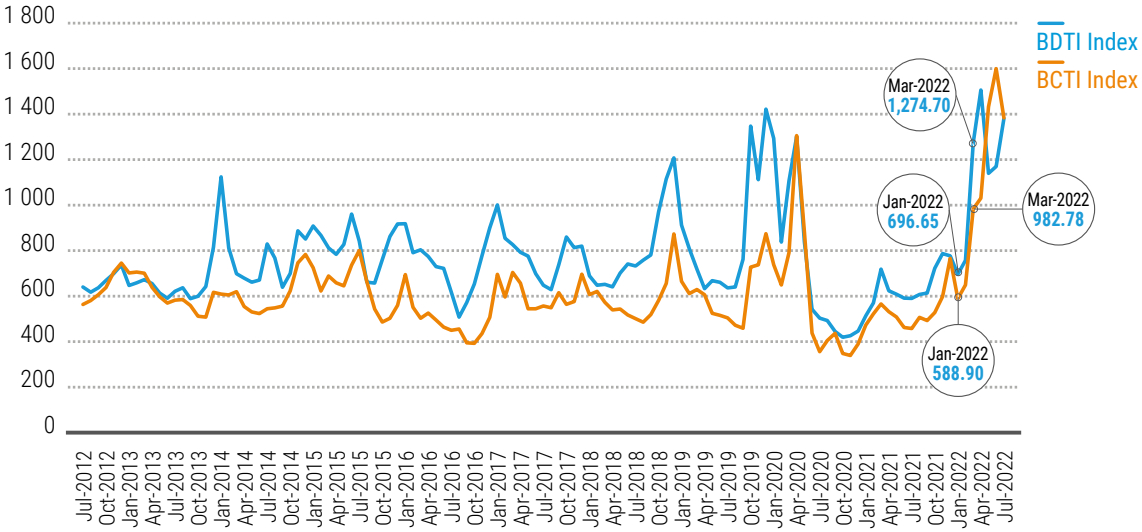
Earnings remained low into early 2022, but in February 2022 the war in Ukraine led to major spikes on some routes, and some prices were also pushed up by shifts in oil trade flows.[47] Between January and March 2022, the cost of moving crude oil, as tracked by the Baltic dirty tanker index (BDTI), increased by more than 80 per cent, while the Baltic Exchange clean tanker index (BCTI) increased by more than 60 per cent (figure 3.14).

The war in Ukraine is having a range of impacts. The economic and other restrictive measures have cut crude oil flows from the Russian Federation to Europe, to be replaced by oil from the United States and the Middle East. This has reduced the demand for very large crude carriers (VLCCs) but increased the demand for the smaller Aframax and Suezmax tankers. At the same time the Russian Federation has increased crude oil exports from the Black Sea and Baltic Sea ports to Asia, replacing oil from the United States, Latin America, and the Middle East. This too has reduced demand for VLCCs and increased the use of smaller vessels.[48]

As a result, daily earnings for Aframax c. 2015-built (Eco) which in January 2022 were $13,733, in April 2022 jumped to a record $79,343 (figure 3.15). Over the same period average Suezmax c. 2015-built (Eco) daily earnings jumped from $10,146 to $55,791. There were also huge premiums for shipowners willing to take the risk of transporting Russian oil.

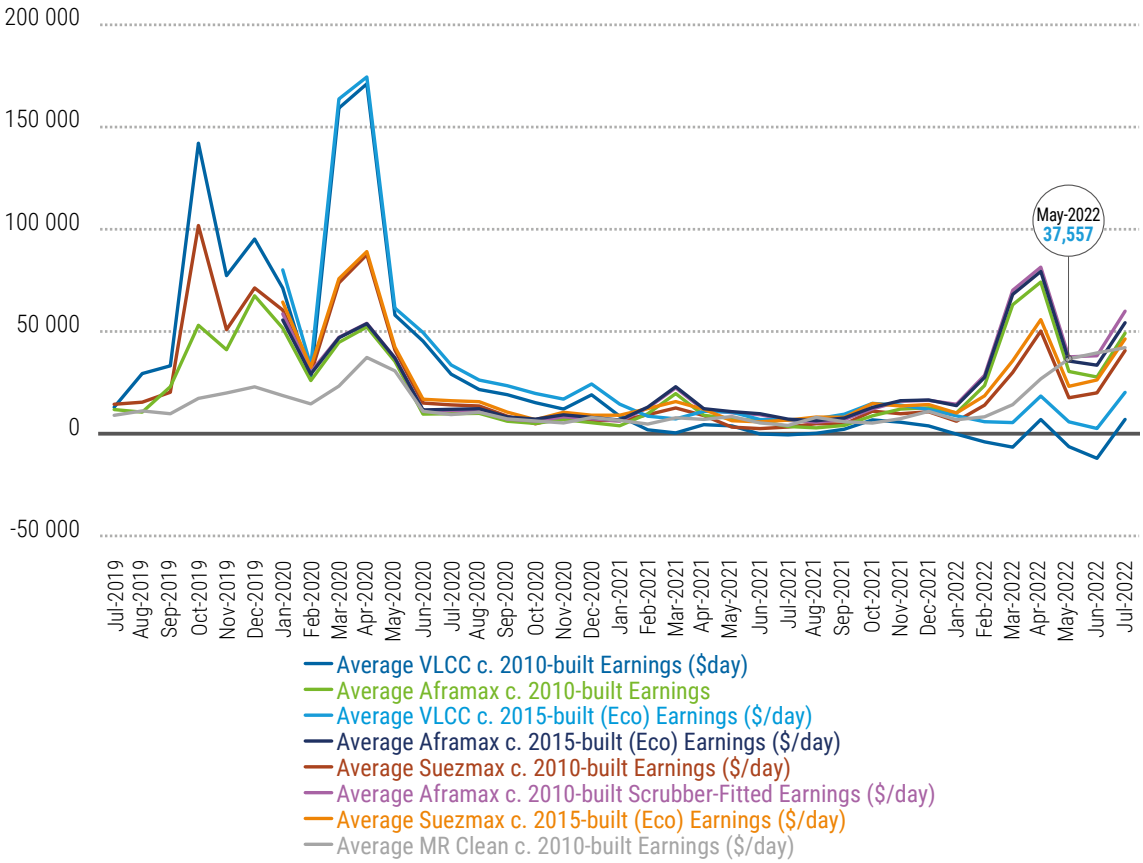
Geopolitical tensions that increased imports to Europe from the United States, the Middle East and Asia boosted freight rates for oil product tankers. Average clean petroleum products MR tanker spot rates jumped from $6,822 per day to $14,184 per day, the highest level since mid-2020. As a result, oil product tankers went from being loss-making, to slightly profitable.

Figure 3.14 Baltic dirty tanker index and the Baltic Exchange clean tanker index July 2012–July 2022



Source: UNCTAD, based on data from Clarkson Shipping Intelligence Network.

Figure 3.15 Average earnings, selected tankers, July 2019–July 2022
($ per day)



Source: UNCTAD, based on data from Clarkson Shipping Intelligence Network.

Looking ahead

In the near future, freight rates may continue to increase in the crude oil and product tanker markets. This would partly be due to a recovery in oil demand and the reshuffling of global oil flows in the aftermath of the war in Ukraine, but also to a tightening of supply with slow growth of vessel supply and the removal of old tankers following the entry into force of the IMO's EEXI and CII regulations.[49]

D. SUMMARY AND POLICY CONSIDERATIONS

Main issues

The COVID-19 pandemic has increased freight rates due to the surge in seaborne trade combined with disruptions at ports, and reduced landside transport, warehouse and storage capacity. This has reduced capacity, tied up ships for longer than usual and increased delays and surcharges.

Higher freight rates and profits have attracted smaller regional container operators on East-West trade lanes, but these services may not be sustainable in the longer term, given market uncertainties and volatile freight rates.

Shippers and governments are concerned about rising costs and the increases in blank sailings, port call cancellations, and rising demurrage and detention charges. They have called for public authorities to monitor and regulate shipping and carrier behaviour, to ensure transparency, fairness and competitiveness in maritime transport. But the core problems are inefficiency and disruptions. Longer-term solutions would be to boost port performance and productivity, and improve transport infrastructure, landside transport and connectivity, and storage facilities, while reducing labour shortages, and making supply chains more robust and resilient.

According to UNCTAD, the increase in global dry bulk freight rates and grain prices will increase global consumer food prices by 1.2 per cent. The effects would be greater in the middle-income economies that import more primary food products than in the low-income economies that import more processed food. The world can also expect regular disruption in supply chains which will need to be more resilient and agile.

Freight rates are likely to fluctuate in the face of the ongoing COVID-19, the war in Ukraine, economic policy uncertainties, geopolitical risks, energy and food security, energy and sustainability regulations and decarbonization. Soaring freight rates will drive up food and energy prices.

Policy recommendations

- **Supply chains** – Developing countries will need support to invest in more robust, resilient and sustainable supply chains. Transport and trade facilitation solutions should accelerate the transition to smart and green trade logistics and enhance transport infrastructure, including port and hinterland, and logistics services.
- **Finance** – Increased finance and investment and resource mobilization should be based on a long-term vision for resilient and sustainable maritime transport supply chains.
- **Mitigating impact on vulnerable countries** – High shipping costs hit hardest at import-dependent countries. There is a need for a response mechanism to mitigate the impact on the most vulnerable countries, including net food importing countries, SIDS, LLDCs, and LDCs.
- **Regional solutions** – High transport costs can be addressed by fleet and shipping services at the regional and sub-regional levels. This could include regional maritime indices, and regional freight observatories to collect data and monitor key performance indicators.[50]
- **Technical assistance** – Vulnerable countries will need technical assistance and support to mitigate the impact of rising prices and to develop sustainable and resilient transport systems and value chains.

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END NOTES

1 McKinsey & Company (2022).

2 IMF (2022).

3 See also chapters 1, 2 and 4.

4 McKinsey & Company (2022). See also chapter 4 for further information on container port performance.

5 Hellenic Shipping News (2021a).

6 McKinsey & Company (2022).

7 The Maritime Executive (2022).

8 UNCTAD (2022a).

9 See the discussion in chapter 1.

10 Clarksons Research (2022a).

11 BRS Group (2022).

12 Insider (2021).

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14 Container xChange (2022).

15 See also chapter 4.

16 https://www.congress.gov/bill/117th-congress/senate-bill/3580/text/enr.

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18 Feport (2022). See also chapters 1 and 7.

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21 Drewry (2022a).

22 Maersk (2022).

23 CMA CGM (2022).

[24] One (2022).

[25] BRS Group (2022).

[26] Sea-Intelligence (2021); Sea-Intelligence (2022a).

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[28] TIM Market Intelligence Initiative Global Ocean Transport.

Overview & Methodology: Transporeon / TIM Consult Market Intelligence are operating the Market Intelligence Initiative (MII) in global ocean transport (Full Container Load and Less Than Container Load) in support of a Community (consortium) of world-class enterprises (shippers only). The analyses cover ocean transport on more than 12,000 port pairs, pre- and on-carriage (all modes) and door-door-transport. The benchmarking as well as the monitoring of freight indices and service levels is updated on a monthly, quarterly, and annual basis. All input data is provided by shippers and represents actual agreements and volume allocations. No unnegotiated or not actually allocated rate information is included. Continuous data input is equivalent to approximately five per cent of world container transport. Data input is carefully cleansed by an expert team plus all strategic and operative drivers of rate and service levels as much as procurement performance clarified. The analyses and assessment of shippers' agreements are conducted by accurate segmentation (by box type, box size, port pair, process setup) and harmonization (normalization), taking into account all cost and service level drivers in full transparency. The rate benchmarking and the index information provided to UNCTAD are given on gate-in-gate-out level including all ocean transport-related charges and surcharges. Not included are pre- and on-carriage as much as classical administrative services of forwarders (customs clearance, booking and invoice control fees, etc.). MII members range from 1,000 TEU to 500,000 TEU per year. www.transporeon.com.

[29] Lloyds List (2022).

[30] UNCTAD (2022b).

[31] https://www.imo.org/en/MediaCentre/PressBriefings/pages/MEPC76.aspx.

[32] See also chapters 1, 2, and 4.

[33] Drewry (2022b).

[34] The normal level of Clarkson Port Congestion Index is around 30 per cent.

[35] Fastmarkets (2022).

[36] BIMCO (2022).

[37] See also UNCTAD (2022b).

[38] UNCTAD (2021).

[39] Ha, Jongrim, M. Ayhan Kose, and Franziska Ohnsorge (2021). "One-Stop Source: A Global Database of Inflation." Policy Research Working Paper 9737. World Bank, Washington DC.

[40] Scenario with a 13 per cent dry bulk freight rate increase and a 4 per cent global grain price increase compared to no increase (i.e., same freight rate and grain price levels as February 2022) as a percentage of the consumer food price level. The assumptions are based on a 13 per cent increase in the Baltic Dry Index between February 2022 and July 2022 and a 4 per cent increase in global grains price index between February 2022 and July 2022. The simulation methodology is similar to the one used in chapter 3 of the *Review of Maritime Transport 2021*.

[41] See also chapter 1 and chapter 2.

[42] See also chapter 4.

[43] See also UNCTAD (2022a).

[44] Drewry (2022b).

[45] Clarksons Research (2022b).

[46] Hellenic Shipping News (2021b).

[47] See also chapter 1.

[48] Drewry (2022c).

[49] See also chapter 1 and 2.

[50] See also UNCTAD (2022a) and UNCTAD (2022b).

4

KEY PERFORMANCE INDICATORS FOR PORTS AND THE SHIPPING FLEET

This chapter reports on key performance indicators based on a growing wealth of data derived from satellite tracking of vessels, shipping schedules, and port information platforms. For improving the efficiency and resilience of international maritime transport, this year's analysis draws lessons from the COVID-19 experience. The chapter has the following sections.

A – Port calls and turnaround times – The number of port calls rebounded in 2021, supported by the recovery in seaborne trade volume, though container ships have been hindered by heavy port congestion, with impacts that cascaded to Sub-Saharan Africa and Oceania.

B – Port wating time and cargo handling – During the pandemic, waiting times in container and dry bulk ports increased significantly, though the impact has been alleviated by upgrading port infrastructure. Port cargo handling shows increasing returns to scale.

C – Port authority performance – Higher shipping rates and the increase in revenue enabled a strong recovery in 2021. Since 2020, training costs have remained low, and there is scope to invest in employees for digitalization and decarbonization. The port industry is still dominated by men.

D – Liner connectivity – China widened its lead as the most-connected economy, while other economies lost connectivity. During the pandemic, States in Africa and Latin America and the Caribbean lost more than 10 per cent of direct shipping connections, but there were new links between India and other Asian economies.

E – Impact of the war in Ukraine – Liner shipping connection to Ukraine was completely cut off. The Russian Federation also suffered losses in the Black Sea, the Baltic Sea and the Far East, as European countries significantly reduced their connections.

F – Fleet productivity – World fleet productivity has declined steadily due to oversupply of vessel capacity and sluggish growth in demand. Despite a strong rebound in demand, this trend continues.

G – Fleet greenhouse gas emissions – Fleet carbon intensity had been declining but has levelled off. There is significant variation across carriers. From 2023, new IMO regulations will encourage further speed reductions, as well as energy saving technologies and retrofitting.

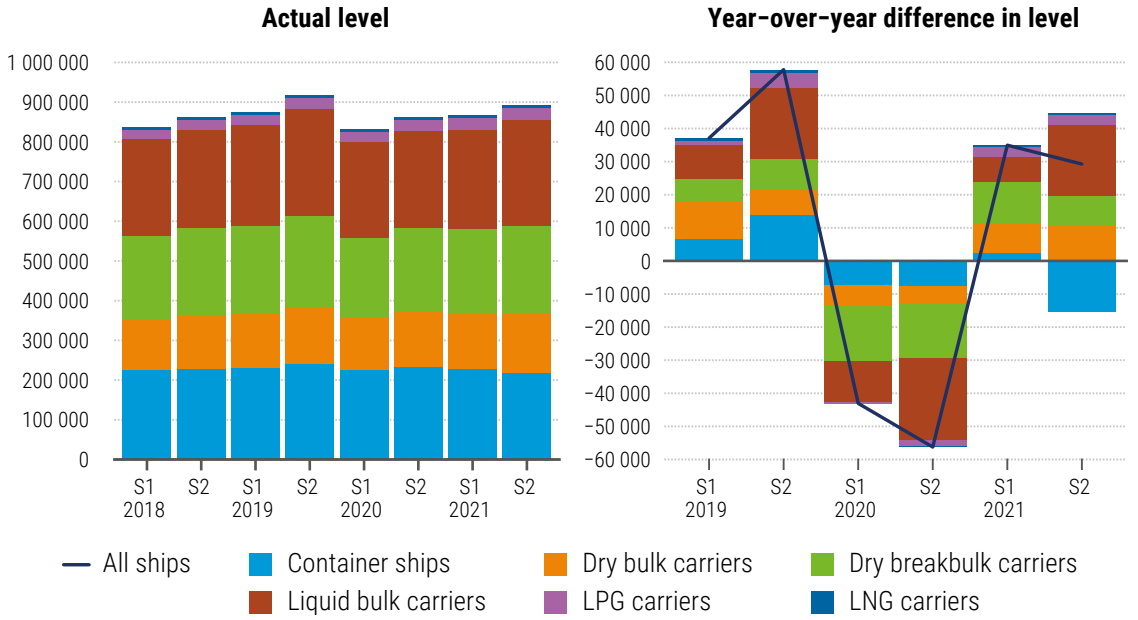
A. PORT CALLS AND TURNAROUND TIMES

1. More trade, but congestion reduces port calls

In line with the broader upturn in the global economy, the world's cargo-carrying ships made more port calls during the first six months of 2021 compared with the corresponding period in 2020 (figure 4.1). The recovery was more robust in dry bulk carriers, dry breakbulk carriers, and liquid bulk carriers. For dry bulk carriers there was a 6.6 per cent increase. For container ships, however, the increase was only 1.1 per cent, due to global container shortages and heavy port congestion. Port calls decreased by 1.9 per cent in Eastern Asia and by 1.2 per cent in Northern America.

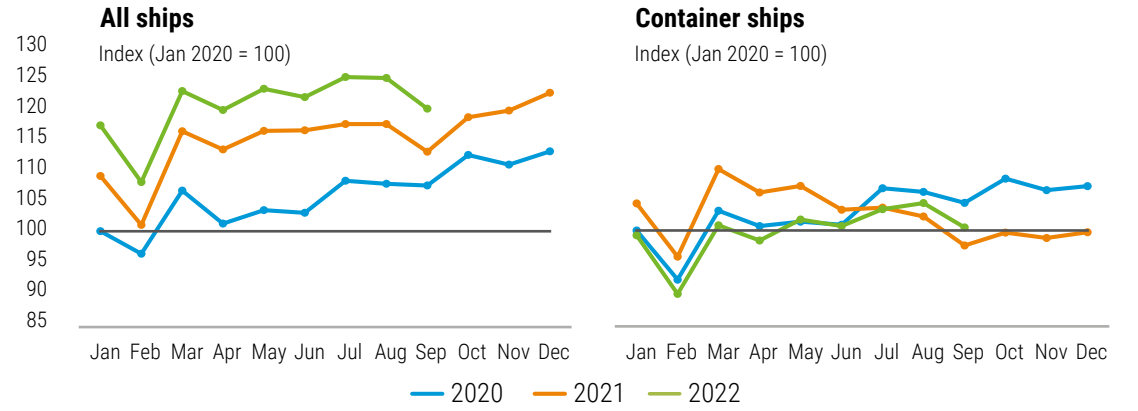
The second half of 2021 saw a rebound in port calls, which continued in the first nine months of 2022 in all segments except container ships which faced continuing congestion (figure 4.1 and figure 4.2). According to Clarksons Research, the proportion of container ships in port, taken as a proxy of port congestion, increased from 31.7 per cent 2019 to 34.2 per cent in 2020, 34.9 per cent in 2021, and 35.7 per cent in the first nine months of 2022.[1] Calls were reduced by lockdowns in major Chinese cities and the impact of the war in Ukraine which entailed increased customs checks.[2]

Figure 4.1 Port calls per half year, world total, 2018–2021



Source: UNCTAD, based on data provided by MarineTraffic (https://www.marinetraffic.com).
Note: Ships of 1,000GT and above. Not including passenger ships and Ro/Ro vessels.

Figure 4.2 Monthly port calls, world total, January 2020–September 2022



Source: UNCTAD, based on data provided by Clarksons Research.
Note: All ships do not include passenger ships and Ro/Ro vessels.

Between 2020 and 2021, there was a 14 per cent increase in median vessel turnaround time for container ships (table 4.1). This reflected increasing demand, with supply constrained by workforces reduced to limit social contact, spillovers from disruptions in hinterland transport, and some temporary port closures as in China.[3] Pandemic-related disruptions increased time in port by 2.3 per cent for dry bulk carriers and by 2.1 per cent for dry breakbulk carriers. This was partly because some dry breakbulk carriers started carrying container-related cargoes, and dry bulk vessels took minor bulk cargoes usually carried by container or dry breakbulk carriers.[4]

Table 4.1 Time in port, vessel age and size, by vessels type, 2021, world total

Vessel type	Median time in port (days)	Median time in port, annual change (%)	Average age of vessels	Average size (GT) of vessels	Maximum size (GT) of vessels	Average cargo carrying capacity (dwt) per vessel	Maximum cargo carrying capacity (dwt) of vessels	Average container carrying capacity (TEU) per container ship
Container ships	0.80	13.7	14	37 223	237 200			3 431
Dry breakbulk carriers	1.17	2.1	21	5 463	91 784	7 427	116 173	
Dry bulk carriers	2.11	2.3	14	32 011	204 014	57 268	404 389	
LNG carriers	1.13	0.9	11	95 356	168 189	74 522	155 159	
LPG carriers	1.03	-1.5	15	10 541	61 000	11 799	64 220	
Liquid bulk carriers	0.98	1.3	14	15 739	170 618	27 275	323 183	
All ships	**1.05**	**4.8**	**16**	**21 732**	**237 200**	**26 997**	**404 389**	**3 431**

Source: UNCTAD, based on data provided by MarineTraffic (https://www.marinetraffic.com).

Note: Ships of 1,000GT and above. Not including passenger ships and Ro/Ro vessels.

Table 4.2 Port calls and median time spent in port, container ships, 2021, top 25 economies

Country	Number of arrivals	Number of arrivals, annual change (%)	Median time in port (days)	Median time in port, annual change (%)	Average age of vessels	Average container carrying capacity (TEU) per container ship	Maximum container carrying capacity (TEU) of container ships
China	70 506	-5.3	0.73	17.2	13	4 401	23 992
Japan	35 526	-6.4	0.36	7.4	13	1 541	21 237
Republic of Korea	20 652	-3.8	0.72	11.7	14	2 958	23 992
United States of America	18 816	-6.1	1.25	20.8	15	5 417	21 237
Indonesia	15 648	4.2	1.06	7.6	15	1 218	6 921
Taiwan Province of China	14 909	-10.3	0.57	27.2	14	2 644	23 992
Spain	14 705	2.7	0.65	-1.8	15	3 029	23 964
Malaysia	14 577	-8.2	1.00	24.5	14	3 649	23 992
Singapore	13 408	-10.3	1.03	29.1	13	5 421	23 964
Türkiye	12 171	5.0	0.63	2.8	17	2 969	23 756
Netherlands	11 516	-0.7	0.89	10.8	15	2 819	23 992
Viet Nam	11 367	18.6	0.83	-7.8	14	2 229	19 273
China, Hong Kong SAR	10 435	-12.9	0.65	24.8	14	3 395	23 964
India	8 983	14.2	0.93	1.1	16	4 017	15 000
Thailand	8 321	2.6	0.75	11.6	12	2 059	19 630
Italy	7 746	-2.3	0.96	4.7	16	3 642	23 964
United Kingdom	7 513	-4.1	0.83	12.7	16	3 114	23 992
Brazil	7 284	-4.3	0.85	11.2	11	5 799	12 690
United Arab Emirates	7 228	-5.0	1.00	4.7	17	4 026	23 964
Germany	7 082	-0.8	1.13	14.9	13	4 497	23 992
Philippines	5 816	12.3	0.94	6.2	16	1 673	6 258
Panama	5 444	21.9	0.88	27.4	13	4 630	15 000
Belgium	4 960	-5.3	1.20	15.4	15	4 760	23 964
Morocco	4 541	5.2	0.76	3.3	15	4 210	23 964
France	4 521	-2.8	0.96	22.3	14	5 105	23 964
Subtotal, top 25	**343 675**	**-2.7**			**14**	**3 477**	**23 992**
World total	***446 589***	***-2.8***	***0.80***	***13.7***	***14***	***3 431***	***23 992***

Source: UNCTAD, based on data provided by MarineTraffic (https://www.marinetraffic.com).

Note: Ships of 1,000GT and above. Ranked by number of port calls. For the complete table of all countries, see http://stats.unctad.org/portcalls_number_a and http://stats.unctad.org/portcalls_detail_a.

Figure 4.3 Proportion of container ships fully laden, world total, 2018–2022

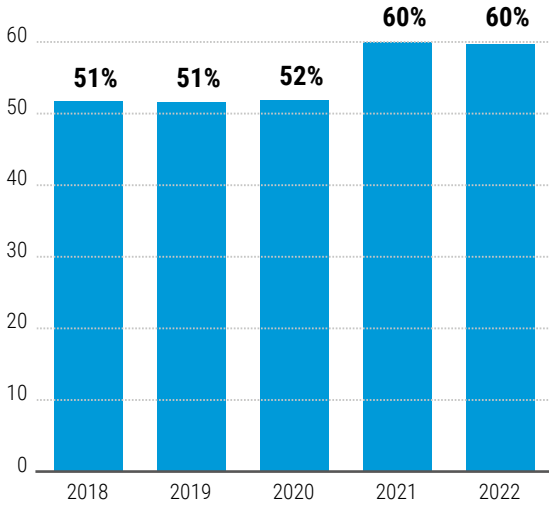
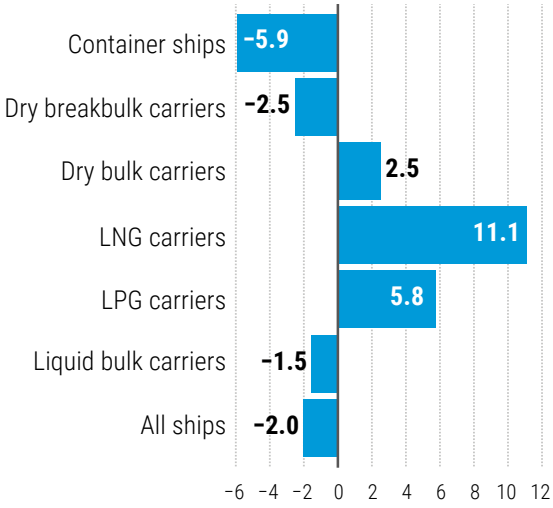


Figure 4.4 Change in port calls from 2019 to 2021, world total, percentage



Source: UNCTAD, based on data provided by Sea/ (www.sea.live, left-hand side) and MarineTraffic (https://www.marinetraffic.com, right-hand side).

Note: Fully laden, partially laden, and ballast status is estimated by Sea/ based on historical draft messages transmitted by each vessel. Data for 2022 is up to 12 October 2022 (left-hand side). All ships do not include passenger ships and Ro/Ro vessels (right-hand side).

In 2021, among the 25 economies with the most container ship arrivals, 23 recorded increases in median turnaround time, and 15 economies faced double-digit increases (table 4.2). The largest increase was in Singapore at 29 per cent, followed by Panama, Taiwan Province of China, Hong Kong China, Malaysia, France, the United States, and China. Some freight was sent to Singapore without on-time connecting vessels to load the containers – disrupting shipping schedules and resulting in container shortages in other Asian economies.[5] Table 4.2 includes large vessels operated by international shipping lines as well as small feeder vessels deployed for domestic and regional shipping.

Longer times in port reduced efficiency, and shipping lines tried to avoid some congested ports. Some container ships for the China-EU trade lane have bypassed the refuelling hub in Singapore and bunkered in China to save time.[6]

In contrast, the number of arrivals in Panama increased by 22 per cent, as more container ships transited through the Panama Canal to avoid congestion in the US West Coast ports, increasing port calls, bunkering and requiring crew changes in Panama.[7] Growth here was supported by stable provision of port services and crews.[8] India had double-digit growth in port calls, partly supported by increased regional connectivity (see section D.3).

Viet Nam and Philippines recorded similar increases in the number of port calls, driven by strong growth of exports, mainly of electronic products,[9] despite a temporary economic downturn during the third quarter of 2021 due to the spread of the COVID-19 Delta strain.[10] Viet Nam's export volume increased by 15.6 per cent in 2021,[11] with mobile phones, computers and electronics accounting for a third of total exports.[12] Philippines export volume increase by 5.3 per cent, with electronic products forming two-thirds of the total.

Despite fewer container port calls, global containerized trade volume and port throughput increased, a result partly of higher tonnage per call and better use of vessel capacity. Between 2020 and 2021, the proportion of container ships that were fully laden increased from 52 to 60 per cent (figure 4.3). Also, shipping lines started skipping some ports such as Singapore. On the US West Coast routes, some shipping services eliminated dual calls – loading and discharging in two ports.[13]

2. Cascading effects of COVID-19 in Sub-Saharan Africa and Oceania

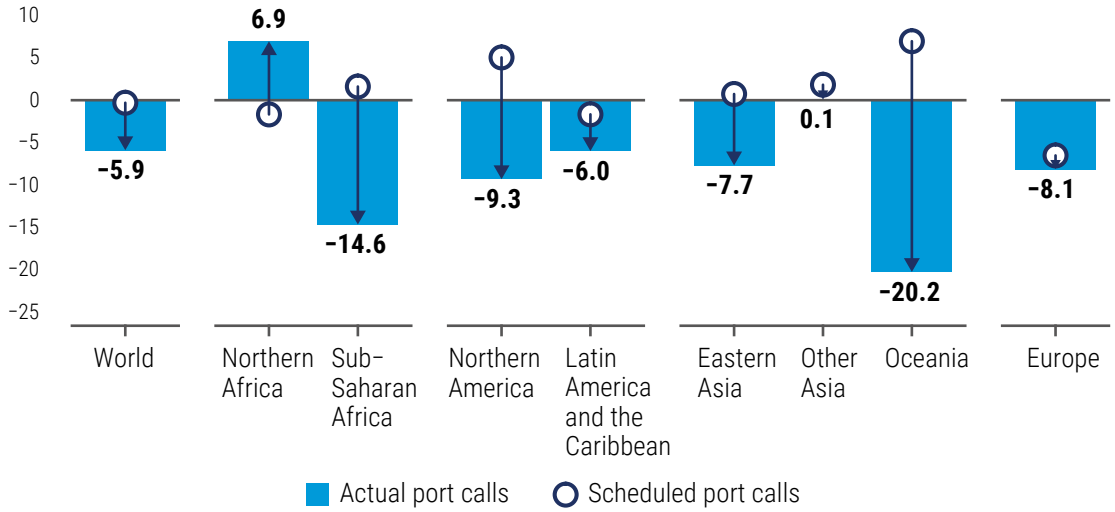
Container ships were the worst affected by the cascading effects of the pandemic, with a decline in port calls between 2019 and 2021 of 5.9 per cent, followed by dry breakbulk and liquid bulk carriers (figure 4.4). On the other hand, there was strong growth in port calls for gas carriers , driven by expansion of US export capacity and firm demand from Asia.[14] For dry bulk carriers, there was a rebound in demand for grains and industrial materials.

In Sub-Saharan Africa and Oceania, port calls for container ships fell steeply (figure 4.5). This was partly a knock-on effect of port congestion in main trading lanes – through late arrivals of vessels and container shortages, combined with COVID-related restrictions on workforces.[15] In addition, carriers removed some shipping capacity in order to service routes in Eastern Asia and Northern America (see section D).

The first two years of the pandemic saw declines in port calls in Northern America, Eastern Asia, and Europe. Scheduled port calls increased in Northern America and Eastern Asia to meet increased container shipping demand, but actual port calls declined due to serious port congestion and container shortages.

Despite a six-day blockade of the Suez Canal in March 2021, Northern Africa recorded stable growth in container ship port calls, supported by ongoing development and upgrading of ports, including Tanger Med in Morocco and Ain Sokhna in Egypt. Between 2019 and 2021, container ship port calls in Tanger-Med increased from 2,652 to 3,195, and in Ain Sokhna from 59 to 217. On the other hand port calls in Port Said – the largest port in the region – decreased from 3,516 to 3,393.[16]

Figure 4.5 Changes in actual and scheduled port calls of container ships from 2019 to 2021, per cent



Source: UNCTAD, based on data provided by MarineTraffic (https://www.marinetraffic.com, for actual port calls) and MDS Transmodal (https://www.mdst.co.uk/, for scheduled port calls).

B. PORT WAITING TIME AND CARGO HANDLING PERFORMANCE

1. Remarkable improvement of Middle East and Mediterranean port performance

The World Bank and S&P Global produce a container port performance index that assesses turnaround time by vessel size and port call size. For 2021, the highest-ranked ports were in the Middle East and Mediterranean, and East Asia (table 4.3). Among the 25 highest-ranked ports, ten were in the Middle East and Mediterranean, up from four in 2020. For East Asia, reflecting congestion, the number of ports in the top 25 decreased from 15 to 8.

The strong performance of the ports in the Middle East and Mediterranean and East Asia is indicated in a global heatmap (figure 4.6). In Europe, south-western ports were ranked higher than the ports in Northwest Europe. The latter required more time for terminal operations caused mainly by a surge in average cargo exchange volume as carriers, aiming to mitigate volatile demand and the risk of congestion, consolidated some of their port calls. In the US West Coast ports, much of the time was spent waiting.[17]

In South Asia, the highest-performing port was Colombo in Sri Lanka. However, almost all these performed better than the global average. In North and Central America, ports in the US West Coast suffered from long-term underinvestment in infrastructure. In 2021, Long Beach and Los Angeles were the two-lowest ranked ports in the world.[18] Ports in the US East Coast and Mexico performed better.

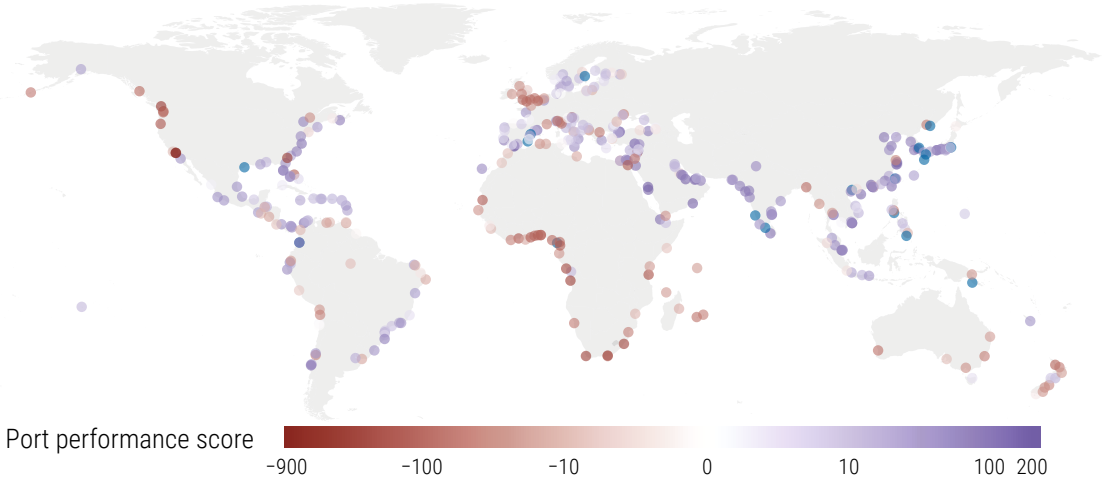
Table 4.3 Top 25 ports under the Container Port Performance Index 2022

Port name	Economy	Rank in 2021	Rank in 2020
King Abdullah port	Saudi Arabia	1	2
Salalah	Oman	2	9
Hamad port	Qatar	3	38
Yangshan	China	4	10
Khalifa port	United Arab Emirates	5	22
Tanger-Med	Morocco	6	15
Ningbo	China	7	13
Jeddah	Saudi Arabia	8	42
Guangzhou	China	9	6
Yokohama	Japan	10	1
Algeciras	Spain	11	32
Cartagena	Colombia	12	34
Cai Mep	Viet Nam	13	18
Dammam	Saudi Arabia	14	92
Port Said	Egypt	15	70
Shekou	China	16	5
Chiwan	China	17	27
Tanjung Pelepas	Malaysia	18	11
Djibouti	Djibouti	19	93
Buenaventura	Colombia	20	71
Kaohsiung	Taiwan Province of China	21	4
Barcelona	Spain	22	46
Port of Virginia	United States	23	110
Colombo	Sri Lanka	24	33
Busan	Republic of Korea	25	36

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

Note: Ranked by the Administrative Approach scores.

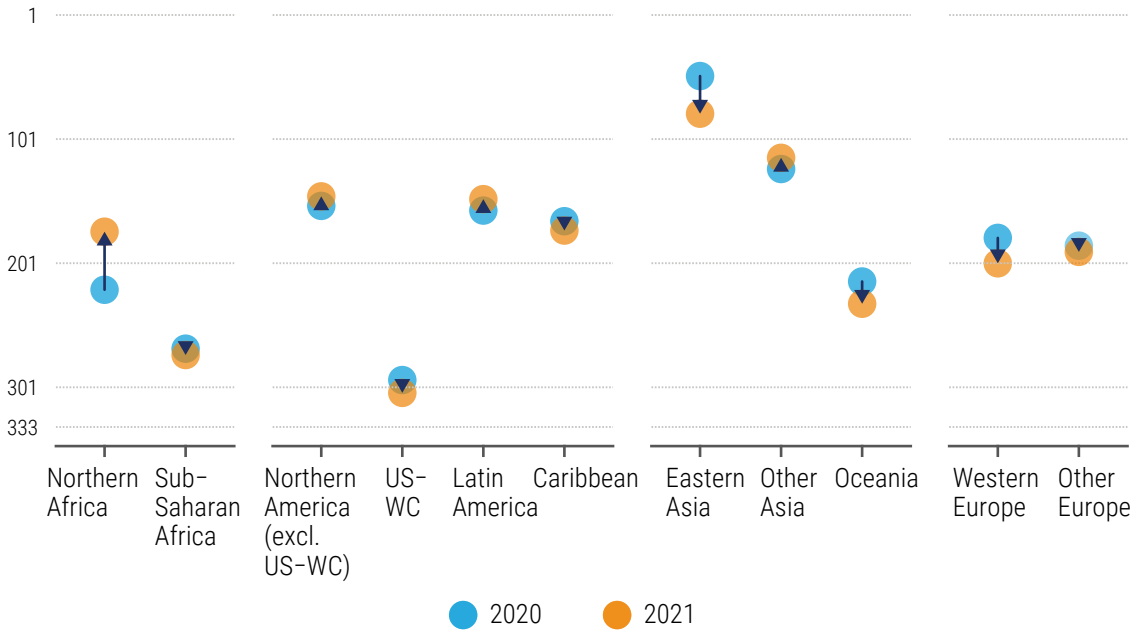
Figure 4.6 Global heatmap for the Container Port Performance Index 2022



Source: UNCTAD, based on data provided by the World Bank and S&P Global Port Performance Program.

Note: The heatmap is based on the Administrative Approach score.

Figure 4.7 Average rank of container port performance, by region, 2020 and 2021



Source: UNCTAD, based on data provided by the World Bank and S&P Global Port Performance Program.

Note: The average rank is based on the Administrative Approach score. The rank is recalculated by UNCTAD across 333 ports, for which port performance scores are available in 2020 and 2021.

The results for South American ports were mixed: two-thirds of the ports had better than global average performance, led by Cartagena and Buenaventura in Colombia, with the lowest ranking for San Antonio in Chile. Overall, however the regions with the lowest rankings were Sub-Saharan Africa and Oceania.

Between 2020 and 2021, in East Asia, due to heavy congestion many ports dropped from the top 25, while the average rank of container ports worsened. But as indicated in figure 4.7 their average was higher than that of other regions. Western Europe ports and US West Coast ports suffered from logistics disruptions that depressed their averages.

Sub-Saharan Africa and Oceania faced further deterioration, with the biggest drop for the Port of Auckland in New Zealand – from 118 to 351 – partly due to a massive backlog of freight caused by serious shortages of skilled port operators.[19]

In contrast, there were improvements for Northern Africa, Latin America, Northern America (excluding the US West Coast) and Other Asia – which all improved their rankings. The greatest advance was for Northern Africa, driven by Damietta Port in Egypt, whose ranking jumped from 297 to 58 due to a new multi-purpose terminal installed in 2019 that reduced vessel waiting time.[20]

2. Longer dry bulk waiting times due to disruption in ports and supply chains

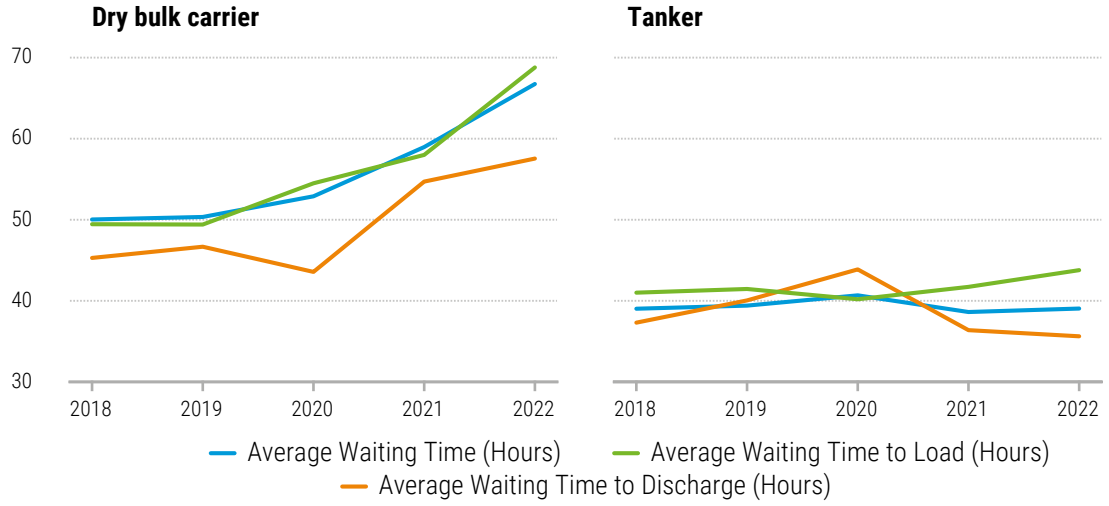
Waiting time in port

The COVID-19 pandemic caused serious port congestion and increased waiting times for dry bulk vessels. Between 2019 and the first half of 2022, the average waiting time across 30 major dry bulk handling economies increased from 50 to 67 hours (figure 4.8).[21] This was primarily caused by stringent COVID-19 related protocols, including mandatory quarantine periods and negative PCR tests for seafarers.[22] Among the top 30 economies, 12 recorded more than 50 per cent increases in waiting time for loading, with the highest increases in Colombia, Oman and Norway (table 4.4). In Colombia, COVID-19-related restrictions disrupted not only port operation but also coal mining and rail transportation.[23]

In Europe in 2022, congestion in dry bulk ports has been exacerbated by the knock-on effects from the war in Ukraine, and the wider global energy crisis, which have increased coal imports, particularly from South Africa. In Rotterdam, the region's main coal terminal, between 9 May and 29 June the waiting time for dry bulk carriers increased from 48 to 186 hours.[24]

For tankers on the other hand, average waiting time is largely unchanged because of weak demand for oil products, particularly for gasoline and jet fuel (figure 4.8).

Figure 4.8 Average waiting time across 30 major dry bulk/ tanker handling economies, 2018–2022, hours



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

Note: The 30 major dry bulk/ tanker handling economies are listed in table 4.4 and table 4.5. The data for 2022 is the average from 1 January 2022 to 30 May 2022.

Table 4.4 Waiting time to load and discharge for dry bulk carriers, top 30 economies by vessel arrivals, average values for first half of 2022 and changes from 2019

	Average waiting time to load (hours)		Average waiting time to discharge (hours)	
	2022	%-change from 2019 to 2022	2022	%-change from 2019 to 2022
China	78.8	67.1	38.9	7.7
Australia	132.6	47.6	54.5	44.9
United States of America	88.0	48.7	30.2	102.4
Brazil	184.7	41.2	181.6	36.0
Russian Federation	43.8	-1.6	63.0	-4.9
Canada	102.3	37.3	24.2	143.4
Argentina	43.3	1.5	12.4	-52.4
South Africa	146.3	51.4	91.2	146.9
Japan	27.6	-22.3	40.8	-2.4
India	57.7	-3.2	32.3	-36.2
Ukraine	41.5	-4.6	17.3	9.2
United Arab Emirates	47.8	34.6	31.4	109.7
Indonesia	19.9	54.9	43.5	5.5
Republic of Korea	22.3	-13.7	52.4	-3.9
New Zealand	43.0	-14.8	21.8	-12.0
Chile	107.7	61.2	172.6	142.7
Türkiye	57.8	91.2	72.3	134.0
Viet Nam	22.7	24.7	25.9	18.2
Colombia	57.7	208.3	25.7	3.8
Malaysia	50.6	62.8	75.9	41.2
Mexico	57.0	26.2	52.2	13.7
Taiwan Province of China	29.7	60.7	41.6	6.0
Peru	86.4	11.5	110.1	159.5
Oman	65.8	196.8	19.8	-56.0
Norway	38.4	107.5	6.8	-76.0
France	18.1	21.8	40.3	-19.6
Saudi Arabia	57.9	49.8	39.7	-12.6
Morocco	125.7	56.6	101.7	-29.6
Romania	71.4	-1.6	78.1	521.5
Mozambique	137.0	70.3	128.3	-7.9

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

Note: Ranked by number of dry bulk carrier arrivals for loading. The data for 2022 is the average from 1 January 2022 to 30 May 2022.

Table 4.5 Waiting time to load and discharge for tankers, top 30 economies by vessel arrivals, average values for first half of 2022 and changes from 2019

	Average Waiting Time to Load (hours)		Average Waiting Time to Discharge (hours)	
	2022	%-change from 2019 to 2022	2022	%-change from 2019 to 2022
United States of America	39.3	-9.3	30.7	-23.2
Russian Federation	39.9	-1.1	12.6	21.6
China	39.7	10.1	54.4	24.8
Brazil	43.8	0.8	50.2	-4.8
Saudi Arabia	36.2	6.1	34.5	-12.4
United Arab Emirates	43.6	4.0	55.1	-2.5
Republic of Korea	64.7	11.4	37.1	-4.7
Singapore	52.3	-18.0	47.8	17.2
India	48.9	-13.0	41.7	-24.4
Malaysia	35.8	17.7	29.0	-16.4
Netherlands	57.6	-0.5	33.8	-9.8
Indonesia	40.9	-15.8	40.9	-8.0
Italy	57.1	18.6	37.4	-11.8
Mexico	95.4	22.6	70.5	-25.7
Nigeria	19.3	31.6	59.0	-68.0
Kuwait	53.7	94.6	115.0	213.8
Iraq	22.8	-34.3	0.1	69.0
Canada	20.4	-17.4	26.1	60.8
Spain	43.4	14.1	36.2	37.8
Qatar	19.9	-1.0	11.3	-68.7
Japan	25.3	3.0	16.3	13.1
United Kingdom	36.5	9.3	39.6	29.5
Türkiye	38.9	38.9	35.5	39.9
Norway	13.3	-30.1	19.5	-21.3
Angola	19.2	-34.3	17.1	-46.9
Belgium	81.8	44.4	56.6	36.3
Bolivarian Republic of Venezuela	66.8	-4.8	7.3	-78.2
Taiwan Province of China	65.6	27.9	32.6	23.5
Argentina	40.4	-15.3	5.0	-66.8
Greece	50.9	16.2	15.7	-40.5

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

Note: Ranked by number of tanker arrivals for loading. The data for 2022 is the average from 1 January 2022 to 30 May 2022.

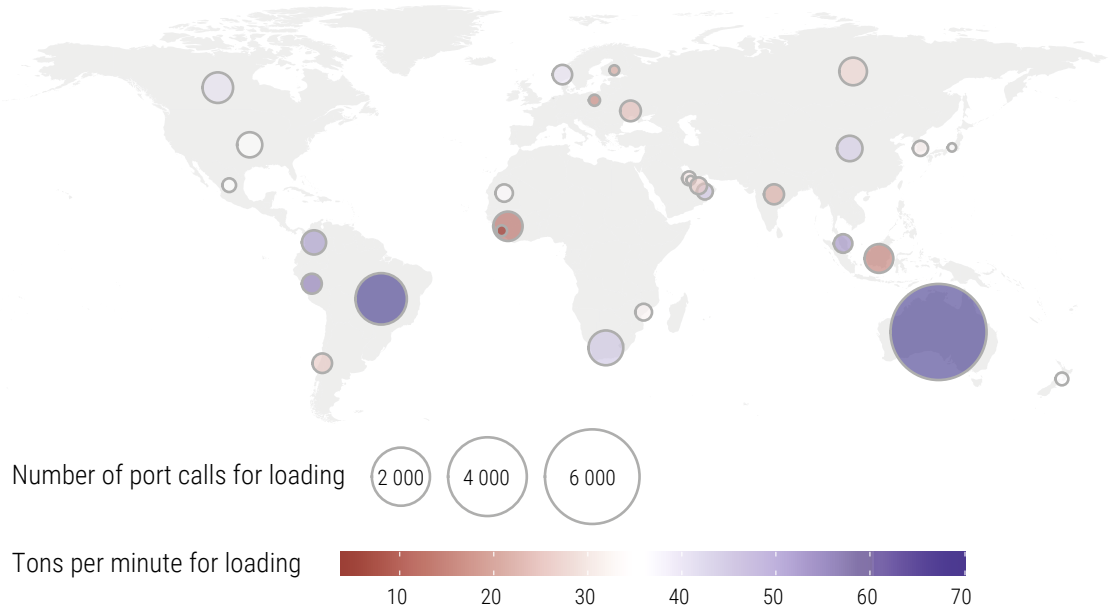
Cargo handling

Cargo handling performance is assessed in tons per minute and increases with ship size since large vessels can be handled by large cranes, conveyer belts and other equipment. In 2021, the global average for loading Capesize dry bulk vessels was 34.9 tons per minute, but for handysize vessels was only 6.3 tons per minute.[25]

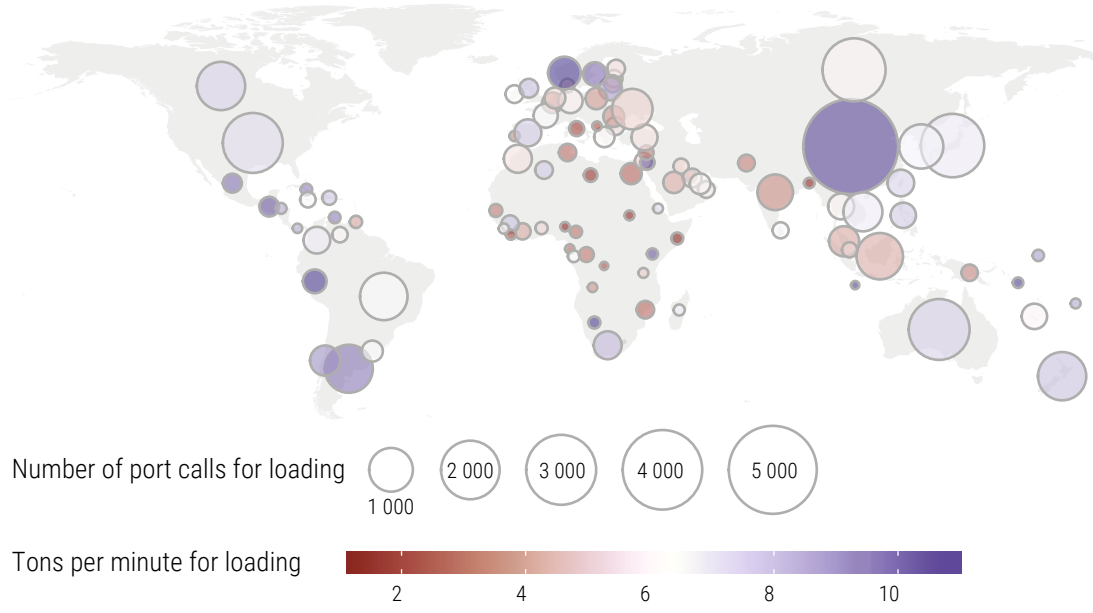
For Capesize dry bulk carriers, countries in Eastern Europe (Ukraine and Poland), South Asia (India), the Middle East (Qatar, Bahrain, and United Arab Emirates), and West Africa (Guinea and Siera Leone) had performances lower than the global average (figure 4.9).

Figure 4.9 Port cargo handling performance for dry bulk carriers, tons per minute and number of port calls for loading, 2021

Capesize



Handysize



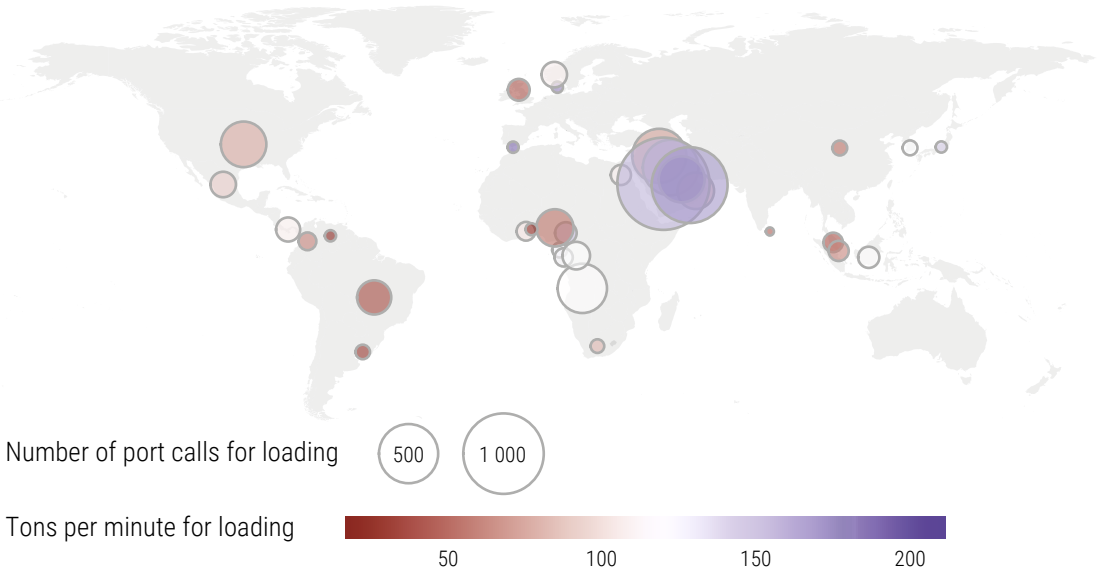
Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

Note: Countries with five or more arrivals for loading. The white color indicates global average (i.e., 34.9 tons per minute for capesize and 6.3 tons per minute for handysize). Blue color means higher than average tons per minute, and red means lower than average. Bubble size indicates number of port calls for loading.

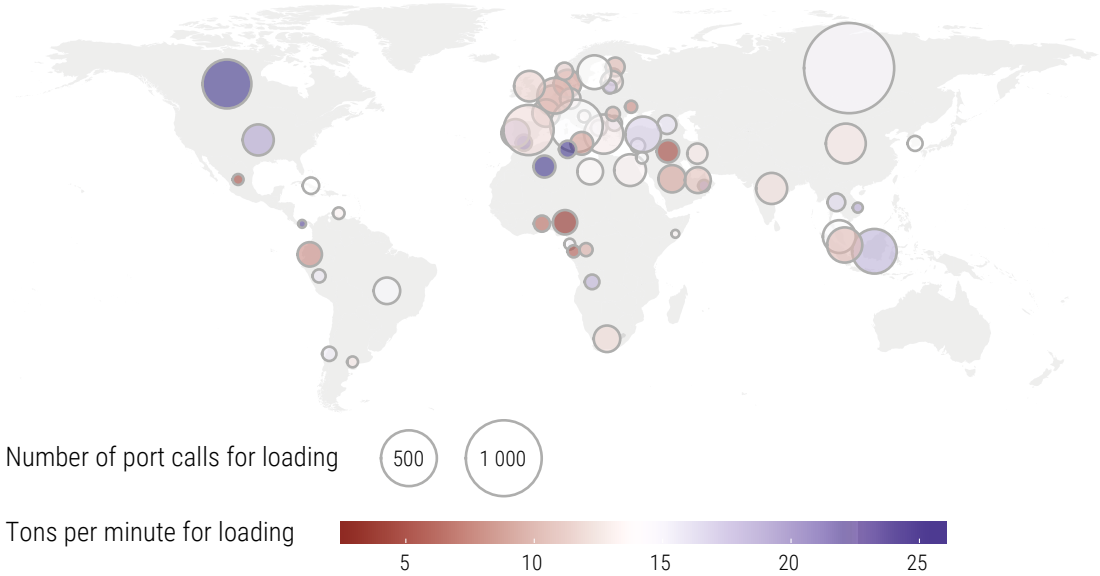
A similar geographical pattern was found for Handysize dry bulk carriers, even though more economies have been handling Handysize vessels than Capesize vessels (figure 4.9). Eight of the top 10 port call economies, including China, Japan, Australia and the United States, had average or higher cargo handling productivity. Exceptions were the Russian Federation and Indonesia. Also, some economies in North Europe and South America – Norway, Sweden, Peru, Guatemala, and Chile – recorded high cargo handling performance even though they had fewer port calls.

Figure 4.10 Port cargo handling performance for tankers, tons per minute and number of port calls for loading, 2021

VLCC



Handysize



Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

Note: Countries with five or more arrivals for loading. The white color indicates global average (i.e., 116.3 tons per minute for VLCC and 14.1 tons per minute for handysize). Blue color means higher than average tons per minute, and red means lower than average. Bubble size indicates number of port calls for loading.

VLCC tankers showed different patterns. The highest-performing economies were in the Middle East – Qatar, United Arab Emirates, Kuwait, and Saudi Arabia – although Oman and Iraq had lower than average performances (figure 4.10). Also, some Western African economies like Angola, Cameroun, Gabon, and Equitorial Guinea, showed average or higher performances, while others – Nigeria and Ghana – had low performances. Performance was also low for economies on the American continent.

For Handysize tankers, the situation was significantly different. Economies in North America and North Africa (Canada, the United States, Tunisia, and Algeria) performed well, while most economies in Europe (Romania, Malta, Denmark, and Ukraine), the Middle East (Saudi Arabia and Iraq) and West Africa (Republic of the Congo, Gabon, Togo, and Nigeria) showed low performance (second map of figure 4.10).

Table 4.6 Port cargo handling performance for dry bulk carriers and tankers by ship size, top 10 economies by vessel arrivals for loading and global average, tons per minute for loading, 2021

Dry bulk carriers				Tankers			
Cape size		Handysize		VLCC		Handysize	
Country	Tons/minute	Country	Tons/minute	Country	Tons/minute	Country	Tons/minute
Australia	71.2	China	10.8	Saudi Arabia	156.6	Russian Federation	14.9
Brazil	77.9	Japan	7.0	United Arab Emirates	168.6	Italy	14.3
South Africa	46.5	Russian Federation	5.9	Kuwait	159.7	Spain	11.8
Canada	41.4	Australia	7.6	Iraq	71.5	Canada	26.1
Guinea	10.3	United States	7.3	Angola	115.0	Indonesia	19.2
Indonesia	12.3	Canada	7.5	Qatar	259.3	China	12.4
Russian Federation	26.3	New Zealand	8.0	United States	74.0	Greece	12.7
China	45.3	Argentina	9.7	Nigeria	51.1	Netherlands	10.1
United States	34.3	Brazil	6.1	Oman	79.8	Türkiye	17.3
Colombia	54.0	Indonesia	4.2	Brazil	34.3	Singapore	10.0
Global average	***34.9***	***Global average***	***6.3***	***Global average***	***116.3***	***Global average***	***14.1***

Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

Note: Ranked by number of arrivals for loading. Global average is a simple average across all countries with five or more arrivals for loading.

C. LESSONS FROM THE TRAINFORTRADE PORT MANAGEMENT PROGRAMME

The UNCTAD TRAINFORTRADE Port Management Programme helps ports deliver more efficient and competitive services. The programme creates networks through which port operators can share knowledge and expertise and strengthen talent management and human resources development.

Over the past 20 years the Modern Port Management elite course has been adopted by over 250 member ports. In response to the COVID-19 pandemic, the programme offered a special interactive online course, Building Port Resilience Against Pandemics, in French, English and Spanish. At the time of publication, this had trained over 2,800 participants from 138 countries.

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) that enables port managers to benchmark their performances and provide evidence for policy analysis at global, regional and state levels.[26]

1. PPS as a strategic port management tool

The PPS has been used in various ways in different countries:

- **Ireland, for a new port** – For a proposed new port development – Bremore – the PPS network supported detailed revenue and profitability forecasting, as well as data for employee metrics. The indicators on operations will be of value in tendering for concessions and for other investment partners.
- **Philippines, for concession agreements** – Concession agreements are challenging to construct and to manage. The Philippines Ports Authority is responsible for more than 400 trading ports and is offering concession opportunities supported by the global operational benchmarks available from the PPS.
- **Spain, for reporting** – Most ports in the network are owned, directly or indirectly, by governments, so have a range of reporting obligations. Valencia port has used the PPS to compare operational benchmarks for container handling, such as dwell time or handling rates, and to compare revenue profiles, profit levels and organizational structures.
- **Ireland, dealing with disruption** – Prior to Brexit, Ireland moved a large proportion of containers to hub ports on mainland Europe via the UK by ferry and road. Brexit required major changes with many shippers now moving cargo onto direct ferry services to mainland Europe. The indicators for the ports across the whole island of Ireland in 2021 showed mixed results, prompting further analysis of both the ports' own data and that in the PPS.

In 2021, 58 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. Table 4.7 shows annual median values for the period 2016 to 2021.[27]

Port profiles

Most ports in the network have some degree of state control – typically through ownership of underlying assets such as quay walls and breakwaters. The private sector participates through concessions, though public authorities also maintain a high degree of control over pricing and over investment decisions for commercially funded port operating assets. Most ports have adopted environmental management systems and comply with ISO 14001 and national requirements, while monitoring air, waste, noise, and water quality.

Signs of post-COVID 19 recovery

In the period up to the pandemic, cargo throughput had grown annually by four to six per cent. The pandemic then caused a steep decline before a recovery in 2021 partly due to higher freight rates with some increase in capacity.

In March 2020, as a result of the pandemic the entire world cruise fleet stopped operating, with serious consequences for cruise companies, their crews and their management teams. However, over more than 50 years of history the cruise sector has proved very resilient and is expected to return to 2019 levels by the end of 2023.

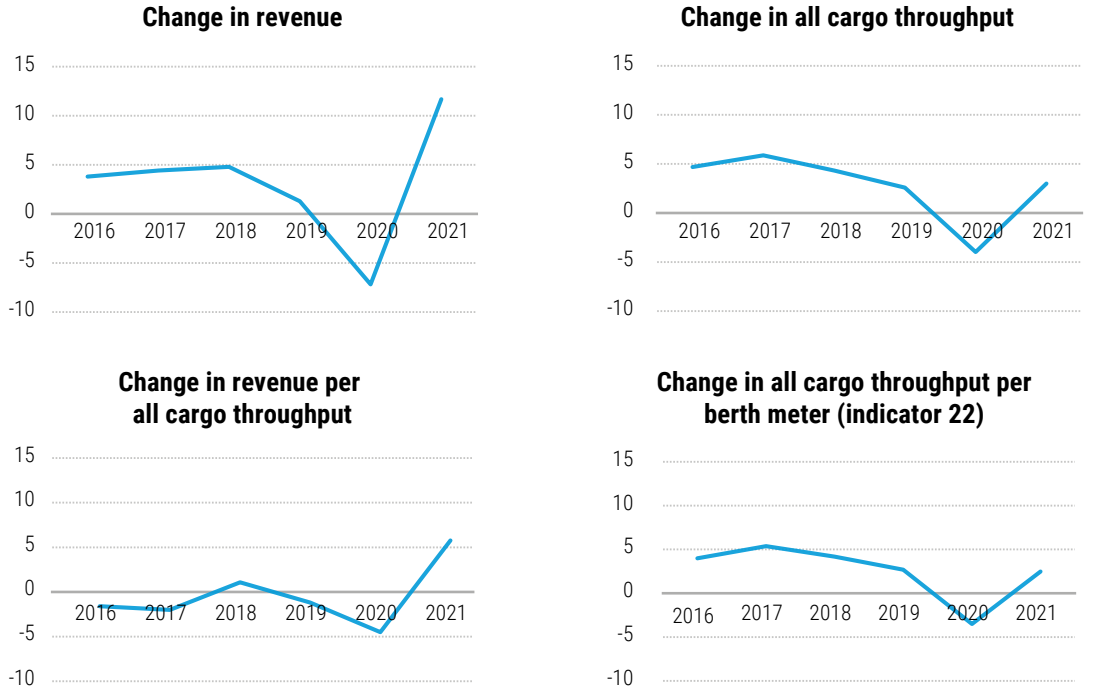
Table 4.7 Port performance scorecard, 2016–2021

	Indicator number	Indicator	Median values					
			2016	2017	2018	2019	2020	2021
Finance	1	EBITDA/revenue (operating margin)	37.1%	40.1%	47.5%	43.6%	39.3%	42.8%
	2	Labour/revenue	14.9%	19.0%	17.6%	17.2%	18.9%	16.2%
	3	Vessel dues/revenue	15.4%	17.8%	17.8%	13.9%	14.3%	14.7%
	4	Cargo dues/revenue	36.3%	33.3%	28.4%	29.5%	35.2%	32.6%
	5	Concession fees/revenue	2.5%	6.5%	17.0%	14.0%	6.4%	5.6%
	6	Rents/Revenue	2.4%	2.5%	2.7%	3.2%	2.9%	2.2%
Human resources	7	Tonnes/employee	15 951 t	17 640 t	37 742 t	37 583 t	26 805 t	40 476 t
	8	Revenue/employee	$120 867	$113 378	$122 405	$243 932	$131 583	$268 501
	9	EBITDA/employee	$53 664	$45 524	$57 573	$66 115	$52 766	$61 898
	10	Labour cost/employee	$24 338	$20 697	$23 425	$21 220	$24 651	$23 370
	11	Training cost/wages	0.9%	1.0%	1.2%	0.7%	0.2%	0.2%
Gender	12	Female Participation Rate (All categories)	15.0%	15.6%	16.4%	16.8%	16.9%	17.1%
	12.1	Female Participation Rate (Management)	34.4%	35.0%	42.4%	44.3%	44.6%	42.3%
	12.2	Female Participation Rate (Operations)	8.6%	8.1%	7.0%	7.4%	6.2%	5.9%
	12.3	Female Participation Rate (Cargo Handling)	0.0%	4.4%	6.5%	5.8%	3.6%	7.5%
	12.4	Female Participation Rate (Other employees)	24.4%	21.0%	35.3%	32.2%	28.0%	26.3%
Vessel operations	13	Average waiting time	4 h	8 h	11 h	5 h	7 h	8 h
	14	Average gross tonnage per vessel	15 573 t	15 911 t	16 759 t	16 081 t	19 515 t	19 056 t
	15.1	Oil Tankers arrivals	3.4%	4.6%	6.9%	7.4%	5.9%	5.7%
	15.2	Bulk Carrier arrivals	5.4%	4.2%	5.0%	7.1%	5.9%	8.6%
	15.3	Container Ship arrivals	42.4%	42.0%	26.7%	25.0%	27.5%	18.5%
	15.4	Cruise Ship arrivals*	1.3%	2.2%	1.7%	1.4%	0.7%	0.3%
	15.5	General Cargo Ship arrivals	21.5%	17.2%	20.6%	22.1%	20.6%	25.7%
	15.6	Other Ship arrivals	13.0%	10.7%	12.9%	8.8%	15.0%	6.2%
Cargo operations	16	Average tonnage per arrival (all)	4 296 t	4 882 t	5 337 t	5 238 t	4 970 t	5 011 t
	17	Tonnes per working hour, dry or solid bulk	244 t	257 t	235 t	207 t	219 t	186 t
	18	Tonnes per hour, liquid bulk	736 t	222 t	175 t	171 t	157 t	124 t
	19	Containers Lift Per Ship Hour at Berth	22	32	18	20	27	27
	20	Average container dwell time in days	5	4	4	5	5	5
	21	Tonnes per hectare (all)	141 091 t	116 534 t	129 241 t	88 454 t	89 885 t	94 271 t
	22	Tonnes per berth meter (all)	3 071 t	3 043 t	3 010 t	2 889 t	2 833 t	2 888 t
	23	Total Passengers on Ferries*	817 727	1 222 436	1 006 742	1 141 094	321 023	410 578
	24	Total Passengers on Cruise*	65 538	55 968	118 606	146 953	17 085	14 146
Environment	25	Investment in Environmental Projects/Total CAPEX	0.0%	0.5%	0.6%	0.2%	0.0%	0.2%
	26	Environmental expenditures/Revenue	0.0%	0.2%	0.2%	0.9%	0.4%	0.2%

Source: UNCTAD Secretariat calculations, based on data from port entities reporting to the TRAINFORTRADE PPS platform.

Abbreviations: CAPEX, capital expenditure; EBITDA, earnings before interest, taxes, depreciation and amortization.

Figure 4.11 Revenue and cargo throughput, 2016–2021
(median year-to-year percentage change across all ports)

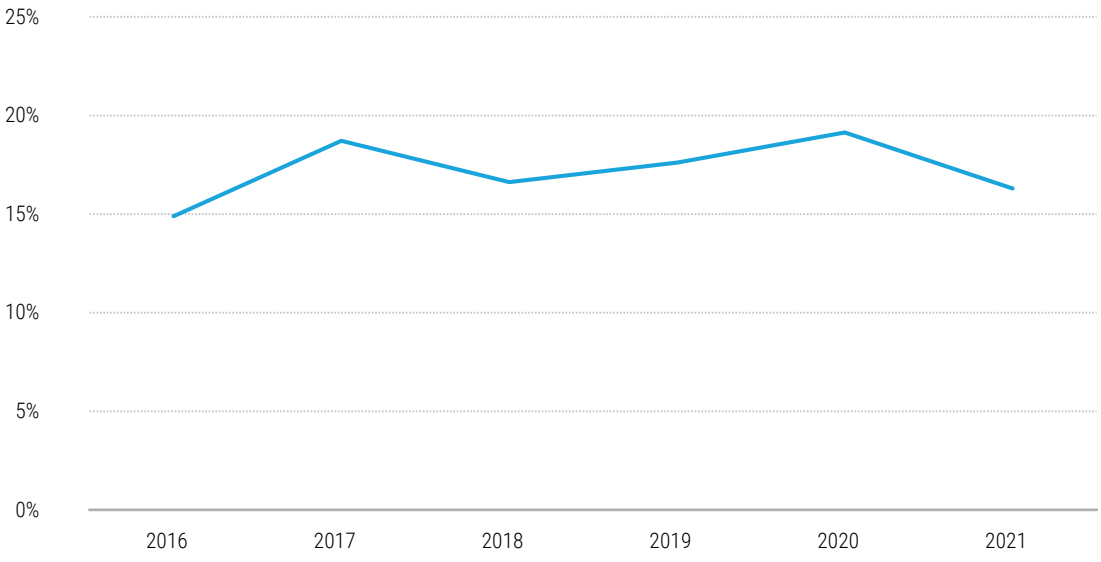


Source: UNCTAD Secretariat calculations, based on data from port entities reporting to the TRAINFORTRADE PPS platform.
Note: To minimize the bias due to data availability from reporting port entities. these charts look first at the dynamics of revenue and cargo throughput changes on every port and then at the median value across all ports.

Human resources

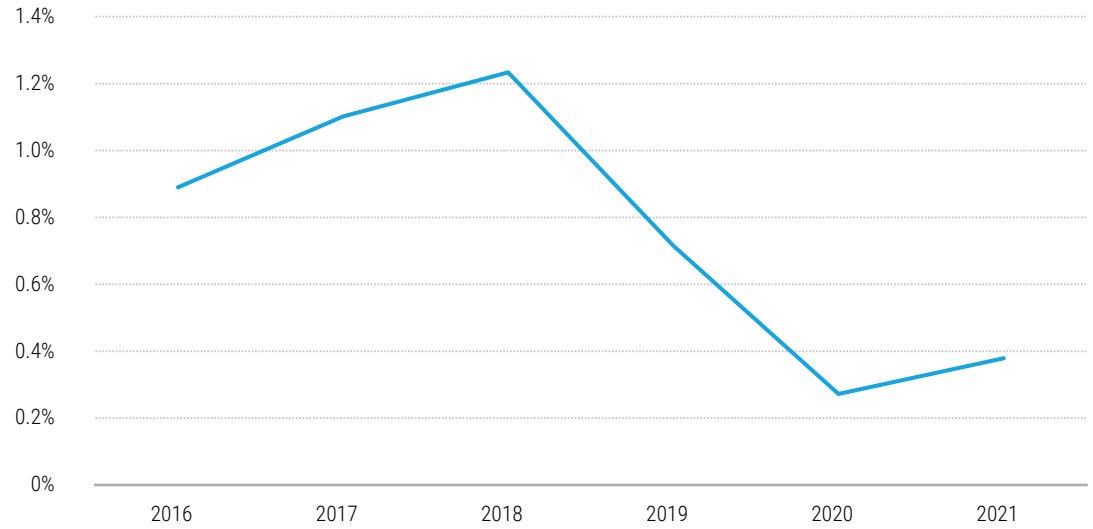
Figure 4.12 indicates that for contracted workers and port authority staff labour costs a proportion of revenue have been fairly consistent. But staff have been getting less training: since 2020, only a small proportion of labour costs have been for training (figure 4.13). The dip following the onset of the epidemic was partly due to fewer training programmes but also because most training went online thus reducing travel and logistical costs. This benchmark remains a valuable indicator as ports go through digitalization and decarbonization as it shows the scope for investing in employees.

Figure 4.12 Labour costs as a proportion of revenue, 2016–2021
(median across all ports)



Source: UNCTAD Secretariat calculations, based on data from port entities reporting to the TRAINFORTRADE PPS platform.

Figure 4.13 Training cost as a proportion of labour costs, 2016–2021
(median across all ports)

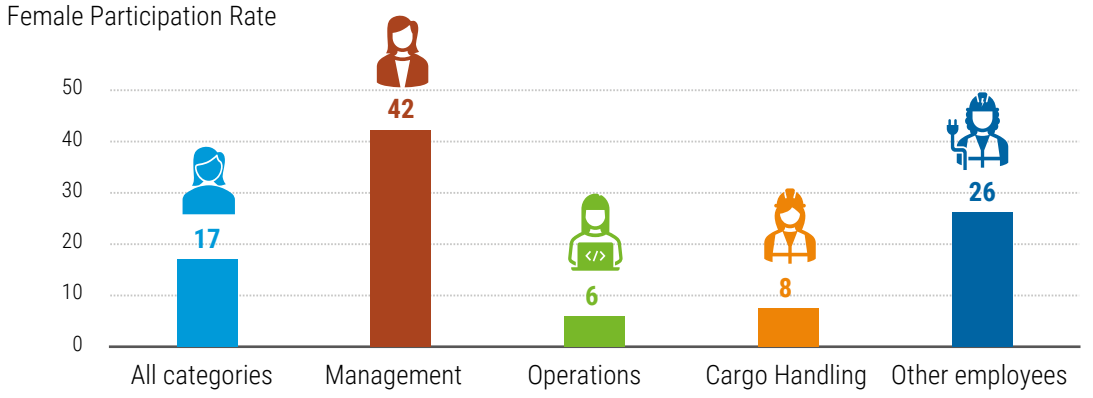


Source: UNCTAD Secretariat calculations, based on data from port entities reporting to the TRAINFORTRADE PPS platform.

Female participation in ports

The PPS disaggregates data by gender and shows that the port industry as a whole is still dominated by men. In 2021, the median value for female participation in port management was 42 per cent globally – and in Asia 60 per cent (indicator 12.1). However, women's participation rate in ports overall workforces remained low, at 17 per cent, and even lower for port operations at 6 per cent, and for cargo handing at 8 per cent.

Figure 4.14 Women's participation in port workforces, 2021
(median across all ports)



Source: UNCTAD Secretariat calculations, based on data from port entities reporting to the TRAINFORTRADE PPS platform.

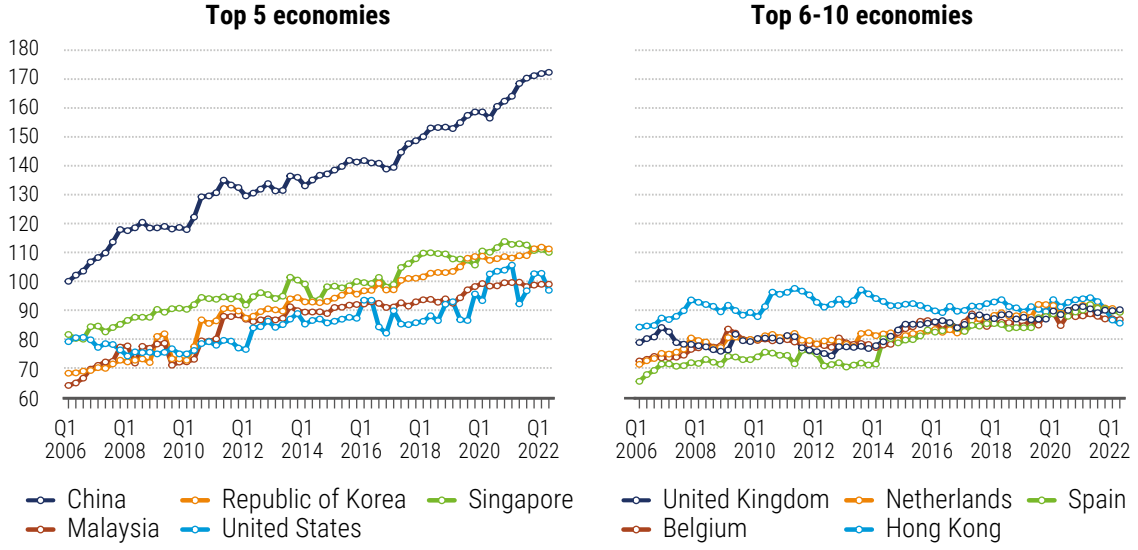
D. LINER SHIPPING CONNECTIVITY

This section focuses on port connectivity. In this regard, UNCTAD, in collaboration with MDS Transmodal, has prepared the liner shipping connectivity index (LSCI), which since 2020 has measured connectivity to the global liner shipping network at both port and country levels.[28]

1. China widened its lead while most other economies lost connectivity

In the second quarter of 2022, the four most-connected economies, with the highest LSCIs, were in Asia – China, Republic of Korea, Singapore, and Malaysia (figure 4.15). China widened its lead as it deployed more vessel capacity to the United States trade routes (figure 4.16). The United States, ranked fifth in the second quarter of 2022, had large fluctuations due to changes in maximum vessel size, but benefited from redeployment of vessels (figure 4.17).

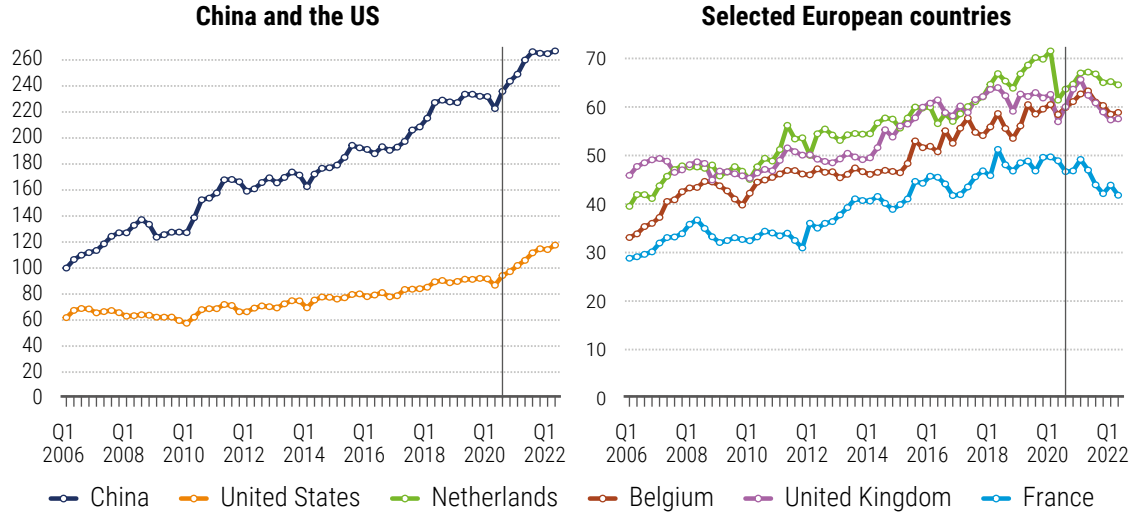
Figure 4.15 Liner shipping connectivity index, top 10 economies, 2006Q1–2022Q2



Source: UNCTAD, based on data provided by MDS Transmodal. For the complete data set for all countries, see http://stats.unctad.org/LSCI.

Note: Index is based on 2006Q1 = 100 in China. Top 10 economies as of the second quarter of 2022.

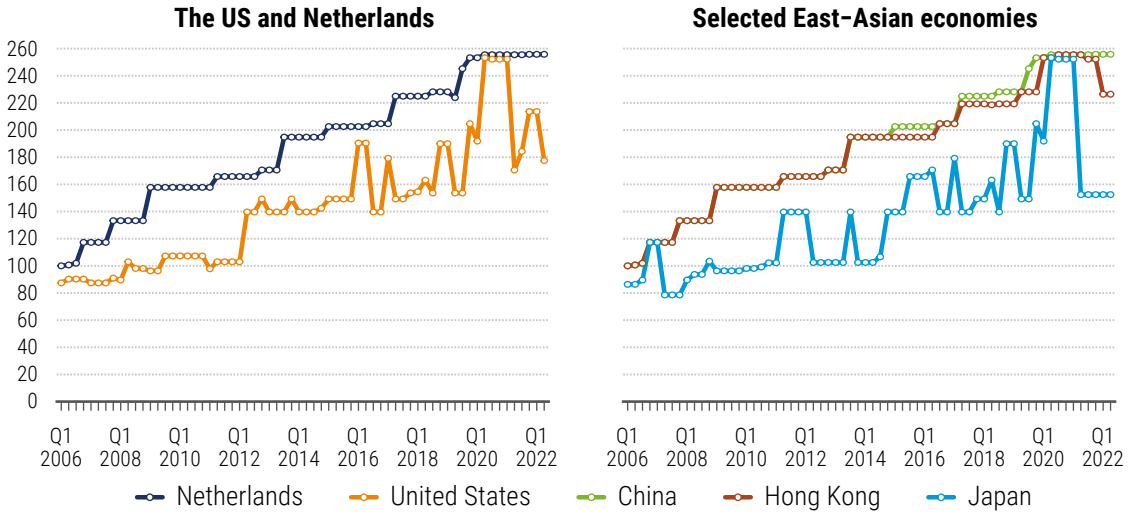
Figure 4.16 Deployed capacity of container ships, selected economies, from 2006Q1 to 2022Q2, index
(maximum value across countries in 2006Q1 = 100)



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

Note: Numbers are normalized by setting the maximum value across countries (i.e., value for China) as of the first quarter of 2006 to 100. Vertical lines in 2020 correspond to the worsening of port congestion.

Figure 4.17 Maximum capacity of container ships, selected economies, from 2006Q1 to 2022Q2, index
(maximum value across countries in 2006Q1 = 100)



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

Note: Numbers are normalized by setting the maximum value across countries (i.e., value for China) as of the first quarter of 2006 to 100.

Four European countries – United Kingdom, Netherlands, Spain, and Belgium – ranked sixth to ninth. Apart from Spain, they redeployed vessels to the China-US route (figure 4.16). France faced the same pressures. Although Spain increased capacity, it lost operators resulting in a decline in overall connectivity.

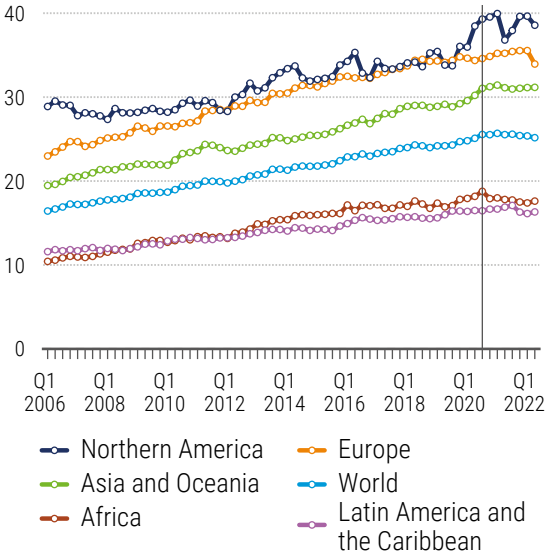
Hong Kong China dropped from fifth to tenth as large container vessels serving the China-EU route, started skipping this port (figure 4.17). Japan faced the same problem three quarters earlier; its rank dropped from 11th to 21st.

2. COVID-19 causes Sub-Saharan Africa and Latin America and the Caribbean to lose connections

The COVID-19 pandemic also reduced shipping connectivity even for some top performing countries. In the third quarter of 2020, worsening port congestion reduced the global average of the LSCI (figure 4.18). Europe continued improving until the first quarter of 2022, but it dropped steeply in the second quarter, mainly in Eastern and Southern Europe, due to the war in Ukraine (see section E). Northern America and Asia and Oceania, on the other hand continued their positive trends, led by China and the United States.

Connectivity also fell in Africa and in Latin America and the Caribbean. Between the third quarter of 2020 and the second quarter of 2022, the LSCI for Africa declined from 18.8 to 17.6 and for Latin America and the Caribbean from 16.5 to 16.3. In Africa, the average number of direct connections fell by 12.4 per cent, and in Latin America and the Caribbean by 13.5 per cent (figure 4.19). As shipping lines reassigned ships to the China-US routes, other States lost

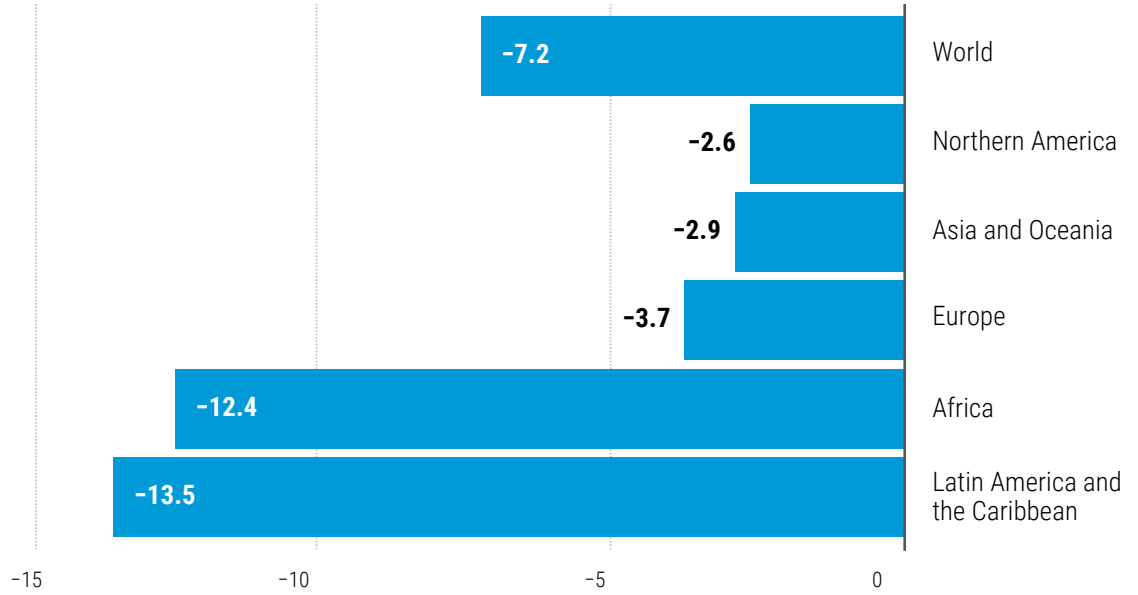
Figure 4.18 LSCI, world and regional average from 2006Q1 to 2022Q2



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

Note: Numbers are normalized by setting the maximum value across countries (i.e., value for China) as of the first quarter of 2006 to 100. For countries whose data are missing for a particular period due to a complete loss of liner shipping connections, such as Ukraine in the second quarter of 2022, their values are assumed to be zero.

Figure 4.19 Changes in direct calls by region, from 2020Q3 to 2022Q2, per cent



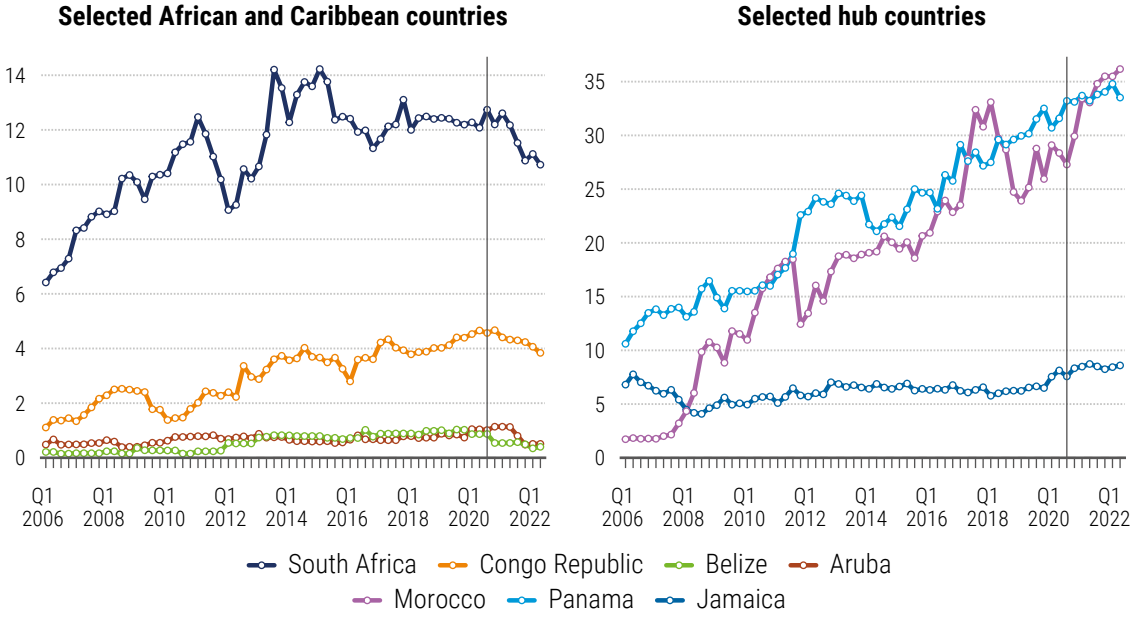
Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Numbers are normalized by setting the maximum value across countries (i.e., value for China) as of the first quarter of 2006 to 100. For countries whose data are missing for a particular period due to a complete loss of liner shipping connections, such as Ukraine in the second quarter of 2022, their values are assumed to be zero.

connectivity: South Africa and Republic of the Congo recorded container carrying capacity decline by 16 per cent, Belize by 54 per cent, and Aruba by 50 per cent (left chart of figure 4.20).

However, even in Africa and Latin America and the Caribbean regions, some hub countries increased vessel capacity. Panama's increased by 0.9 per cent, and Jamaica by 13.5 per cent (figure 4.20). Capacity in Morocco increased by 32.5 per cent, mostly driven by ongoing development of Tanger Med.

Figure 4.20 Deployed capacity of container ships, selected developing economies, from 2006Q1 to 2022Q2



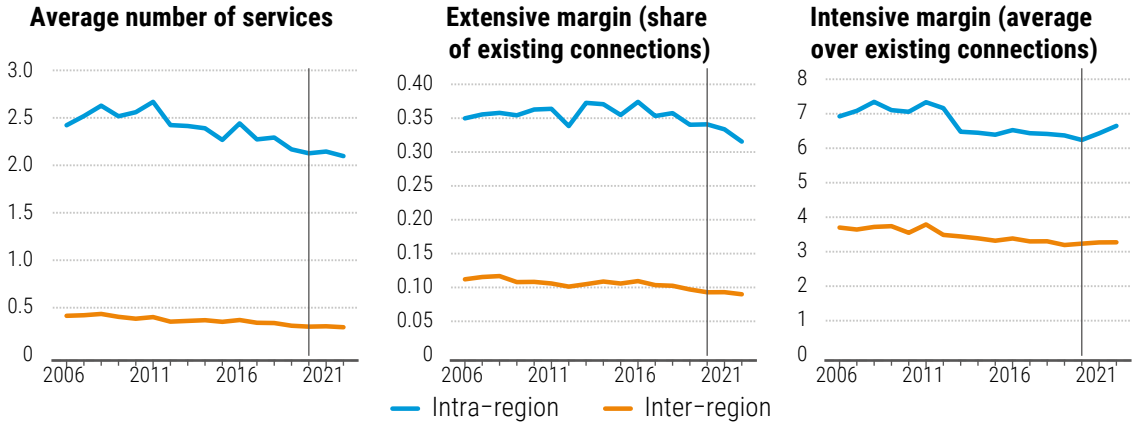
Source: UNCTAD, based on data provided by MDS Transmodal.

Note: Numbers are normalized by setting the maximum value across countries (i.e., value for China) as of the first quarter of 2006 to 100. For countries that suffered a complete loss of liner shipping connections, such as Ukraine in the second quarter of 2022, their values are assumed to be zero.

3. Most regions lose shipping connections

The pandemic may have shifted trade from global supply chains to regional ones. To examine this hypothesis UNCTAD has calculated the average number of liner shipping services across intra- and inter-regional country pairs. Overall, the average number of shipping services continued to decline both across intra- and inter-regional country pairs (left of figure 4.21). However, for intra-regional country pairs the loss was mostly for non-core pairs which suffered falls in their extensive margins (middle of figure 4.21). The extensive margin measures the share of connected intra-regional country pairs over all potential intra-regional country-pairs, and its decline indicates a complete loss of shipping services in thinly connected country pairs.

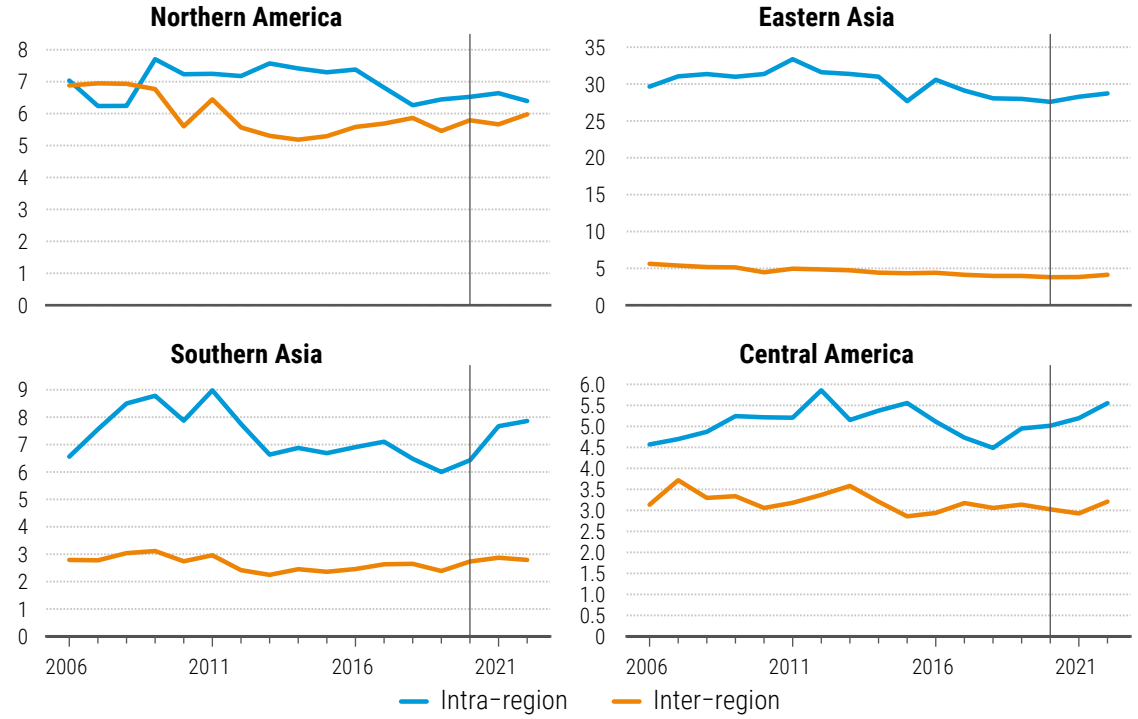
Figure 4.21 Average number of liner shipping services and its extensive and intensive margins, across intra- and inter-regional country pairs, global average, 2006 to 2022



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

Note: Annual data for the first quarter of each year. Intra-region is the average for trading partner countries within the same region, inter-region is the average for trading partners countries in other regions. The indicators are calculated for all countries and aggregated into global average.

Figure 4.22 Average number of liner shipping services over existing connections (intensive margin), by intra- and inter-region trade, selected regions, 2006 to 2022



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

Note: Annual data for the first quarter of each year. Intra-region is the average for trading partner countries within the same region, inter-region is the average for trading partners countries in other regions. The indicators are calculated for all countries and aggregated into regional average.

In contrast, shipping services have been strengthened for core trading country pairs, as indicated by an increase in their intensive margins (figure 4.21). The intensive margin measures the average number of shipping services between existing pairs, and an increase implies an improvement in existing connections.

Intra-regional shipping connections increased in Southern Asia – as India strengthened connections to Pakistan, Sri Lanka, China, the Republic of Korea, Malaysia, Saudi Arabia, United Arab Emirates and Singapore. Jawaharlal Nehru port and Mundra port in India secured several additional connections facilitated by port expansions and upgrades including the launch of dwarf-container train services.[29] Dwarf containers are lower by 660 millimetre than the normal containers, giving them a logistical edge. Connections have also been strengthened in Central America, mainly between Guatemala, Nicaragua, and Mexico.

Overall, however, between 2006 and 2021 the number of shipping services declined, partly due to consolidation of liner shipping companies and the trend towards larger container ships. This is posing a problem for developing economies, especially for those dependent on maritime transport such as small island developing States (SIDS) (box 4.1).

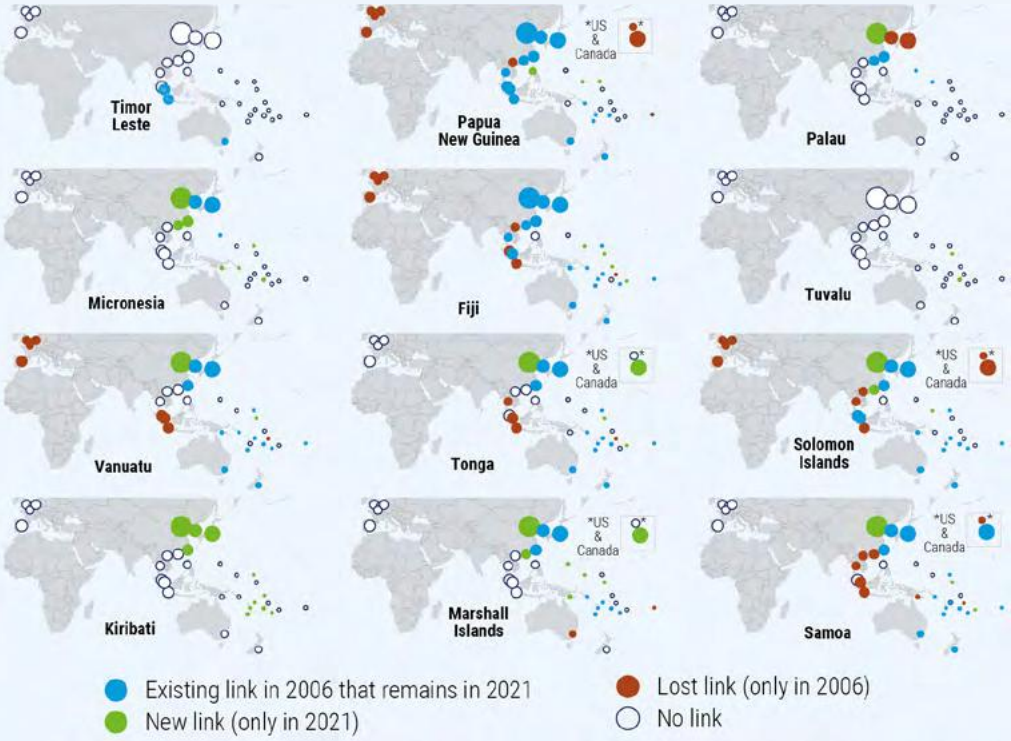
Box 4.1 Liner shipping connectivity in the Pacific SIDS

An UNCTAD-ESCAP study has assessed maritime connectivity in the Pacific SIDS – which have the world's lowest liner connectivity.[30] The best-connected States are the more populated ones with larger markets: Papua New Guinea, Fiji and Solomon Islands, which are regional transhipment bases. All the other States are among the world's least connected, with Kiribati, Tuvalu and Nauru in the bottom 10.

Pacific SIDS have direct connections with a few partners, mainly in Asia and the Pacific. In 2021, the best-connected State was Fiji, with 23 direct connections, followed by Solomon Islands (19), and Papua New Guinea, Tonga, Samoa, Marshall Islands (18), and Vanuatu (16). For the other States the number of direct connections varies between two (Tuvalu) and 12 (Micronesia and Kiribati). These direct connections are limited to the Asia-Pacific region, and mostly with other small States and territories.

A handful of States in Asia have direct connections with the Pacific SIDS: Japan, Republic of Korea, Taiwan Province of China, Hong Kong China, and China. Direct connections with ASEAN States are less common.

Direct links of selected Pacific SIDS. Circle size reflects number of calls (first half of 2021)
Direct* links between countries. Situation in 2021 and change with regard to 2006



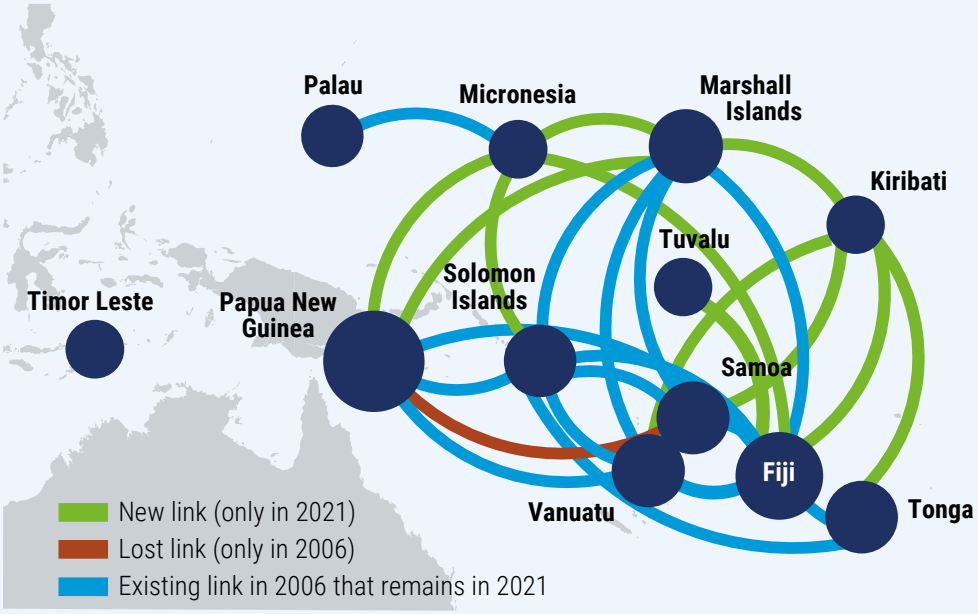
Circle size (number of vessel calls, 2021 S1) [MarineTraffic data].

* A direct link exists between two countries in a same vessel calls at ports in both countries. Based on MDST data.

China has recently become the main non-Pacific partner, with direct connections to ten Pacific SIDS. The States gaining new direct links between 2006 and 2021 were Kiribati, Micronesia and the Marshall Islands. Over the same period, Fiji, Solomon Islands, Papua New Guinea and Vanuatu lost their direct connections with Europe, and Samoa, Tonga and Vanuatu lost connections with South-East Asian countries.

Box 4.1 Liner shipping connectivity in the Pacific SIDS *(Cont.)*

Direct links between Pacific SIDS. Circle size reflects number of calls (first half of 2021)



Low connectivity results in high transport costs. On average, SIDS pay twice as much for international transport of their imports as do developed countries.

Another major challenge is to maintain frequent vessel connections. The Pacific SIDS attract very few container ship port calls, indicating a low frequency of shipping services. However, there are important intra-regional differences. During the period 2018–2021, for the first half-year, Papua New Guinea on average received 392 vessel calls and Fiji 165. At the other end of the scale, during the first six months of 2019, Kiribati received only 21 container ship port calls, fewer than a vessel per week. The other Pacific SIDS had similar numbers, ranging between 38 and 48.

When deciding how to deploy their ships, companies consider remoteness, the volumes of cargo and trade imbalances, port fees and infrastructure, and the level of transport facilitation. ESCAP and UNCTAD are helping countries to elaborate strategies for maritime connectivity, such as improving port infrastructure, and investing in port facilities, port efficiency and hinterland connections.

Contribution from ESCAP.

E. IMPACT OF THE WAR IN UKRAINE

The war in Ukraine has seriously affected shipping in the Black Sea region. This section quantifies these impacts based on port performance and connectivity.

1. Impact on port calls in the Black Sea region

After the onset of the war on 24 February 2022, weekly departures of ships from Ukraine's ports immediately dropped from 160 to around 10 (figure 4.23). They marginally recovered to about 30 by April and after the signing of the Black Sea Grain Initiative (BSGI) in July increased to around 100, but were still about 35 per cent below the pre-war period in September.[31]

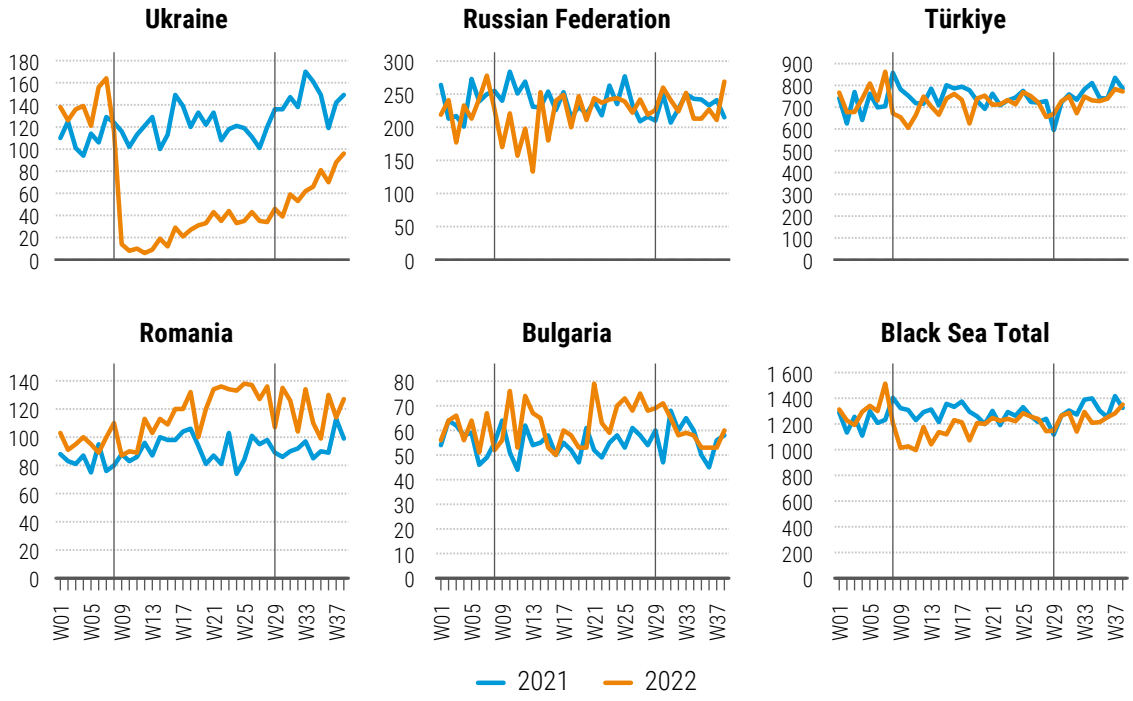
Departures from Black Sea ports in the Russian Federation also declined, from 280 to around 150, though by April had recovered to 250. Port calls in Türkiye dropped from 700–800 to 600, though by May had recovered to 700–800; since then for most weeks they have been around the corresponding week of 2021.

Some cargoes are transported from Ukraine to Romania by road, rail or barge, and then shipped from Romanian ports, particularly Constanta. As a result, Romania's port calls increased from around 100 to 120–140.[32] Given the ensuing congestion in Constanta, ports in Bulgaria have become a viable option for Ukrainian exporters and importers.[33]

Other Carriers from Ukraine turned to safer trade routes along the Danube River, departing from river ports such as Reni and Izmail, but since these cannot accommodate large dry bulk vessels generally carriers have been using small general cargo and multipurpose vessels (figure 4.24 and figure 4.25). Following the signing of the BSGI, more dry bulk carriers departed from major Black Sea ports – Chornomorsk, Odessa, and Pivdennyi/Yuzhny.

Figure 4.26 shows a typical shipping route from Ukraine for one general cargo ship, the Sparta. This vessel departed Reni on the Danube River on 3 July 2022[34] and used branch rivers to enter the Black Sea through Sulina in Romania. It visited Istanbul in Türkiye on 5 July 2022 and reached Abu Qir in Egypt on 8 July 2022.

Figure 4.23 Number of weekly departures of all cargo ships in the Black Sea region for international shipping, 1st week to 38th week in 2021 and 2022



Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

Note: X-axis represents departure week. The Russian Federation includes only ports in Black Sea. Black Sea Total includes Georgia and Moldova. The vertical lines indicate the start of the war in Ukraine in the eighth week of 2022 and the signing of the BSGI in the 29th week.

Figure 4.24 Composition of port calls in Ukraine by port, departure before and after the war and the BSGI

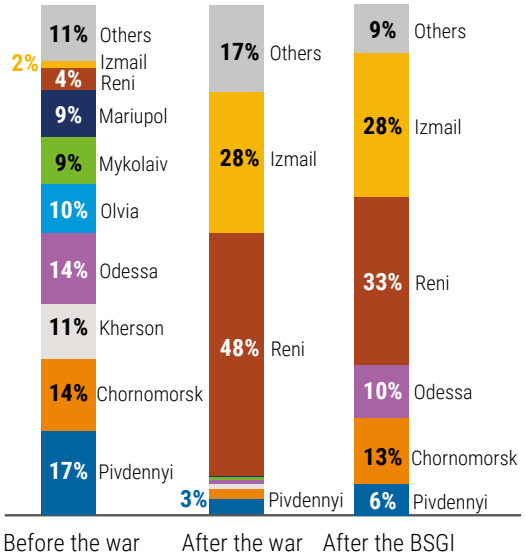
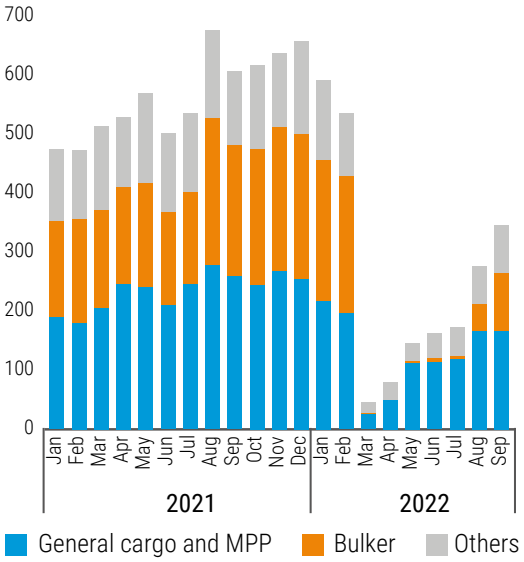


Figure 4.25 Monthly port calls in Ukraine by shipping sector, departure during January 2021 to September 2022



Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

Note: The period "before the war" refers to 1 January 2021 – 23 February 2022, "after the war" refers to 24 February 2022 – 21 July 2022, and "after the BSGI" refers to 22 July 2022 – 16 October 2022.

Figure 4.26 Typical shipping route from Ukraine after the war

Source: Sea/ (www.sea.live) and Google Map.

Note: A voyage of Sparta from Reni in Ukraine to Abu Qir in Egypt from 3 July 2022 to 8 July 2022.

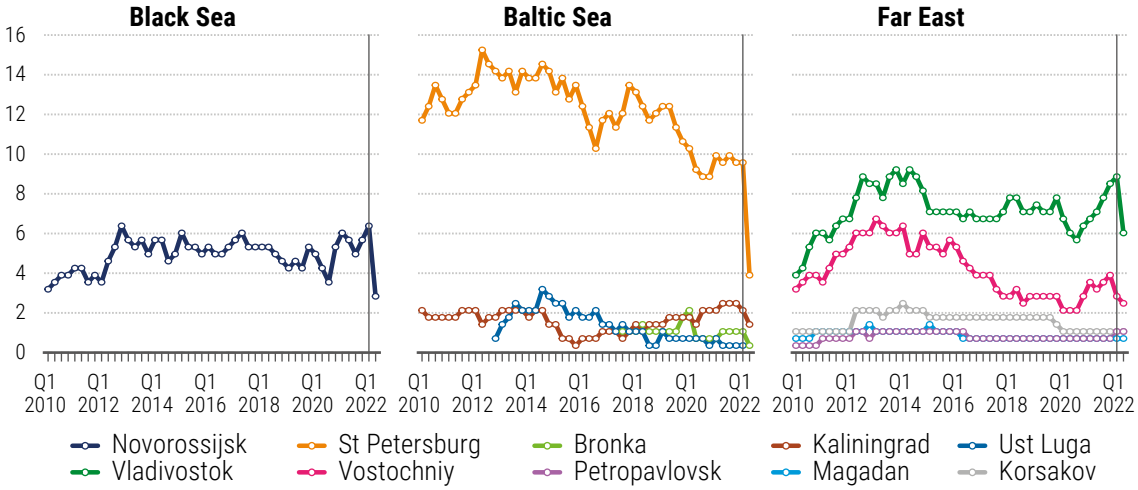
2. Impact on liner shipping connectivity in Ukraine and the Russian Federation

The war also reduced liner shipping connectivity in Ukraine and the Russian Federation. Due to safety concerns, Ukraine has been completely cut off, with the number of liner shipping services falling from 10 in the first quarter of 2022 to zero in the second quarter. Services for the Russian Federation have fallen by half.

As shipping companies limited their businesses in the area, the Russian Federation lost services not only in the Black Sea ports but also in Baltic Sea and Far East ports (figure 4.27). The number of liner services in St. Petersburg, the largest Russian port in the Baltic Sea, dropped by about 60 per cent, and those in Vladivostok in the Far East by about 30 per cent.

The decline in liner shipping connections with the Russian Federation was primarily with European countries (figure 4.28). Before the war, Germany was the largest partner country with a monthly average of 114 voyages, but that number fell to 32. For the Republic of Korea, the fall was from 96 to 73. On the other hand, Türkiye retained its monthly average at around 70 voyages, while China increased its average from 29 to 50.

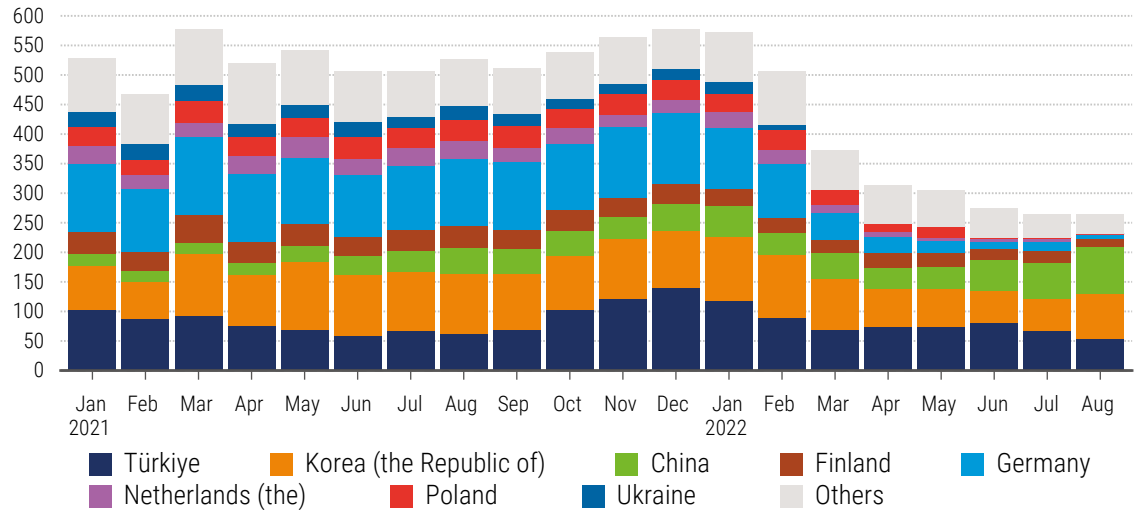
Figure 4.27 Number of liner shipping services, ports in the Russian Federation by region, index (maximum value across ports in 2006Q1 = 100)



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

Note: Excluding recently inactive ports and Northern ports.

Figure 4.28 Number of monthly voyages of container ships from and to the Russian Federation, by partner country



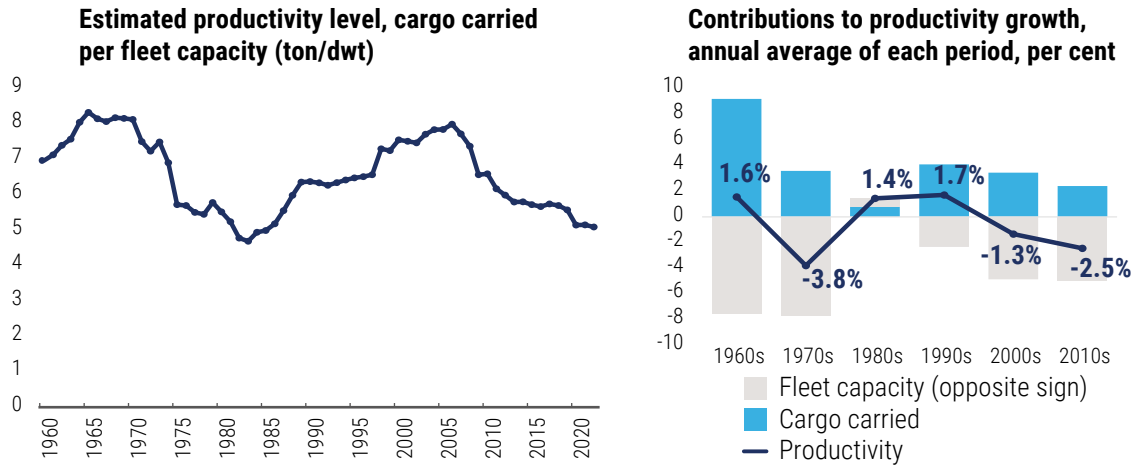
Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

F. PRODUCTIVITY OF THE WORLD FLEET

UNCTAD has estimated the operational productivity of the world fleet, in terms of cargo carried per unit of fleet capacity for the period 1960 to 2022. During the 1970s and early 1980s, deep recessions, including oil shocks in 1973 and 1979, reduced shipping costs, while fleet productivity declined by over one-third to around five tons per dwt of capacity (figure 4.29).[35] Productivity revived during the 1990s and early 2000s, following export-led global growth in Asia, only to decline again following the global financial crisis.[36] It continued to fall in the 2010s as fleet supply increased per year by about five per cent, while demand increased only by two per cent.

As indicated in figure 4.30, this fall was evident in all three major shipping sectors – oil tankers, dry bulk carriers, and container ships – though smaller for container ships due to market consolidation which reduced oversupply.[37] The trends were similar for chemical tankers and gas carriers. But it was a different story for other dry carriers as the limited supply of new vessels reduced fleet capacity. Between 2009 and 2021, cargo carried increased from 678 million to 940 million tons but the fleet capacity declined from 95.5 million to 92.5 million dwt.

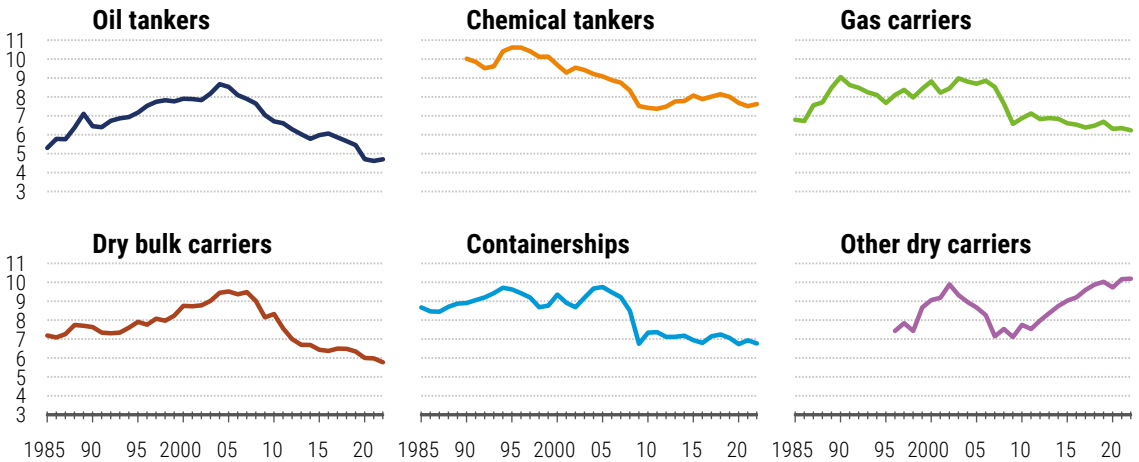
Figure 4.29 Operational productivity of the world fleet, all ships, 1960–2022



Source: UNCTADstat for fleet capacity for 1980-2022 and cargo carried for 1970–2022. Data before 1980 for fleet capacity and before 1970 for cargo carried are retrieved from earlier issues of *Review of Maritime Transport*.

Note: Fleet productivity (tonne per dwt) = cargo carried (tonne) / fleet capacity (dwt). Fleet capacity is in the opposite sign in the right-hand chart. Fleet capacity is as of 1 January of each year. Cargo carried in 2022 is forecast by UNCTAD.

Figure 4.30 Operational productivity of the world fleet, by fleet sector, available years for 1985–2022, cargo carried per fleet capacity (ton/dwt)



Source: UNCTAD, based on data provided by Clarkson Research Services (Shipping Intelligence Network and several issues of Shipping Review and Outlook).

Note: The estimated productivity level is slightly higher than the estimated productivity in figure 4.29 due to the difference in data sources. Cargo carried in 2022 is forecast by Clarkson Research Services.

With container ship capacity expected to grow by 7.9 per cent in 2023, productivity will decline further.[38] But for dry bulk carriers fleet growth in 2023 is projected at only 0.4 per cent so changes are likely to be marginal, with a similar outcome for oil tankers with fleet growth of less than 2 per cent.[39] For bulk and oil tankers, demand continues to recover which should boost productivity, but given the war in Ukraine the outlook is uncertain.

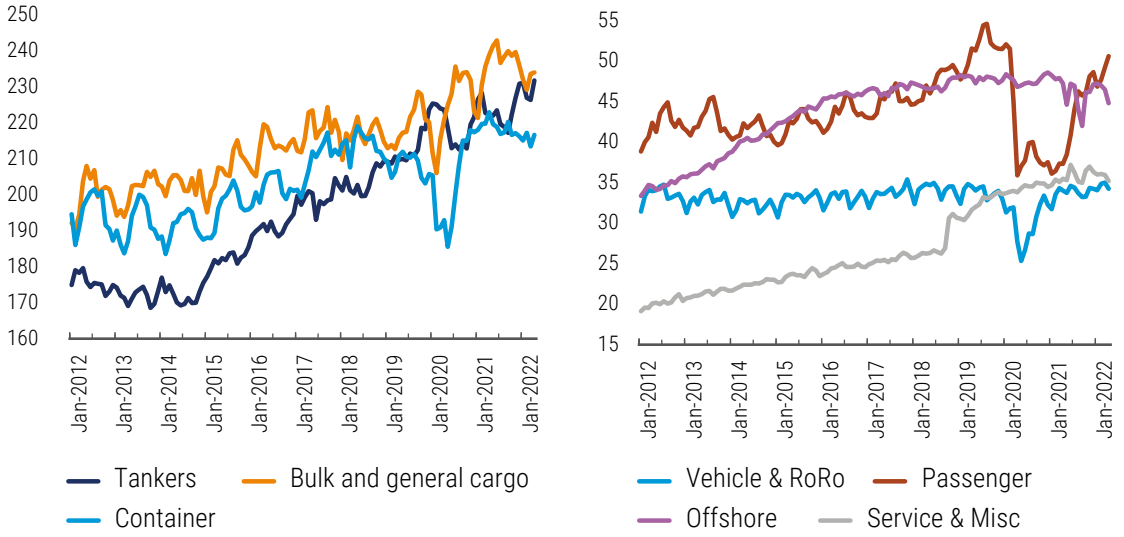
G. GREENHOUSE GAS EMISSIONS FROM THE WORLD FLEET

1. Pandemic stalls improvements in carbon intensity

Between 2020 and 2021, total emissions from the world fleet increased by 4.7 per cent, with most of the increases coming from container ships, dry bulk and general cargo vessels (figure 4.31). Emissions also increased from vehicle and Ro/Ro vessels and from passenger vessels. Increases were due primarily to a recovery in maritime transport work, with a 3.1 per cent increase in ton-mile seaborne trade in 2021, but emissions in grams of CO_2 per ton-mile – carbon intensity – also increased slightly.

During the previous decade there had been a steady reduction in carbon intensity (figure 4.32). Between 2012 and 2022, the carbon intensity of container ships fell by 21 per cent and that of bulk and general cargo vessels by 18 per cent. In contrast, for tankers the decline was only 1 per cent; tanker carbon intensity hit a bottom in August 2018 then peaked in October 2020.

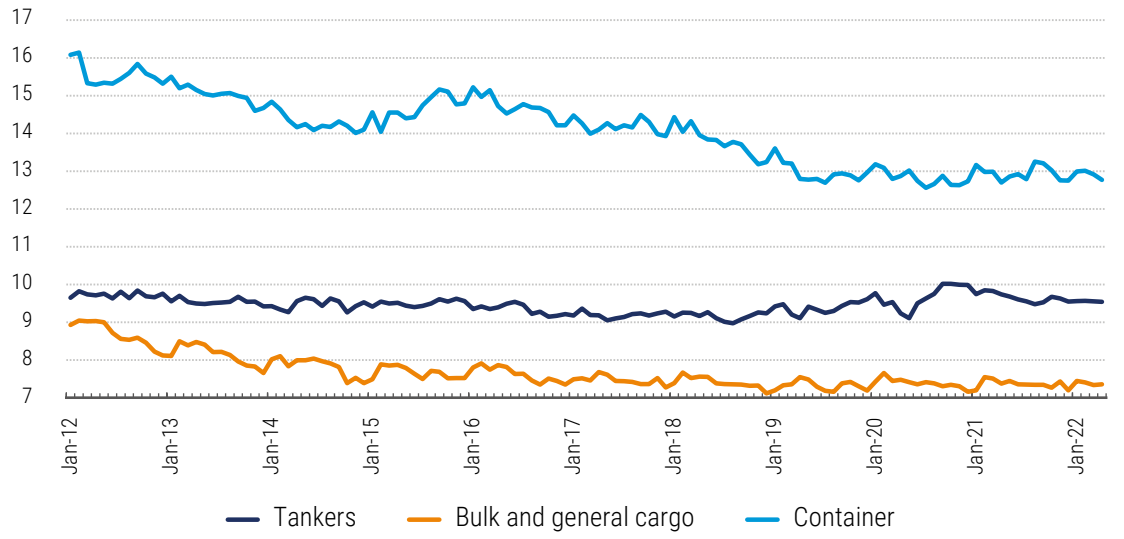
Figure 4.31 Total CO_2 emissions of world fleet by vessel type, annualized monthly, January 2012 to April 2022, million tons



Source: UNCTAD, based on data provided by Marine Benchmark.

Note: Service & Misc includes tug boats, fishing vessels and others. CO_2 emissions from vessel specific calculated bunker fuel from AIS.

Figure 4.32 CO_2 emission intensity by vessel type, monthly, gram per ton-mile



Source: UNCTAD, based on data provided by Marine Benchmark.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS.

Larger ships consume less fuel per cargo volume and, having generally been built more recently, have more efficient designs (figure 4.33).[40] Over this period, carbon intensity of container ships decreased by 3.3 grams of CO_2 per ton-mile. UNCTAD estimates that around half of the reduction in intensity for container ships can be explained by their increasing size. In a counter-factual scenario, where carbon intensity is fixed for each ship size segment, and only ship size composition is assumed to change, the carbon intensity should have dropped by only 1.7 grams of CO_2 per ton-mile (figure 4.34). In the second half of 2020, as major shipping lines redeployed vessels to the US-China route, small shipping lines and shippers moved in, which produced a slight increase in carbon intensity.

Another factor for carbon intensity is slow steaming. During economic downturns, ships sail slower to save fuel, so the pattern is cyclical (figure 4.34). The association is higher for larger ships than smaller ones (figure 4.35). Between 2015 and 2016 however, the benefit of slow steaming for transport efficiency was outweighed by a slow growth in demand.

Figure 4.33 CO_2 emission intensity of container ships by ship size, grams per ton-mile, 2021

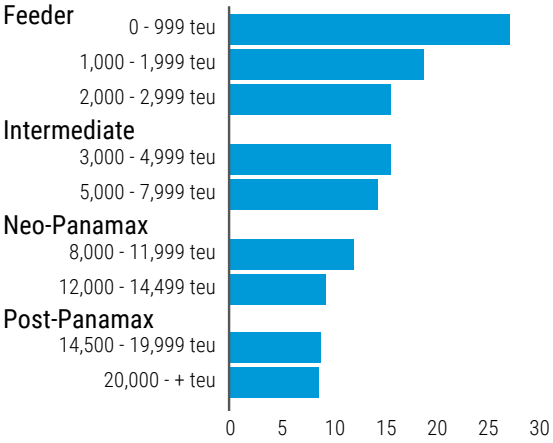
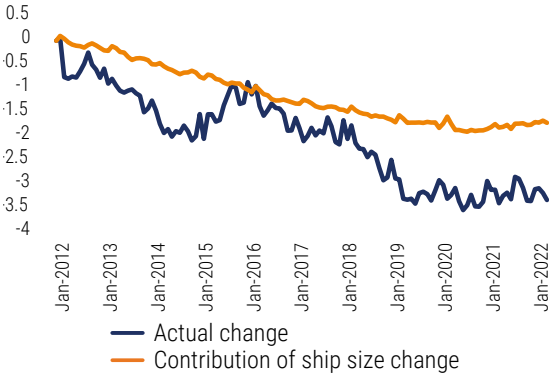


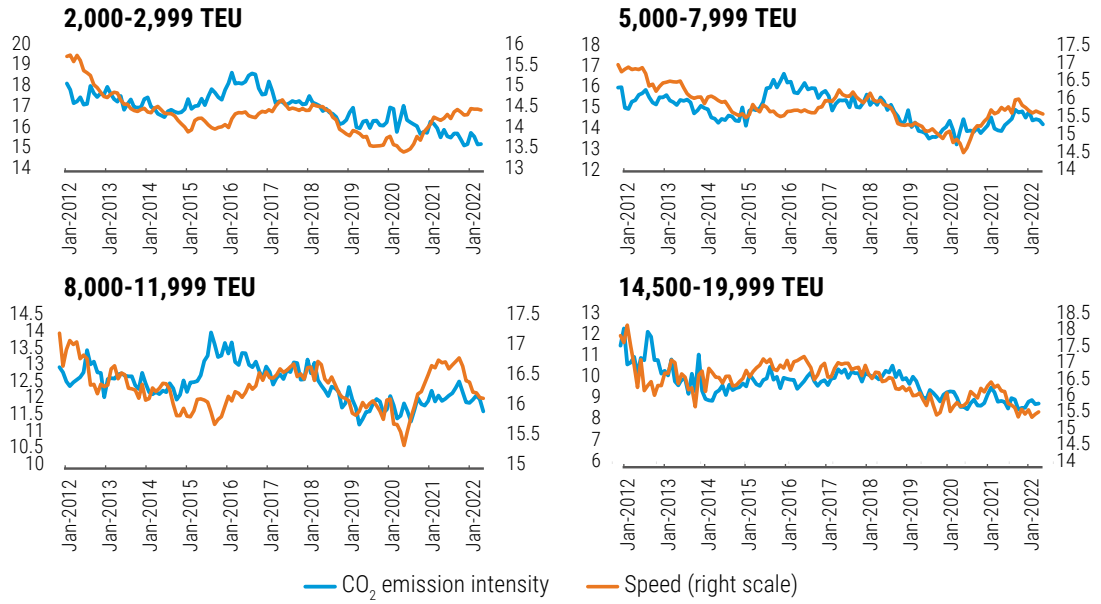
Figure 4.34 Cumulative change from January 2012 in CO_2 emission intensity, and contribution of ship size change of container ships, grams per ton-mile



Source: UNCTAD, based on data provided by Marine Benchmark.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS. Right-hand chart is an actual cumulative change in CO_2 emission intensity from January 2012 and contribution of ship size change. The contribution of ship size change is calculated by fixing the CO_2 emission intensity in each ship size segment at the value in 2021 and only changing the ship size composition.

Figure 4.35 CO_2 emission intensity and steaming speed of container ships, selected ship sizes, monthly, grams per ton-mile and knot



Source: UNCTAD, based on data provided by Marine Benchmark.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS. Steaming speed is average of voyages above 6 knots.

2. Flag State CO_2 emissions reflect fleet compositions

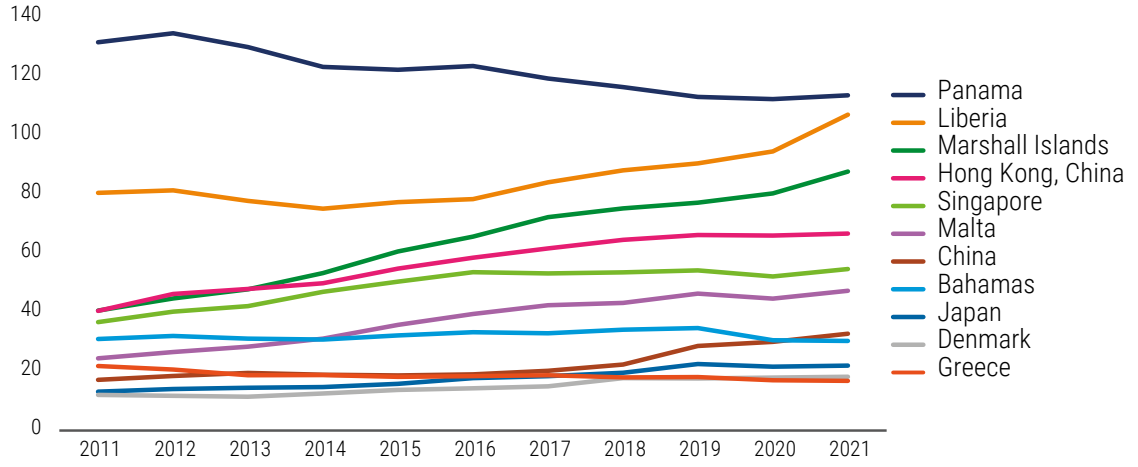
The International Maritime Organization target for 2050 is to reduce total annual 2008 GHG emissions by at least 50 per cent. The company Marine Benchmark has assigned total CO_2 by flag State based on the automatic identification system (AIS) tracking system. Over the past decade some of the largest increases, 33 per cent and 116 per cent, have been for Liberia and Marshall Islands due to their substantial increases in registered vessel capacities (figure 4.36). In contrast, emissions from Panama's flag ships have declined by 14 per cent because improvements in GHG efficiency outweighed the moderate increase in registered ship capacity.

In 2021, the flag States emitting the most CO_2 were Panama, Liberia, Marshall Islands, and Hong Kong China (figure 4.37). However, they had a smaller share of emissions than of capacity because they had a higher proportion of dry bulk vessels which tend to have lower emission intensities.[41] Japan's higher share in emissions is partly because it uses more general cargo vessels which generally have the highest emission intensities.[42] Similarly, Denmark has a high share of container ships which also have higher emission intensities.[43]

3. Carriers differ in their carbon intensities

Marine Benchmark and Xeneta have developed a global index system to assign CO_2 emissions per ton of cargo transported, by trade lane and by container carrier. This is based on real voyages using AIS data, including vessel dimensions and CO_2 emission per unit of fuel consumption, as well as the tonnage of cargo onboard, the speed, distance sailed, and port rotation. The results are shown in figure 4.38 for the major 10 carriers, anonymized as carriers A to J, for the Far East–North Europe trade lane. Over the last four years, the trend has been downwards, though with large differences between carriers. In the first quarter of 2022, the average carbon intensity for Carrier-J, for example, was about 30 per cent lower than that of Carrier-C.

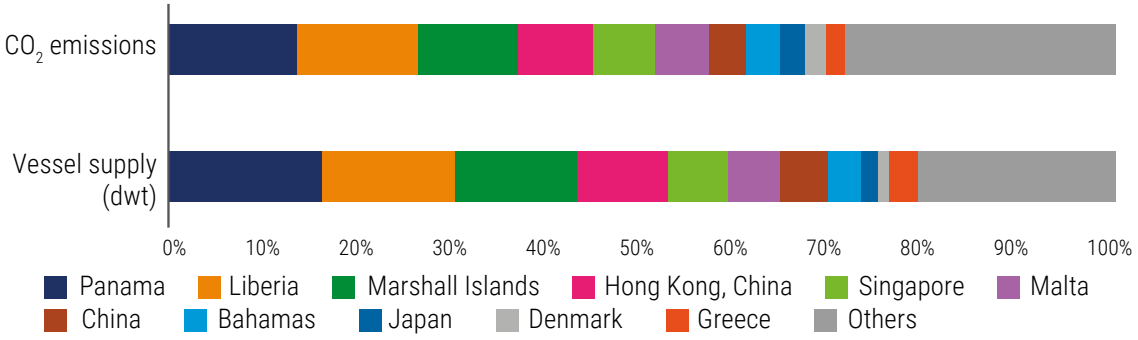
Figure 4.36 Total CO_2 emissions of the world fleet by flag state, annual, 2011 to 2021, million tons



Source: UNCTAD, based on data provided by Marine Benchmark.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS.

Figure 4.37 Main flag states' shares in world fleet CO_2 emissions (million tons) and vessel supply (dwt), 2021, percentage



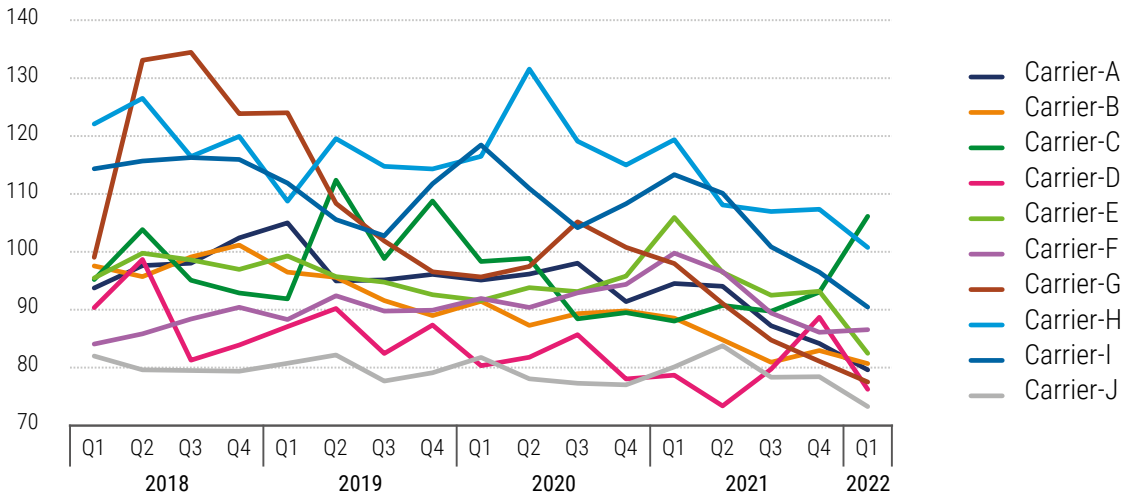
Source: UNCTAD, based on data provided by Marine Benchmark for CO_2 emissions and Clarksons Research for vessel supply.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS.

Carriers have different intensities because of differences in vessel size and age (figure 4.39). Generally, the larger and younger the vessel, the lower the carbon intensity. Carrier-G had the youngest vessels, and 96 per cent of those had electronically controlled engines; also, 83 per cent could use alternative fuels including LNG.[44] In contrast, Carrier-E had the oldest vessels of which 82 per cent had electronically controlled engines and none could use alternative fuels.

Figure 4.39 also shows how deploying larger and younger vessels and slow steaming have helped reduce emissions. Carrier-G attained the largest reduction – increasing average vessel size by 210 per cent, decreasing average age by 86 per cent, and reducing average speed by 23 per cent. However, only a few carriers increased vessel sizes or reduced average age. As discussed in chapter 2, carriers have been reluctant to invest due to uncertainty about environmental regulations, fuel and carbon prices, and technological developments.

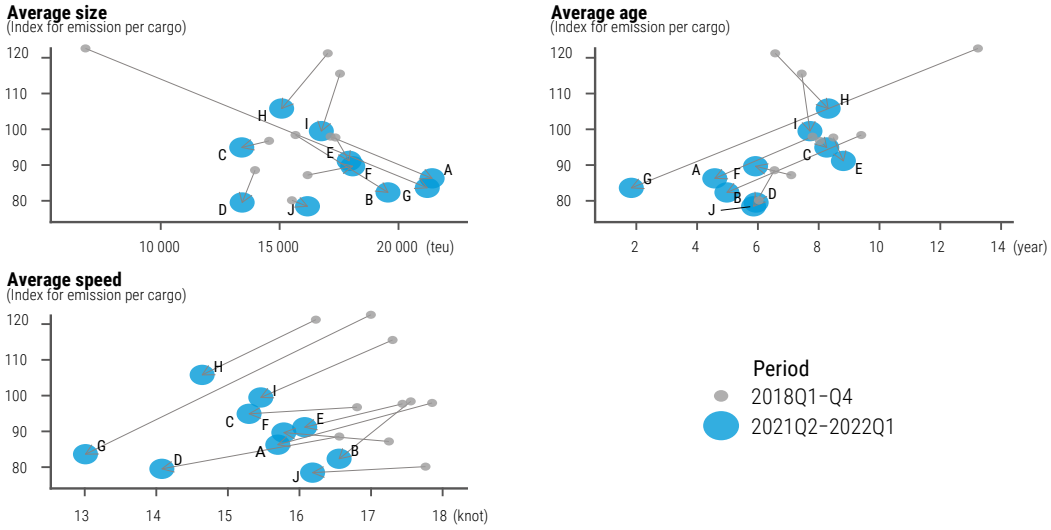
Figure 4.38 Average CO_2 emissions per ton cargo transported of container ships on the trade lane from Far East to North Europe for ten major carriers, quarterly, index (average across carriers in 2018Q1 = 100)



Source: UNCTAD, based on data provided by Marine Benchmark and Xeneta.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS.

Figure 4.39 Average CO_2 emission per ton cargo transported, vessel size and age, and steaming speed of container ships on the trade lane from the Far East to North Europe for ten major carriers (Carriers A-J), averages over 2018Q1–2018Q4 and 2021Q2–2022Q1, index (average across carriers in 2018Q1 = 100), TEU, year and knot



Source: UNCTAD, based on data provided by Marine Benchmark and Xeneta.

Note: CO_2 emissions from vessel specific calculated bunker fuel from AIS. Based on vessels assigned to the trade lane from Far East to North Europe. Steaming speed is average speed above 6 knots.

4. From 2023, IMO regulations will encourage slower speeds and retrofitting energy saving technologies

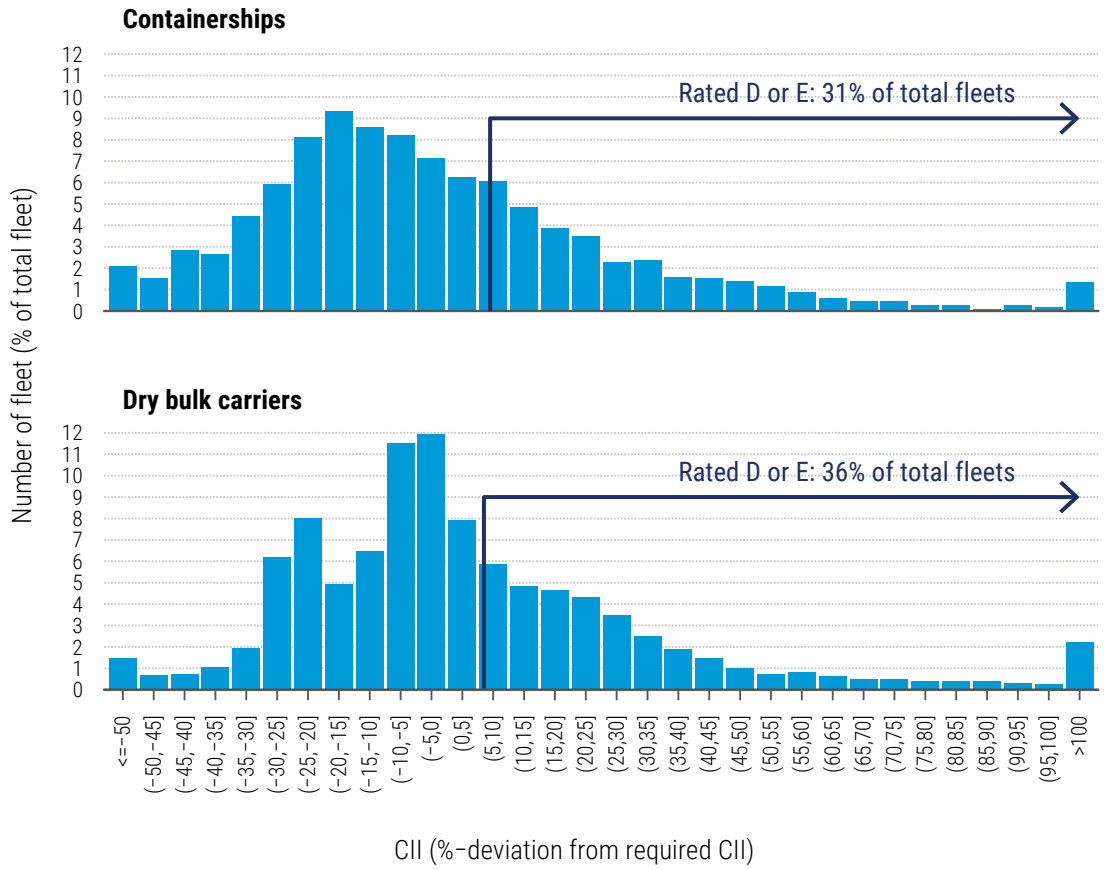
From January 2023, IMO will implement regulations for existing ships. These are based on two indices, the first is the energy efficiency existing ship index (EEXI) which addresses energy efficiency of ship design including retrofitting. The second is the carbon intensity indicator (CII) which deals with the ship's operational energy efficiency. Ships are required to achieve a certain level of energy efficiency based on these indices.

The EEXI regulation would encourage carriers to steam more slowly and retrofit energy-saving technologies. Around 65 per cent of the fleet capacity of tankers and bulk carriers is already compliant with the EEXI although some need to undergo engine power limitation.[45] Other vessels would be required to slow down or fit new technologies.

To analyse the potential impact of the CII regulation, UNCTAD has compared actual and required CII for container ships and dry bulk carriers in 2021 (figure 4.40). Most container ships were CII-compliant while 31 per cent would be rated D or E. For dry bulk carriers, the share of rate D or E vessels was estimated at 36 per cent. This result is consistent with the conclusion from Clarksons Research that 42 per cent of the existing tanker, bulk carrier and container fleets would be rated D or E in 2026 if they had not modified their speeds or specifications.[46]

A vessel with a D rating for three consecutive years or an E rating in any one year would not comply. Owners are required to implement corrective plans, but there is no significant penalty if they do not. The regulations will be more effective if shippers and consumers require vessels with higher environmental standards.

Figure 4.40 Distribution of percentage deviation of actual CII from required CII, individual fleets, per cent of total fleet, 2021



Source: UNCTAD, based on data provided by Sea/ (www.sea.live).

Note: Ships of 5,000GT and above. Required CII reference line is calculated as 1984 * vessel's capacity (in dwt) ^ -0.489 for container ships and 4745 * min (vessel's capacity, 279,000) ^ -0.622. Required CII in 2021 is two per cent below the reference line, and the threshold for D rating is seven per cent higher than the required CII for container ships and six per cent higher for dry bulk carriers. Actual CII is Annual Efficiency Ratio (AER): CO_2 emissions per dwt-mile. For the details of the CII regulation, see IMO, 2022a, 2022b, 2021, 2022c.

H. SUMMARY AND POLICY CONSIDERATIONS

The pandemic disrupted port operations almost everywhere, causing serious shortages of skilled port workers and delays in hinterland transport and upstream supply chain operations. Port congestion was greatest in major trading lanes, but it had far-reaching cascading effects in other routes, through late arrival of vessels, container shortages, and withdrawal of vessel capacity for redeployment to the United States and China.

Problems have been exacerbated by "locally optimal" behaviour. To increase the efficiency of their services, liner companies in Northwest Europe, reduced the number of port calls, though this increased the average cargo exchange volume per port call, lengthening the time for terminal work and adding further pressure to the main ports.

Some regions managed the crisis better than others. North Africa did so by developing port infrastructure. India strengthened and upgraded port capacity and launched dwarf-container train services. Performance of container ports in the US West Coast in contrast, suffered from long-term underinvestment in infrastructure.

The findings in this chapter suggest the following policy implications:

- **Strengthen coordination across stakeholders** – Maritime shipping involves complex networks, that require coordination. Stakeholders need to share information and prepare for negative cascading effects by developing "globally optimal" solutions. Such coordination should be supported by real-time digital platforms, using information from the AIS/GIS system and electronic single windows.
- **Boost resilience with better port infrastructure** – Port upgrades should be based on engagement with the private sector and be accompanied by improvements in hinterland connections. Future shipping demand should be carefully assessed, particularly for potential pandemic-related shifts in shipping and supply chain patterns.
- **Accelerate female participation in the port industry** – Relatively few women work in ports. As port congestion is partly due to a shortage of skilled workers, accelerating female participation will strengthen port resilience.
- **Encourage compliance with new IMO regulations** – Maximizing the effectiveness of the new regulations will require raising the awareness of stakeholders, including transport user companies and consumers.
- **Reinforce training opportunities, particularly for digitalization and decarbonization** – Further technological development will require continual upgrading of expertise, with more resources allocated to training.

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5

MARITIME TRADE FACILITATION

During the COVID-19 pandemic, ports and intermodal transport systems were unprepared for the surge in demand and this, combined with restrictions, on products and personnel, increased clearance times. These delays, and the congestion and the ongoing supply chain crisis, can be mitigated by better trade facilitation – which is very much the domain of the public sector, albeit often developed and implemented in public-private partnerships.

The pandemic highlighted the importance of electronic and digital solutions, including customs automation, and greater trade transparency. In response, UNCTAD and other international agencies have increased their support for trade facilitation, both for the required technology and for multilateral agreements.

This chapter has five sections:

Section A – Trade facilitation can lessen the supply chain crisis linked to port congestion.

Section B – Fast passage of medical supplies and other emergency goods requires specific trade facilitation measures at ports and at border crossings.

Section C – An ever-more digitalized economy depends on electronic solutions, including automation and creating visibility of logistics operations.

Section D – Complex maritime logistics systems depend on close cooperation between all stakeholders, users and providers, public and private, national and foreign.

Section E – Summary and policy recommendations.

A. TRADE FACILITATION HELPS DECONGEST THE SUPPLY CHAIN

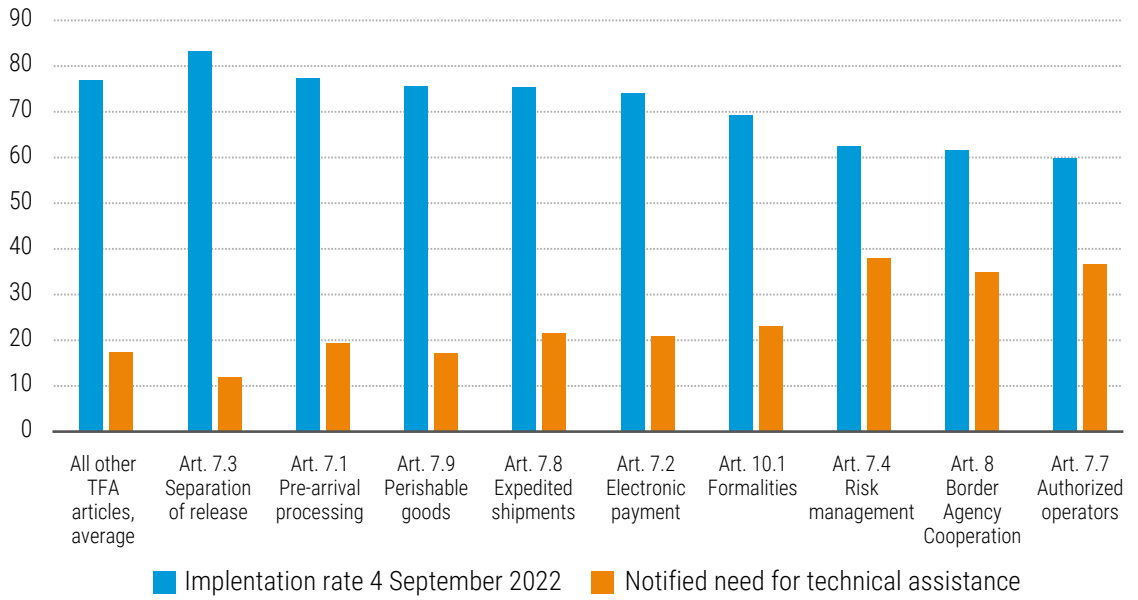
1. Port congestion is often the result of inefficient procedures

Faster and more efficient clearance depends on better trade facilitation. The WTO's Trade Facilitation Agreement (TFA) covers the following in the numbered articles:

- **Pre-arrival processing (7.1)**. Under this article, to expedite the release of goods, documents and information are to be provided to customs and other authorities prior to arrival.
- **Electronic payments (7.2)**. Traders and operators must have the option to make payments of duties, taxes, fees and charges electronically.
- **Rapid release** – Release should be separate from clearance **(article 7.3)**. Goods should be released as rapidly as possible, leaving the determination of payments of duties to a later stage.
- **Risk management (7.4)**. Customs and other agencies should focus on high-risk consignments and expedite the release of low-risk ones.
- **Authorized operators (7.7)**. Trusted and operators can obtain facilitated clearance, with the option of fast release and clearance at their premises, provided they give access to their internal IT systems and warehouses for subsequent audits.
- **Expedited shipments (7.8)**. Solutions include providing adequate infrastructure, paying customs expenses for expedited shipments, advance information processing and fee assessment, and the use of technology for internal security, logistics and tracking.
- **Perishable goods (7.9)**. Prioritized clearance for perishable goods that are particularly sensitive to delays.
- **Border agency cooperation (8)**. Authorities and agencies responsible for border controls and customs procedures should cooperate and coordinate their activities.
- **Formalities and documentation (10.1)**. Trade, technologies and requirements change over time, so it is important to regularly review and update all procedures. Authorities should always apply the least trade-restrictive measure available, and discontinue procedures no longer required.

These measures involve close cooperation among agencies and the private sector, often using the technology. Many countries have notified that they need technical assistance to implement the above mentioned WTO TFA obligations (figure 5.1).

Figure 5.1 Implementation of selected TFA articles that may help ease port congestion, percentage of members



Source: UNCTAD calculations, based on data from WTO TFA data base, https://tfadatabase.org/.

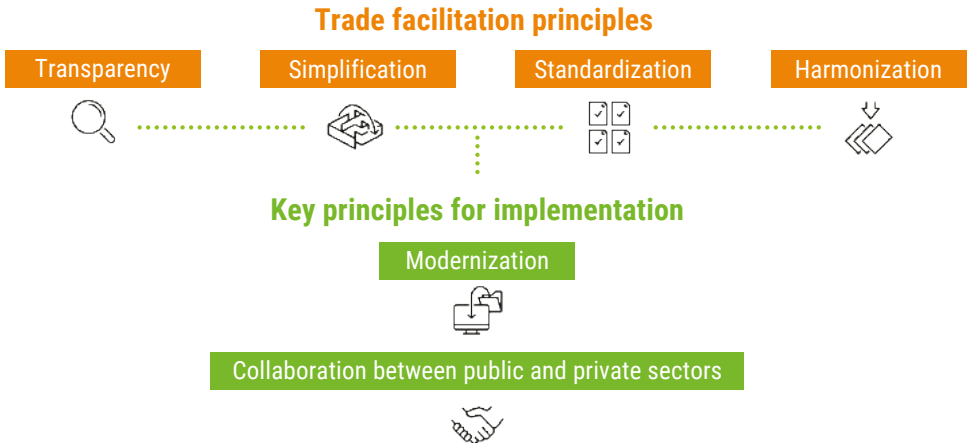
During COVID-19, there was a significant increase in median vessel turnaround time in ports, especially for container ships, which increased overall shipping times globally.[1] From 2020 to 2021, delays averaged more than one day (table 4.1). Delays are costly: the estimated additional days in transit for the average shipment in December 2021 can be compared to an ad-valorem tariff of 0.9 to 3.1 per cent, roughly equivalent tariff reductions achieved over the period 2003 to 2017. The crisis thus temporarily wiped out the benefits of the reducing or eliminating tariffs through a number of WTO negotiating rounds.[2]

For maritime companies, transit operators and traders, the delays in ports and in the related hinterland operations had multiple consequences. These included higher delay fees for berth and container storage, and longer idle times for vessels, port cranes, containers and transit vehicles. Moreover, shipping companies increasingly required cargo to be reloaded at ports from containers to transit vehicles, especially in developing countries – which not only added to trans-shipment costs but also risked cargo deterioration, especially for perishable goods.

2. Suggested solutions

Good trade facilitation operates on four fundamental principles: harmonization, standardization, simplification, and transparency (figure 5.2). Applying these principles to ports and hinterland transport procedures can reduce delays along supply chains, particularly in developing countries where ports have low handling capacities. The benefits are greatest in developing countries, and in low-income countries where they can reduce trade costs by 14 per cent.[3]

Figure 5.2 Four principles of trade facilitation



Source: UNCTAD Empowerment Program for the NTFCs.

The COVID-19 pandemic would have caused even worse delays and congestion in customs and seaports without advances in digital technologies. A good example of the benefits of such solutions is the UNCTAD ASYHUB[4] maritime platform which can help maritime transport and governments clear goods prior to arrival (box 5.1).

Box 5.1 The ASYHUB maritime initiative

The ASYHUB maritime initiative connects customs and cross-border regulatory authorities to global maritime systems. ASYHUB maritime piloting started in 2021 and the benefits to the trading community and ports have started to materialize.

- Simplified and automated processes for submitting sea-cargo manifest information through system-to-system interfaces.
- Re-use of data and automatic reconciliation, for seamless flow of information.
- Improved coordination of ports and border agencies for controls and information exchange.
- Real-time harmonized and streamlined information exchange between ship data providers and customs authorities.
- Capacity to process in advance sea-cargo data, pre-arrival or pre-departure.
- Advance risk analysis on cargoes.

Source: UNCTAD.

Cargo tracking systems that use real-time data provide transparency, predictability and certainty for traders while assuring regulatory agencies of customs compliance. With access to instant information, traders and border agencies can reduce bottlenecks, particularly for cargoes that involve hinterland multimodal transport where delays add to port congestion. Landlocked countries are particularly exposed, with transit routes that require passage through ports and one or more borders.

A recent advance has been the development of an electronic version of the Transports Internationaux Routiers (TIR) carnet (box 5.2). This speeds up trade procedures at ports by providing advance cargo information and allows for real-time exchange of data for multimodal transport.

Box 5.2 Multimodal aspects of eTIR

The Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention, 1975) allows goods to be carried under the cover of a TIR carnet as long as part of the journey has taken place by road. Intermodal transport could involve a subcontractor, and an authorized consignor-consignee.

A subcontractor is crucial in the following circumstances: a) intermodal transport to enhance the efficiency of the transport operation; b) new TIR contracting parties such as India; c) for technically complex transport operations such as the transport of live animals.

Using authorized consignors and consignees provides practical benefits both for customs and trade: (a) formalities can be done outside the working hours of customs offices; (b) controls at the start and end of TIR operations are further minimized; (c) customs procedures are faster and more focused on high-risk consignments; (d) the workload of the customs authorities is reduced; and (e) shorter waiting times for transport operators.

In various countries, ro-ro lines have demonstrated that TIR carnets can be used for intermodal transport. However, the use of paper TIR carnets still raises concerns, particularly when containers are transported by ship. The shipping industry and ports around the world have efficient computerized systems but these do not easily integrate paper documents.

The eTIR system helps resolve these issues. A seamless TIR information flow allows all actors along the route to obtain the information they require, not only in electronic form but also, in most cases, prior to arrival. Submitting the declaration in electronic form allows TIR carnet holders to submit declarations at distance.

Source: UNECE.

B. EMERGENCY RESPONSES: TRADE FACILITATION FOR CRITICAL GOODS

1. Policies for pandemics

During the COVID-19 pandemic, containers and trucks delivering masks and vaccines were often stuck at ports. These blockages can be avoided by trade facilitation that ensures effective control while also reducing the time and cost of checks for delivering medical and other urgent supplies.

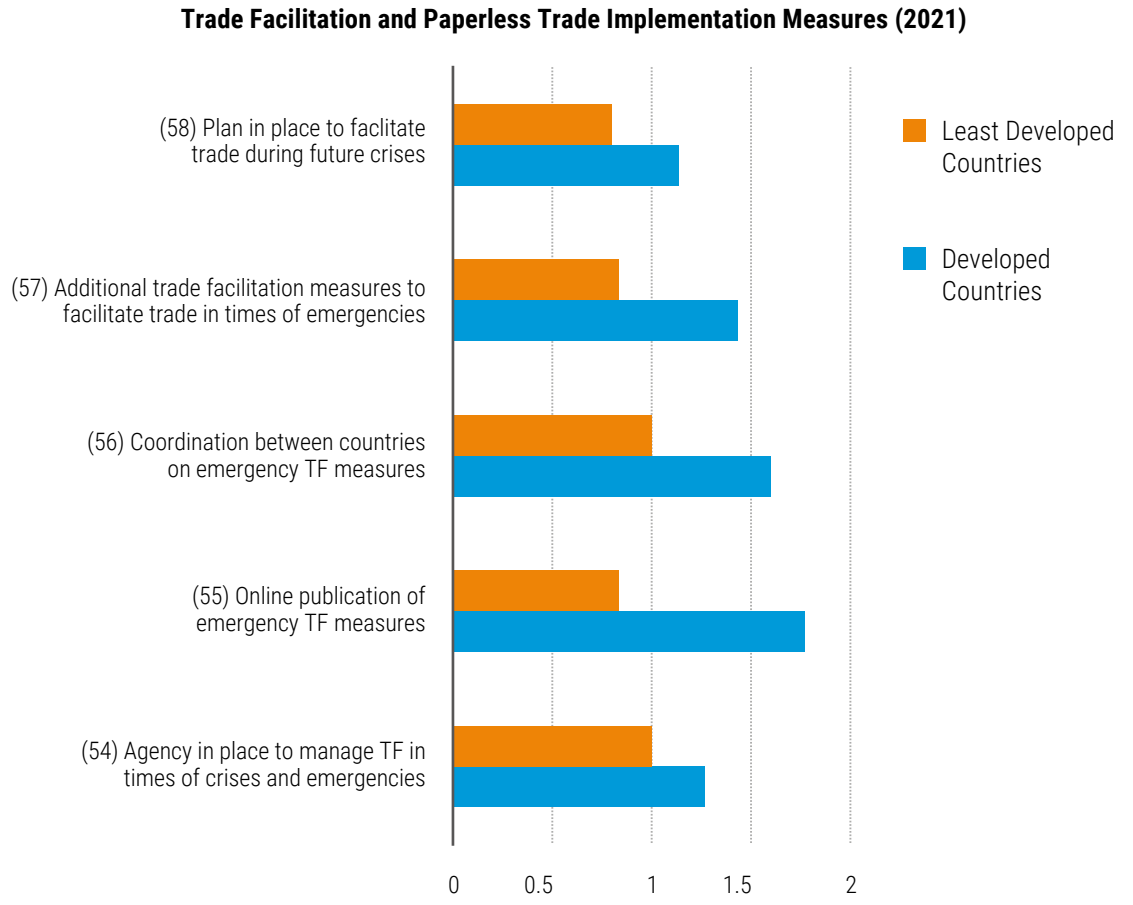
Border agencies can better prepare for any crisis by implementing the relevant international and regional frameworks. These include the Trade Facilitation Agreement (TFA), the Agreement on Technical Barriers to Trade (TBT), and the Agreement on Sanitary and Phytosanitary Measures (SPS), all governed by the World Trade Organization. In addition, there is the Convention on Facilitation of International Maritime Traffic (FAL) of the International Maritime Organization, and the International Convention on the simplification and harmonization of Customs procedures (Kyoto Convention).

2. Unprepared and un-coordinated policy responses

Countries that were more advanced in the digitalization of their trade procedures were able to react faster.[5] A recent report by UNESCAP identified five trade facilitation measure that smooth the flow of goods at times of crisis.[6] These include planning to facilitate trade during future crises, and online publication of emergency measures. The extent to which such measures are implemented varies greatly between countries, and is notably lower in Least Developed economies which responded more slowly to the crisis (figure 5. 3).[7]

During the COVID-19 pandemic, many people have been deprived of medical goods and other urgent supplies. This has happened for a number of reasons.

Figure 5.3 Degree of implementation of trade facilitation measures related to crisis, by the developed economies and the least developed countries



Source: UN Global Survey on Digital and Sustainable Trade Facilitation.

a. No regulations for emergency responses

Many countries do not have regulations or procedures to fast-track clearance for emergency supplies. Vaccines and medical equipment often face administrative hurdles such as VAT charges on humanitarian consignments or requirements for certificates of origin.

Countries frameworks should comply with the regional and national regulations and with international standards such as Recommendation No. 44, adopted by the UN/CEFACT in 2021, on Cross-Border Facilitation Measures for Disaster Relief.[8] Implementation should be coordinated by National Trade Facilitation Committees (NTFCs), with the primary implementing agency being the customs authority working with the ministry of health and the relevant non-government organizations.

National committees will need to monitor changes in international agreements. The relevant policies and international legal frameworks for import and customs clearance of relief items during natural disasters are currently being reviewed by the IMPACCT Working Group, led by OCHA. The WCO Kyoto Convention is also under review and one proposal is for fast-tracking of the relief consignments.

b. Restrictive trade policies

In times of crisis, countries sometimes limit the export of medical supplies. In March 2022, as reported by WTO, there were 98 measures that prohibited or restricted exports of medical and emergency goods.[9]

World Customs Organization nomenclature provides six-digit codes for classifying traded goods on a common basis. But this does not define the list of essential goods, which makes it difficult for national authorities to apply special customs treatment. However, there is some agreement on food supplies: in June 2022, the WTO agreed not to impose export prohibitions or restrictions on food purchased by the World Food Programme.[10]

c. Lack of preparedness

All countries need crisis-response plans for trade facilitation. To assist in this endeavour, UNCTAD has developed the methodology for a 'Rapid Scan of Trade Facilitation preparedness in times of crisis'. This allows developing countries and LDCs to assess national emergency regulations on cross-border trade and supply chains. It also covers compliance with trade-related regulations, coordination structures and partnerships, and information availability and transparency, as well as potential solutions. For these scans, UNCTAD can assist through ICT tools such as the ASYCUDA customs management system, the trade Information portals, and Reform Tracker – a web-based project management and monitoring tool. By late 2022, five countries had undertaken a Rapid Scan – Bolivia (Plurinational State of), Ecuador, Honduras, Mongolia, and Peru. All the recommendations and work plans are approved by the NTFCs and will be accessible on their Reform Trackers.

d. Inadequate infrastructure

Swift crisis response needs reliable infrastructure to deliver emergency goods on time and in good condition. Vaccines and other medicines may require a cold chain and while they may start their journeys on vessels with refrigerated containers, the chain may be broken in destination quays and hinterland transport in vulnerable regions – in the Pacific Islands, for example, or in zones affected by earthquakes or floods that are remote from ports.

3. Automated customs solutions for emergency goods

UNCTAD and OCHA have developed the Automated System for Relief Emergency Consignments (ASYREC). ASYREC[11] provides for coordinated, efficient and facilitated imports of humanitarian relief, and medical supplies (box 5.3). This is an inclusive and dedicated solution that is compatible with international standards and is compliant with automated customs systems.

Other initiatives include the Safe Trade Emergency Facility, launched by TradeMark East Africa. During COVID-19, this supports trade by making ports, border and critical supply chains safe for trade and ensuring food security and access to critical medicines. Safe Trade includes harmonization of safety and hygiene protocols, and rapid COVID-19 tests at ports, airports, and borders along with quarantine facilities and health offices and joint border committees. It can also track truck drivers, through the East African Community' Regional Electronic Cargo Tracking System. To ensure coordination and transparency, data collection on trade flows is centralized.

Box 5.3 UNCTAD Automated System for Relief Emergency Consignments

The Automated System for Relief Emergency Consignments (ASYREC) builds on existing international standards to provide automated and coordinated support to all key stakeholders, including port authorities, in the humanitarian supply chain – before, during and after emergencies. The first pilot was launched in May 2022 and is expected to be completed by the end of 2022.

ASYREC's expected benefits include:

- Automatic activation by the affected country's request or acceptance of international assistance.
- Eligible actors and humanitarian donors are registered in the system, prior to emergencies.
- Identification by customs administrations of humanitarian consignments, and distinction from non-humanitarian shipments.
- Shipments of eligible operators and registered ASYREC end-users are processed with priority, minimizing delays and reducing congestion in ports.
- Prioritized humanitarian consignments based on identified priority needs.
- Post-clearance audit controls and assessments of humanitarian operators' compliance, performed by customs and disaster management agencies.
- Configurable for implementation, independent of the operational customs or port IT systems, as online or standalone systems.

Source: UNCTAD.

The World Customs Organisation has taken initiative to facilitate the flows of emergency good and has compiled a list of Members' practices.[12]

C. TRADE FACILITATION FOR BETTER PORT PERFORMANCE

1. Adapting to re-shaped global value chains and new maritime business models

Responses to the supply chain crisis increasingly involve digitalization and smart technologies. Generally, this means embracing the 'fourth industrial revolution' through advances in interconnectivity, automation, machine-learning and the use of real-time data. As logistic companies have turned to digitalization, this has encouraged governments to install automate clearance and compliance processes. In turn, digital solutions help boost trade efficiency and competitiveness, and make countries more attractive to inward investment.

Coordinating digital solutions requires major changes in the organizational structure of government agencies which are more used to working in silos. Often, for example, there can be discrepancies between the need for speed and agility of the shipping and logistics industries and the administrative requirements for the clearance of goods. Governments should ensure that the laws and regulations for maritime and hinterland transport are consistent and adapted to the latest requirements.

India, for instance, has been under pressure from the business community to upgrade its ports. In response, the Government has instituted a national single-window system, with a unified portal for all clearances, enabling the country to remove 25,000 processes.[13] Other countries, often the least developed with less maritime trade traffic, still face major hurdles in implementing automated solutions as they lack the required financial support and technical assistance.

2. Digital solutions

The WTO TFA, which entered into force in 2017, has stimulated the introduction of digital solutions based on e-services and paperless systems using international standards and harmonized processes. Such reforms are part of overall national development plans that include e-governance and e-commerce, national ICT development, and customs and fiscal management. Carried out in a collaborative manner through public-private dialogues, such initiatives can significantly boost efficiency and sustainability. Such changes received a further impetus during the COVID-19 crisis and the war in Ukraine.

Research from UNESCAP on Cross-Border Paperless Trade shows that the full digital trade facilitation implementation beyond the WTO TFA could cut the average trade cost in the region by more than 13 per cent, seven percentage points more than that could be expected from implementation of the WTO TFA measures.[14]

In the current context of GVCs volatility, trade facilitation ensures speed, agility, resilience, and predictability in the trade processes by accelerating the automation. To achieve these improvements, governments are automating customs and trade procedures based on real-time data and centralized technology while also improving procedures for risk assessment. This is being done mainly in three areas, namely customs management, port communities, and transparency.

a. Customs management

For customs processes, the ASYCUDA management system is now being implemented in more than 100 States and territories, ASYCUDA improves efficiency and optimizes the use of government resources, and has reduced clearance times, and improved compliance while boosting public revenues. For instance:

- **Angola** – Revenue increased by 44 per cent.[15]
- **Bangladesh** – Revenue increased by 50 per cent.[16]
- **Jamaica** – In 2019, average application processing reduced to 28 hours and overall clearance times to an average of 32 hours.[17] In 2018 there was a 40 per cent improvement in submissions of manifests to the Jamaica Customs Agency.[18]
- **Timor-Leste** – The ASYCUDA-based Timor-Leste Electronic Single Window has reduced the average release time for commercial imports to four days. In 2020, 53 per cent of declarations were assessed and paid on the day of submission, compared to 6.5 per cent in 2015.[19]
- **ECOWAS** – The SIGMAT ASYCUDA Regional Transit system has facilitated trade, and acceptance by the trade community. Between 2019 and 2020, this system helped double the number of transit documents processed in the Abidjan-Ouagadougou corridor.[20]

Digital trade facilitation solutions, including the increasing use of the Electronic Data Interchange (EDI) and electronic single windows, respond to the needs for fast-tracking documentary requirements – breaking the silos among border agencies and maritime stakeholders and increasing general preparedness. This allows for better risk management of shipments and vessels prior to their arrival at ports and real time tracking increasing the level of preparedness of government agencies. Nevertheless, access to and sharing of data remain a challenge in many business communities. Companies can be reluctant to share confidential commercial information. This relates to a more general concern for security in the use of ICT and the need for protection from cyber-attacks on government networks and public websites.

Nevertheless, access to and sharing of data remain a challenge in many business communities. Companies can be reluctant to share confidential commercial information. This relates to a more general concern for security in the use of ICT and the need for protection from cyber-attacks on government networks and public websites.

Ultimately, governments have little choice but to adapt to the new global context. They are facing increasing demands from shipping companies for tracking systems and the integration of smart technologies in port management, as well greater expectations for online services and e-commerce. They also have to respond to changing global value chains and logistics routes, combined with a series of crises. If developing countries and LDCs are to invest in these technologies, however, they will need increased official development assistance, technical cooperation, and capacity building.

b. Port community systems and management

Digitalization and data interchange are reshaping port operations and organizational structures. This is leading to the creation of more port community systems (PCS). A PCS is an electronic platform connecting all the systems of a port or airport. It is a community system established, organized and shared by a group of organizations and agencies. A PCS can further connect the agencies in several ports, creating a community of ports.

To help ports adopt PCSs, UNCTAD offers its TRAINFORTRADE Port Management Programme. Since its inception over 20 years ago, TRAINFORTRADE has been working in more than sixty coastal and island countries across Africa, Asia, Latin America, and the Caribbean. The programme involves national steering committees with many stakeholders, including the port authority, the chamber of trade and commerce, the shippers' council, the shipping council, customs representatives and shipping lines (box 5.4). In partnership with TRAINFORTRADE, the Valencia Port Foundation, for example, has adopted technology-based crisis preparedness, and has improved sustainability and the continuity of cargo flows.[21]

Port community systems depend on close collaboration among stakeholders. Viet Nam's successful management of the pandemic has involved a comprehensive national digital transformation, in coordination with the business community, to develop a digital economy, including the digital infrastructure for Viet Nam as a logistics hub.[22] Another successful example is Ghana which uses digital solutions in government processes, such as a national ID system and digitalization of fiscal revenue collection.[23]

c. Transparency and visibility in the maritime supply chain

Smart technology has enabled data sharing and information flows over the trade facilitation ecosystem, allowing traders to better prepare, and plan for and address potential bottlenecks. Government agencies should offer correspondingly visible and transparent processes with trade portals and enquiry points for one-stop government desks, and have clear, coordinated approaches to trade facilitation measures, national or regional.

At the regional level, government can cooperate on maritime indices and regional freight observatories to collect data, monitor key performance indicators, and increase the visibility of freight handled at ports. In East Africa, for example, pandemic-induced measures and controls had caused bottlenecks in the hinterland connections. The East African Community responded with a trade portal built upon the UNCTAD step-by step methodology and published COVID-19 emergency guidelines and related procedures, allowing traders to prepare for requirements at border crossing points.[24]

In the maritime transport sector, governments and the shipping industry are closely interdependent, so reforms must be based on public-private collaborations.

Box 5.4 The port community of Canal Tamengo, Bolivia (Plurinational State of)

Canal Tamengo in Bolivia (Plurinational State of) is a partly artificial waterway which connects the town of Puerto Suárez and Caceres Lake with the Paraguay river in Brazil. The Port Community of Canal Tamengo was created in 2019 when Bolivia (Plurinational State of) granted international status to three ports along the canal – Gravetal, Aguirre, and Jennefer. These offer export access to the Atlantic Ocean. The purpose of the port community was to develop foreign trade and address issues such as dredging and removing water hyacinths that hinder navigation.

The main members are ports, shipping agencies, naval organizations, customs, migration authorities, the National Agricultural Health and Food Safety Service, and others including:

- The Japan International Cooperation Agency (JICA) – Together with the Bolivian Government, JICA is defining the financing for possible dredging of the Canal and removal of water hyacinths.
- The Ministry of Defence – Helps develop new regulations adapted to the operational reality of river ports.
- The Brazilian Navy – Has carried out joint actions for contingencies such as fires and removing water hyacinths.

The port community has established links with shipping agencies, logistics operators and importers and exporters using the Paraguay-Paraná waterway which also flows through Brazil, Argentina, Paraguay, and Uruguay. This has given Bolivia (Plurinational State of) a prominent role in foreign trade operations using this waterway.

Digitalization was accelerated by the health crisis, encouraging people to adapt more quickly to digital documents and digital signatures. To implement the new regulations, training had to be given, backed up by remote support lines.

As a result of the PCS, trade operators have real-time online information, and all the entities have their responsibilities defined to create better synergy. This has reduced customs release times – now averaging two hours for imports and one hour for exports.

Source: Port Community of Canal Tamengo, Bolivia (Plurinational State of).

D. PUBLIC-PRIVATE COLLABORATION

As supply chains and the links between ports and their hinterlands become more complex, trade facilitation requires closer collaboration between public and private-sector stakeholders. Once a ship has entered, or is scheduled to depart from, a port, all relevant stakeholders need to coordinate numerous processes, including customs clearance, the issuance and verification of permits, immigration issues, and general inspections.

1. Public-private schemes facilitate maritime transport

Public-private dialogue occurs in the following settings:

- **Maritime transport facilitation committees** – Created in the IMO FAL Convention, these coordinate government departments, other agencies, port authorities and shipowners to expedite international maritime traffic and prevent unnecessary delays for cargoes and crews. In 2022, the scope of national FAL committees was enlarged to include maritime single windows, stopping the trade in illegal wildlife, the reduction of greenhouse gas emissions, and the repatriation of seafarers during the COVID-19 pandemic.[25]
- **National trade facilitation committees (NTFCs)** – established under Article 23.2 of the WTO TFA, these facilitate domestic coordination and implementation of the TFA. Through participation in the NTFC, the private sector can monitor reform and offer positive feedback loops.
- **Port public-private partnerships** – PPSs manage port operations and develop new port infrastructure.[26] The private sector takes over project execution risks, while governments concentrate on other critical socioeconomic areas.[27] PCSs are also a form of public-private collaboration, enabling transparency and efficiency through the safe exchange of information.

Modern strategic port management implies broader coordination with other port services, logistics providers, and carriers, aiming to improve links between overseas countries and inland destinations.[28]

2. Working together to build resilience

All components of the ports sector must work collaboratively to manage and mitigate risks. ASEAN, for example, encourages flexible and comprehensive multimodal connectivity, incorporating alternative transport modes such as railways and road transport. To alleviate high freight costs, ASEAN also recommends information exchange and sharing among stakeholders via digital platforms and PCSs.[29]

To deal with the impact of COVID-19, ports have established dedicated task forces led by senior port officials and customs representatives. By mid-2022, Dublin Port's COVID Coordination Committee, for example, had met 115 times and issued 45 communication briefings, providing important advice and regular updates.[30] The port of Gothenburg similarly developed regular dialogues with the different port operators and stakeholders to keep the port operating. In Amsterdam, daily consultations in the port area addressed the impact of applied measures and the current state of play. In Antwerp, the dialogue was developed via daily meetings or with the local community.[31]

Some ports had sophisticated structures, including thematic subcommittees, to simplify cross-border trade and make the logistics chain more efficient. In Africa, regional schemes and border authorities established committees to coordinate guidelines and resolve border issues[32] NTFCs also helped connect ports with inland multimodal transport (box 5.5).

Box 5.5 Paraguay's hinterland resilience

As a landlocked country, Paraguay relies on ports in neighbouring countries, entailing long journeys that can face physical, operational, logistical, and diplomatic barriers. These problems were exacerbated by the COVID-19 pandemic. To keep goods flowing, Paraguay promoted public-private partnerships and technology. The NTFC, with broad participation from the public and private sector (38 active members), continued implementing the trade facilitation agenda, enshrined in the 2021–2022 work plan elaborated with UNCTAD support.

Inland waterway corridor

In 2020, drought in Paraguay and some parts of neighbouring Argentina and Brazil, resulted in historic low water levels. To allow the passage of barges exporting and importing supplies for agricultural production, as well as fuels and other essential goods, two hydroelectric dams co-owned by Argentina (Yacyreta) and Brazil (Itaipu) released more water.

Box 5.5 Paraguay's hinterland resilience *(Cont.)*

This operation required coordination between the Ministry of Foreign Affairs, the Ministry of Public Works, the two hydroelectric dams, the National Shipping and Ports Authority, and the Directorate-General of the Merchant Marine. It was also essential to have political engagement from Argentina and Brazil. In addition, there was participation from private stakeholders: the Paraguayan Grains and Oilseed Exporters Association, the Paraguayan Oilseeds and Cereals Processors Chamber, the Paraguayan Ports Terminals Chamber, and the Shipbuilding Industry Chamber. Four operations were successfully organized and executed, allowing exports and imports of approximately 3.5 million tons of merchandise – soy, corn, rice, wheat – worth $200 million.

Inland connectivity

COVID-related transport restrictions added to costs and delays especially when crossing Argentina and Uruguay. Extra checks were imposed at the border-crossing point of Puerto Falcón with Argentina. COVID-19 tests for drivers, and sanitation of freight trucks, resulted in congestion that further reduced the competitiveness of Paraguayan exports in international markets.

Upcoming transit route

The proposed Bi-Oceanic Corridor is a $445 million project between Peru, Bolivia (Plurinational State of), Paraguay, and Brazil to connect the Pacific and Atlantic coasts and seaports. For Paraguay this corridor has a high strategic value. It will turn the Western Region into an international logistics centre by offering the shortest route between Chilean and Brazilian ports. This is a demanding project that will require a high degree of commitment and coordination among all regional countries and potential foreign investors.

Public-private partnerships

Post-COVID recovery will require alliances with the private sector. This helps governments reach necessary investment levels and allows companies to gain more market share.

Source: UNCTAD, based on Rivera (2020).

3. Tools and instruments to support cooperation

Maritime trade can benefit from a number of technology-driven innovations One of the most important options is the maritime single window (MSW). From 2024, as agreed in the 2022 amendments to the IMO FAL convention, MSWs will be mandatory – with all information concerning the arrival, stay, and departure of ships, people, and cargo to be submitted electronically to relevant authorities via a single platform.

Establishing a MSW requires considerable collaboration between public and private stakeholders, with a clear governance structure.[33] For the MSW in the European Union, for example, in 2017 the European Commission sought input from stakeholders, including NGOs, business associations, public authorities, and citizens.[34] As a consequence, in 2022 the information procedures for fulfilling reporting obligations were simplified and harmonized.[35] Other innovative digital solutions include the UNCTAD Reform Tracker for Trade Facilitation Reforms, and the UNCTAD TRAINFORTRADE Programme.[36]

Box 5.6 Cameroon Port Community

Port-Synthèse was created on July 7, 1994, as an association of port users and administrations in four autonomous ports: Douala, Kribi, Limbe and Garoua. In 2019, Port-Synthèse was officially extended to all ports, to be the National Port Community.

Founding members in addition to the four ports include the National Shippers' Council of Cameroon and the Chamber of Commerce, Industry, Mines, and Crafts. Permanent members include the Cameroonian Company of Maritime Operations, Aluminum of Cameroon, and Cement Factories of Cameroon. Affiliated members include the African Association of Ports and the Agro-Food Company of Cameroon.

Port-Synthèse is run by a General Secretariat, provided by the ports of Doula and Kribi, which reports to the president of the Port Community, which since 2022 has been led by the port of Kribi.

Port-Synthèse has several missions which include securing the loyalty of shipowners by developing the reputation of Cameroon's ports at the national, regional and international levels. Port-Synthèse also develops cooperation between the members of the Cameroon Port Community and promotes the attractiveness and competitiveness of national ports.

Source: UNCTAD and Cameroun Port Authority.

4. Links between ports, hinterlands and corridors

Many ports handle transit traffic to hinterland countries. For the European Union, for example, 37 per cent of exchanges involve transit through seaports.[37] To facilitate these, and bring additional stakeholders to the scene, governments and companies have been creating new corridors, inland ports and logistical zones. In Europe, for example, rail or barge services have dedicated inland ports. In North America, on the other hand, port authorities tend to set up logistical zones in adjacent areas.[38]

Hinterland connections typically involve intermodal transport. For Tanger Med, Morocco, for example, securing intermodal connections has boosted import-export traffic while also attracting export-oriented industries.[39] Intermodal and hinterland transportation tends to be coordinated along inland corridors which together with maritime corridors form the main arteries of world trade.[40] Intermodal corridors that involve rail, barge and inland terminals require considerable coordination and cooperation. UNCTAD's Corridor Performance Programme helps countries analyse costs, times, and distances.

In East Africa during the pandemic, the EAC Ad Hoc Regional Coordination Committee coordinated partner State responses to ensure smooth and uninterrupted movement of goods and services across transit corridors.[41] Another important route is the Northern Corridor which links a vast hinterland comprising Uganda, Burundi, eastern Democratic Republic of the Congo, northern Tanzania, South Sudan, Somalia and Ethiopia. This corridor has an online platform where member States were able to share experiences and exchange views during the pandemic.[42]

To build national expertise on regional and international transit issues, UNCTAD has developed a programme for national transit coordinators in developing and least developed countries.[43] The programme offers in-person and remote capacity-building with practical tools to help participants understand benefits of the Conventions and international transit instruments and encourage partner country compliance.

E. SUMMARY AND POLICY CONSIDERATIONS

Recent events have brought maritime trade facilitation to the forefront of public attention. The COVID-19 pandemic required governments to take emergency measures at ports and borders, and the war in Ukraine has closed some ports and disrupted the flow of primary commodities.

At the same time, ports and hinterland transport must deal with ever-more complex supply chains and increasing demands from transport operators and their customers for fast and automated electronic systems that ensure compliance but also reduce time and costs for the business community.

With an efficient and digitalized trade facilitation ecosystem, governments, ports and logistic hubs can boost their performance, attract investors and create new opportunities. To achieve this goal, governments, ports and businesses will need to work closely together, with the following recommended actions.

1. **Seize the opportunity for reform** – During the pandemic and the supply chain crisis, maritime and customs authorities, and other border agencies have been forced to try innovative approaches that have largely proven beneficial. They should now build upon efficiency gains to drive through domestic reforms, including maritime single windows.
2. **Harmonize procedures for emergencies** – Governments with other partners should build trade facilitation frameworks based on international agreements and standards to facilitate the supply of emergency goods during pandemics and other crises.
3. **Accelerate automation** – Government systems should be digitalized to enable fully automated, paperless risk-based clearance processes, and smart customs solutions based on real-time data.
4. **Establish an integrated trade facilitation ecosystem** – Reforms undertaken collaboratively through public-private dialogue between relevant border agencies, shipping companies and traders can achieve efficiency and sustainability.
5. **Implement risk management systems** – To ensure business continuity during emergencies, ports can establish public-private task forces to coordinate actions quickly and effectively.
6. **Establish intermodal linkages** – To harmonize processes and strengthen supply chains, port authorities and inland stakeholders need to ensure seamless connections between maritime and intermodal transport corridors, hinterlands, inland ports and logistical zones.
7. **Strengthen coordination and cooperation** – All stakeholders can take advantage of different fora and mechanisms, such as maritime transport facilitation committees, national trade facilitation committees and public-private partnerships. These can encourage political buy-in and coordinate and collaborate at both national and regional levels.

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This chapter assesses consolidation and competition issues in maritime trade, especially for liner shipping.[1] Section A looks at long-term trends in horizontal consolidation, vertical integration, and alliances, as well as their underlying causes. Section B discusses the implications for markets, shippers and regulatory bodies, and the ways in which cooperative agreements may have contributed to the ongoing supply chain crisis. Section C considers policy options for governments, port authorities, and regulatory bodies.

6

CONSOLIDATION AND COMPETITION IN CONTAINER SHIPPING

A. TRENDS IN CONSOLIDATION

Over recent decades, the container shipping sector has seen a continuous process of consolidation and restructuring of relationships. This has included: horizontal consolidation, through mergers and acquisitions; vertical integration, through carriers investing in terminal operations and other logistics services; and strategic cooperation agreements in the form of carrier consortia and alliances.

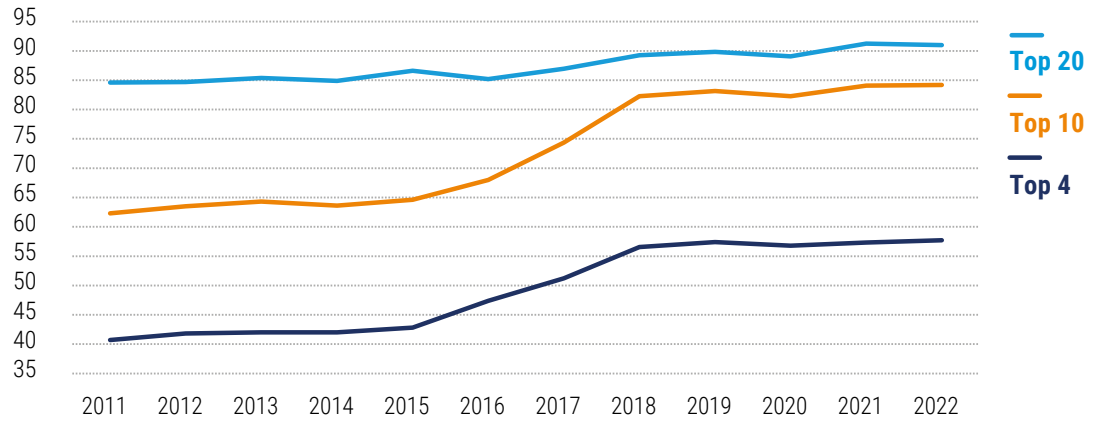
1. Horizontal consolidation

Often in response to capacity oversupply, container shipping lines have long been consolidating horizontally through mergers, acquisitions, and at times because of bankruptcies. As a result, between 1996 and 2022, the share of the top 20 carriers in container carrying capacity went up from 48 to 91 per cent.[2]

More recently, that share has remained stable, but within these 20 carriers the four largest have increased their share. Since 2017, the top four have controlled more than half of global capacity, and since 2018 each has had a market share greater than ten per cent (figure 6.1). The largest carrier in 2022 was MSC with 17.3 per cent of the market, followed by APM-Maersk (16.5), CMA CGM group (12.7) and COSCO Group (11.2). The fifth largest, Hapag-Lloyd, had 6.8 per cent.[3]

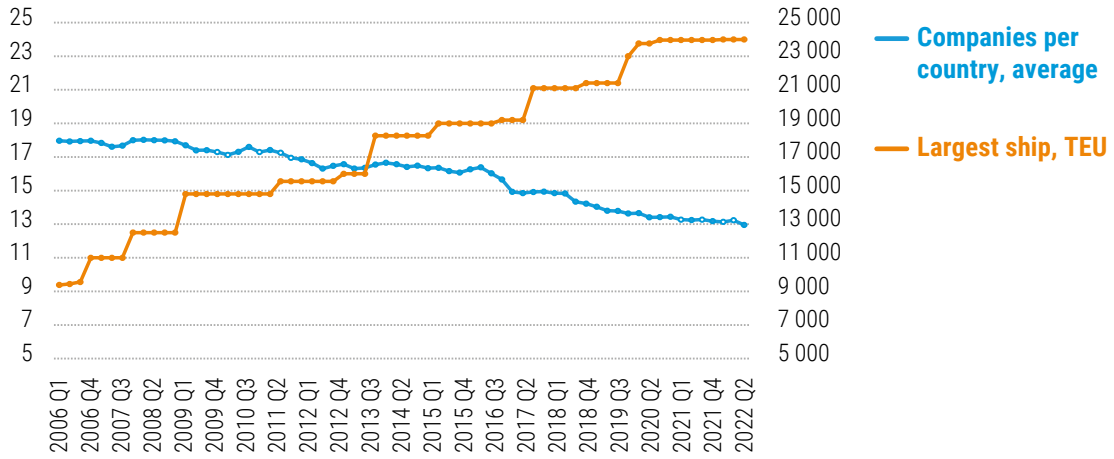
An important indicator is the number of companies that provide services in each country. Generally, this has been falling. As indicated in figure 6.2, between 2006 and 2022 the average number decreased from 18 to 13. Germany, for example, in 2006 had 97 carriers but by 2022 only had 37. In Palau, Turks & Caicos, and Wallis & Futuna, the number of carriers has fallen from two to a monopoly of one.

Figure 6.1 Market shares of top four, top ten and top twenty carriers, 2011–2022
(percentage)



Source: UNCTAD, based on data provided by Alphaliner, https://public.alphaliner.com.

Figure 6.2 Average number of companies providing services per country, and size of the largest ship, Q1 2006–Q2 2022



Source: UNCTAD, based on data provided by MDS Transmodal, https://www.mdst.co.uk.

Meanwhile, the size of the world's largest container ships more than doubled, from 9,380 to 23,992 TEU. During the same period, containerized trade also grew, but only by 75 per cent.[4] On average, the size of the largest ship in each country almost tripled.[5] Ships were thus growing faster than the volumes of cargo to fill them. At the same time, the number of services per country fell by 8.4 per cent, resulting in more than twice as much TEU carrying capacity per service as in 2006 (table 6.1).

These developments reduced competition. As ship sizes expanded faster than volumes, the rate of return on assets fell. Smaller shipping companies found it more difficult to remain in the market – unable to offer the same services, or compete on price with the larger carriers.

However, this experience is not universal. Compared with 2006, 110 countries had fewer companies offering services to importers and exporters, but 56 countries had more. The country that gained the most was Viet Nam, where the number rose from 40 to 55.

Table 6.1 Container shipping fleet deployment indicators, 2006 and 2022

	Q1 2006	Q2 2022	*Change*
Number of companies per country, median	9	8	*-11%*
Number of companies per country, average	18	13	*-28%*
Number of companies per country, maximum	103	93	*-10%*
Number of services per country, average	36	33	*-8%*
Number of countries with 1 to 4 carriers	49	56	*+14%*
Largest ship, TEU, global	9 380	23 992	*+156%*
Largest ship, TEU, average per country	2 814	7 742	*+175%*
Total TEU deployed, average per country	2 790 079	5 561 814	*+99%*
TEU per company, average per country	155 327	429 422	*+176%*
TEU per service, average per country	77 342	168 311	*+118%*

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

2. Vertical integration

Over recent years, container shipping lines have also been integrating vertically. They have extended their operations to:

Terminals – The four largest carriers are now among the top ten terminal operators, competing with port companies such as PSA, Hutchison and Dubai Ports. The two largest container terminal operators are associated with major shipping lines. In 2021 China COSCO Shipping had 13 per cent of global throughput, and APM Terminals, associated with Maersk had 11 per cent. Also among the top 10 terminal operators are Mediterranean Shipping Company (MSC), via a subsidiary Terminal Investment Limited, and CMA CGM.[6]

Logistics – In addition to operating ports and terminals, shipping companies have been buying warehouses and freight-forwarding and other logistics companies. In 2021, MSC expanded its logistics arm MedLog by buying the Brazilian company Log-In Logística Intermodal, as well as Bolloré Group Africa division. CMA CGM bought back Fenix Marine Services, a Los Angeles terminal it had sold four years earlier, while Hapag-Lloyd bought a 30 per cent stake in the German deep-water port Wilhelmshaven. A.P. Moller-Maersk has acquired B2C Europe as well as Visible Supply Chain Management, a leading US-based B2C/e-commerce logistics and parcel delivery company. Vertical integration enables shipping companies to provide customers with last-mile delivery. Maersk, for example, has started to manage all logistics operations for the consumer goods multinational Unilever.

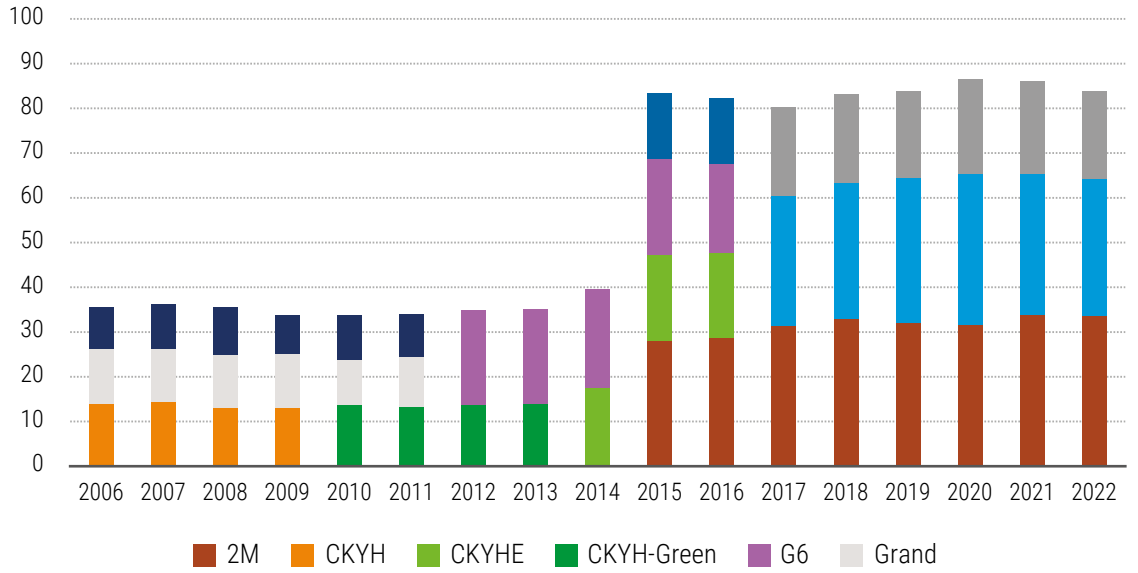
Air freight – In 2021, Maersk acquired the freight forwarder Senator International and ordered five freight airplanes. CMA CGM ordered six air freighters for the launch of its airline. MSC has started developing a new MSC Air Cargo solution, to be available from early 2023, following the delivery of the first of four aircraft that will be operated by Atlas Air.[7]

Rail – To cater for fast-changing customer needs, strengthen supply chains and offer alternatives to ocean and air services, A.P. Moller-Maersk has launched a rail-sea Asian-Europe service connecting China to Romania through Kazakhstan, Azerbaijan and Georgia.[8]

3. Alliances

The most common form of collaboration between the major shipping lines for container transport services is strategic alliances. Since 2015, the proportion of global capacity controlled by such alliances has increased to more than 80 per cent. Today, the top nine container operators organize their East-West services through three strategic alliances: Ocean, 2M, and THE Alliance.[9] During the pandemic, this proportion fell slightly as non-alliance members entered the profitable Asia-North America route, but the three main alliances continued to control 84 per cent of the market (figure 6.3). These alliances do not include small carriers.

Figure 6.3 Global alliances in deep-sea container shipping, market share, percentage



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

Notes: Based on Q2 data. Not all services of alliance members are joint services with alliance partners.

Shipping alliances bring economies of both scale and scope. Running a weekly liner service between several ports requires a set of ships, entailing high fixed costs – often beyond the financial capacity of a single shipping line. In 2022, of the 402 active deep-sea liner services, only 131 were provided by single carriers without vessel partners or slot charterers.[10]

Vessel sharing mitigates risk and increases utilization. The incentive for such cooperation has intensified as ship sizes have increased faster than trade volumes. With the prospect of such agreements to boost utilization, carriers have invested in larger ships.

As part of alliances, shipping lines can spread the risks of investment and with ever-larger vessels achieve economies of scale that reduce shipping costs per container and improve fleet utilization.[11] By forming alliances with shipping lines in complementary regions, they can offer customers more comprehensive networks.[12]

Shippers have a different perspective, worried about shrinking choice and lack of competition, with potentially abusive charging. They and regulators want the cost savings that accrue to the carrier to be passed on to clients.

4. Causes of consolidation

An underlying driver of consolidation is technological development. In the mid-1990s, the first post-Panamax container ships had capacities of 6,000 TEU. Today's largest container ships are four times that size. The newer, bigger ships are more costly to build but are more fuel-efficient and incur lower operations and communication costs.

As ships get larger, a higher proportion of costs are fixed rather than variable. Whether it carries 6,000 or 24,000 TEU, a container ship has a crew of 20 to 30. Over recent decades, while the market has grown, the ship sizes and fixed costs needed to maintain a global network have increased even faster, which tends to reduce the number of companies in the long-term market equilibrium.[13]

Technological development has been accompanied by deregulation. Since the early-2000s there have been reforms in port regulations, as well as changes in competition law that removed national cargo reservation regimes and legal price-setting exemptions. This has made it easier for carriers to expand into new markets through mergers and acquisitions, alliances, and vertical integration.

This process of deregulation and port privatization initially produced fiercer competition – which in turn drove down both freight rates and profits. Though carriers were investing in ever-bigger ships, they did not scrap older and smaller one but sold them or kept this in the market, resulting in overcapacity. But this may now be coming to an end. Container ship sizes seem to have reached a maximum and further mergers and acquisitions are constrained by regulatory limitations.

B. IMPACTS OF CONSOLIDATION ON MARKETS

1. Determinants of maritime freight rates and charges

Freight rates depend on many factors, including the distance to the destination, economies of scale, port performance, trade balances, and the type of service provided. But one of the most important influences is competition.[14] Empirical evidence shows that the more carriers there are the more likely it is that cost savings will be passed on to shippers.

In Latin America, for example, a one per cent increase in the number of services per unit of cargo was estimated to decrease freight costs by 0.11 per cent.[15] In the Caribbean, one study concluded that two-fifths of the variance in the price of shipping was explained by the number of carriers providing direct services.[16] Lower prices stimulate trade: in South Africa an additional carrier on a bilateral route was estimated to increase exports by 2.8 per cent.[17] Globally, modelling shows that improving container shipping connectivity can significantly reduce freight rates.[18]

When deciding on how ports should operate, local and national governments face difficult choices. To attract investment, improve port performance and achieve economies of scale, they might prefer to concession an entire port to a single investor. On the other hand, to increase the choice for shippers, it may be better to divide a port into competing terminals. However, States or islands that depend on a single seaport may not generate sufficient traffic volumes to support multiple terminals.

Governments must also consider infrastructure costs. Larger ships may help achieve economies of scale and improve energy efficiency at sea but the moment they reach port their larger cargos create peak demands that require additional infrastructure and thus higher total logistics costs.

In addition to the basic freight rate, carriers often impose surcharges, for bunkering, for example, terminal operations, or congestion, or for late pick-up (demurrage) or returns of containers (detention). There is the further risk of a monopoly, or an oligopoly with other shipping lines tacitly colluding and following the lead of the dominant player to set prices. Competition authorities need to gauge whether charges are justifiable or excessive.

A limited number of significant players and markets increases the likelihood that certain lines will have dominant positions in specific corridors. Competition authorities always need to maximize choices between competing carriers and services, and monitor anti-competitive behaviour or abusive fees or charges.

2. Competition for the market, and in the market

Ports

When bidding for a concession to operate a port or terminal, the investor competes for the market. That terminal then joins others serving the same hinterland, thus the operator then competes in the market.

When assigning concessions, governments may want to establish their ports as transhipment hubs. They may therefore prefer vertically integrated companies that also run liner shipping services, so are more likely to use the terminal a hub. For example, the port of Piraeus in Greece was concessioned to COSCO (China) which is one of the top five global liner shipping companies. The company brought its own services and cargo and significantly increased volume and connectivity, both to the hinterland and to the 'foreland' – the overseas ports and markets that it links to.

If providers are integrated both horizontally and vertically, this will limit the choices for shippers. After Maersk purchased Hamburg Süd, for example, services that previously went to Buenos Aires in Argentina and Callao in Peru to terminals operated by independent operators such as Dubai Ports, were switched to terminals operated by APM Terminals, which belongs to the same group as Maersk. The acquisition of Hamburg Süd by Maersk not only reduced the choice of shipping lines, it also limited the choice of terminals.

Smaller economies, and especially island economies without extensive hinterlands, may not have sufficient volume to justify more than one terminal or attract more than one operator. To avoid monopolistic pricing the government may need to strengthen regulation.

Liner shipping

If freight rates and profits on a liner (container) shipping route are exorbitant, other carriers will be tempted to redeploy ships to that market. Thus, the surge in demand in the US attracted new carriers to the Far East-North America direct trade lane. According to MDST, between 2020 and 2022, the combined market

share for CMA CGM & COSCO fell by around three percentage points. There was also a fall in market share for Hapag-Lloyd-ONE-Yang Ming.[19]

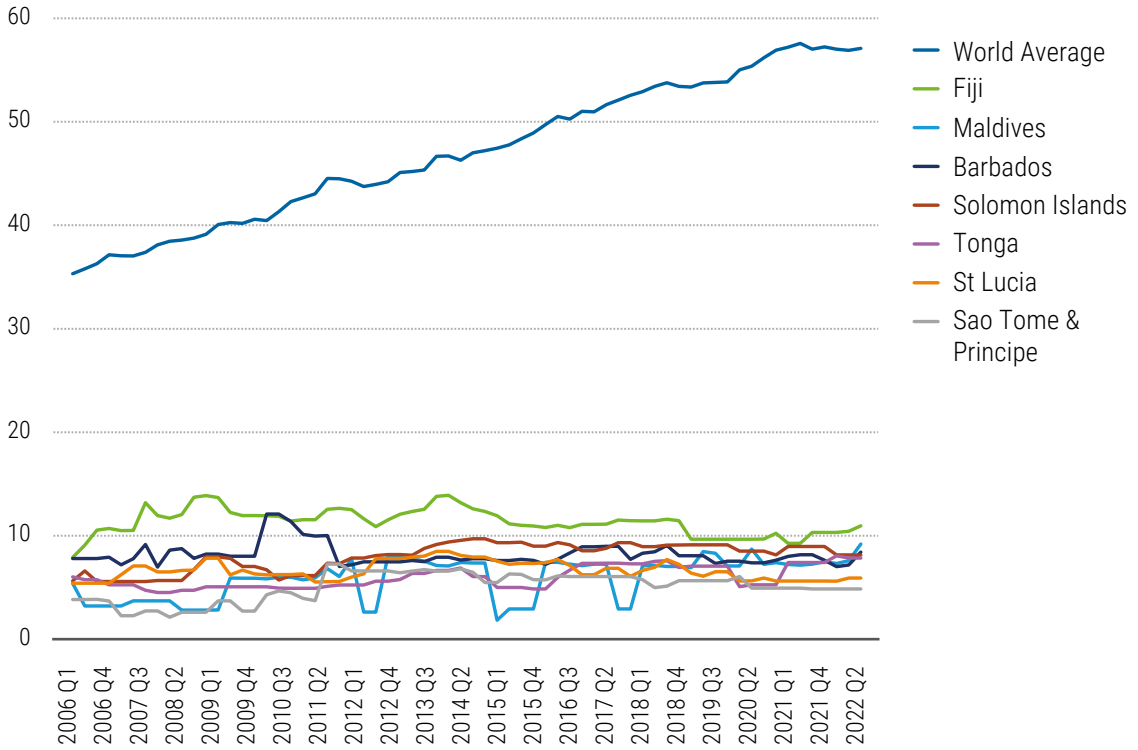
Similarly, on the Far East-North Europe & Mediterranean route, between 2021 and 2022, the combined market share of the Maersk and MSC service decreased by four percentage points. Some of this was lost to another alliance: CMA CGM and COSCO's combined market share increased by two percentage points and is now above 30 per cent.

Other new entries come from high-volume shippers, such as IKEA, Wal-Mart or Amazon. During recent periods of high congestion in United States ports, these companies have been chartering smaller container ships, which has also enabled them to bargain down the freight rates, leaving the smaller volume shippers to pay more. Contracts for container services are confidential, making it easier to charge the higher prices to the smallest-volume shippers, and for the thinnest routes.

Nevertheless, establishing a new service is not easy; it means providing several ships calling at a range of ports and is thus capital-intensive. For a small islands with low volumes, even high freight rates may not suffice to attract new companies. Many SIDS are confronted with a vicious cycle of low connectivity and low trade volumes, where only few carriers provide services, making trade uncompetitive, which in turn leads to low volumes that make the market less attractive to carriers.

Figure 6.4 uses the UNCTAD Liner Shipping Connectivity Index (LSCI) to illustrate the growing divide between small island developing States and the global average. The LSCI has six components including total deployed capacity, the number of direct shipping services, and the number of carriers offering services to and from each country. A low index value implies fewer services, smaller ships, lower frequencies, and less choice for shippers.

Figure 6.4 UNCTAD liner shipping connectivity index, 2006 to 2022, world average and selected small island developing States



Source: UNCTAD, based on data provided by MDS Transmodal. The LSCI for all countries is available under http://stats.unctad.org/maritime.

Bulk cargo shipping

For bulk shipping on the other hand, carriers tend to be independent companies, providing tramp shipping services, comparable to chartered bus services. Shippers generally charter ships for single point-to-point voyages or for periods of time, and negotiate contracts individually through brokers. Competition in the market thus tends to be the same as competition for the market.

Some oil majors and commodity exporters may own their own ships. The Brazilian mining company Vale owns its iron ore mines as well as the railway that connects the mines to the ports, the iron ore terminals, and several "Vale max" iron-ore carriers. In this case the competition is between entire supply chains; iron ore from Brazil competes with iron ore from Australia and China.

Market adjustments over time

As markets change, providers try to adjust. For ports this is a slow process. Expanding capacity or even building new ports can take years, if not decades, since they typically have to take into account inland connections and environmental concerns. National and local governments seeking resilient and sustainable supply chains for their foreign trade will therefore need to plan ahead when considering new ports and the hinterlands they might serve.

Shipping lines, on the other hand can adjust more quickly. It will take them a few years to get new ships, but in the meantime they may be able to deploy previously idle ships, or increase service speeds so same tonnage can carry more cargo. They may order new ships at times when freight rates are high, but since these will be delivered two to four years later, this leads to cyclical up-and-downs for freight rates.

3. Market shares and client choices

In the 1980s, liner shipping companies mostly specialized in specific markets, but in the 1990s, as a result of mergers some of them became truly global players, offering services that connected all the world's major regions. During the initial process of expansion, they were entering new markets and thus offering more options to shippers. But by the early 2000s when the major carriers had covered the globe, subsequent mergers and acquisitions tended to reduce competition and the choices for shippers.

In 2022, the top five carriers together controlled two-thirds of the capacity. These companies do not own all their ships; they charter around half of them from other ship owners. The market for ship ownership is less concentrated, with the top five owners controlling only one-third of capacity.

Industry concentration can be measured as the market share of the four largest operators – the 'four-firm concentration ratio' (CR4). If the CR4 is one, this means that four or fewer shipping companies provide services, and freight rates tend to be higher. In early 2022, there were 56 countries with a CR4 of one – 14 per cent more than in 2006.[20] Many of these are least developed countries and small island developing States, which depend more on shipping for their foreign trade, and already pay high freight rates. Generally, they do not have strong competition authorities or regulators to monitor anti-competitive behaviour. Box 7.1 discusses concentration and cooperation in competition law.

To safeguard shippers' interests, competition authorities have investigated and ruled on competition issues on numerous occasions.[21] As in:

- **China** – Fines for 14 carriers for misreporting freight rates.[22]
- **India** – Fines for Japanese car carriers for sharing commercially sensitive information.[23]
- **Republic of Korea** – Fines for 15 carriers for colluding on price fixing.[24]
- **United States** – Fines for price fixing on ro-ro services;[25] and for Hapag-Lloyd for incorrectly applying detention and demurrage charges.[26]
- **European Union** – 14 carriers avoided a major fine by agreeing to legally binding commitments to increase transparency and reduce the likelihood of coordinating prices.[27]

Competition authorities have also intervened to avoid market domination:

- **United States** – AP Moller-Maersk proposed a $1bn-deal to sell its refrigerated container production unit to China International Marine Containers (CIMC). This could have cemented CIMC's dominant position in an already consolidated industry. After antitrust concerns, the company backed off.[28]
- **European Union** – The European Commission prohibited Hyundai Heavy Industries Holdings from acquiring another Republic of Korea company, Daewoo Shipbuilding & Marine Engineering. This would have given the merged company a dominant position and reduced competition in the global market for large liquefied-gas carriers.[29]
- **Australia** – The competition authority investigated potential anti-competitive compensation deeds and prevented the coal port of Newcastle from building a container terminal.[30]

Box 7.1 Concentration and cooperation in competition law

A key distinction for competition policy is between a concentration operation and a cooperation agreement. Both may restrict competition, but they are treated differently by competition law.

In a concentration operation, two or more companies merge to create a single new legal entity, thus reducing the number of players in the market. Regulatory authorities will examine such a proposal to determine its effects. For this purpose, they can use indicators such as the Herfindahl-Hirschman index (HHI). In addition, they will analyse the entry barriers, the static or dynamic nature of the market and the characteristics of the product or service at stake. They will then decide to approve, conditionally approve, or prohibit the operation.

In a cooperation agreement, independent companies and competitors in the same market agree to cooperate, but each company remains independent. In principle this is anti-competitive, but the negative effects may be outweighed by the benefits such as improving operations and efficiency and making optimal use of available resources. Given the experience of the past two years, with high freight rates and poor service this may no longer be true.

When making agreements, competing shipping companies must adapt to a regulatory framework, as in the European Union with the EU Consortia Block Exemption Regulation. If they do not do so, they can be sanctioned.

In many jurisdictions in developing countries the authorities may not take the appropriate action because they do not have the resources or lack the skilled personnel. They may therefore not act decisively or may approve an operation that is anti-competitive.

Source: UNCTAD.

Competition authorities can safeguard the interests of shippers and clients and enforce anti-trust regulation. They need to remain vigilant and monitor shipping markets closely, especially where a small group of service providers could collude for market sharing or price fixing or otherwise abusing a dominant market position.

4. Carriers as clients in an oligopsony

Carriers may also be strengthening their positions as port users. Over recent decades, the negotiating position of the carriers vis-à-vis the port authorities has been strengthened in four ways:

- Individual carriers have been able to increase their market shares.
- Carriers have a greater choice of ports, to reach the same inland transport markets or, as a result of better trade facilitation, improved transit, and common transport markets in neighbouring countries.
- Through vertical integration, major carriers have become both clients and tenants and acquired greater negotiating power.
- As members of alliances, shipping lines have been able to create concentrated buyers' markets –oligopsonies.

In addition, carriers are likely to benefit if seaports in neighbouring countries or municipalities use public funds to invest in infrastructure to undercut each-other when attracting terminal operators or carriers. States may also find themselves competing for tax income if, through transfer pricing, carriers shift taxable profits to States with lower tax rates.

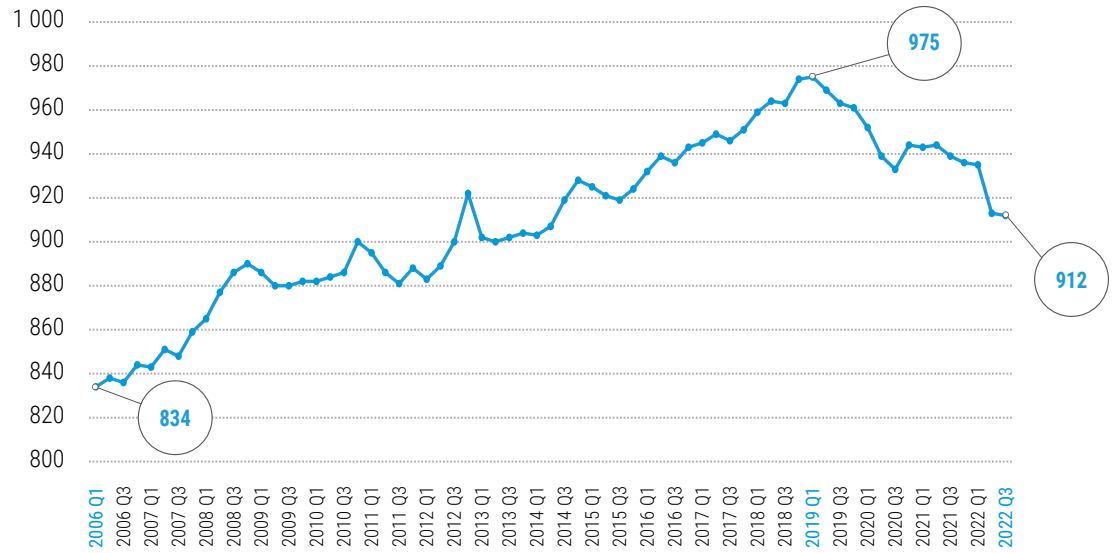
To connect their hubs to secondary ports, carriers and their alliances link with independent feeder service providers. But if they do so as monopolies or oligopsonies, these regional, national, or smaller inter-island services will have little negotiating power.

Shippers too may suffer from fewer service options, but may also gain from greater port operational efficiency, stronger inter-port competition, and the economies of scale achieved by the carriers – as long as these gains are passed on to clients.

For their liner networks, carriers and their alliances may remove or add ports. Figure 6.5 shows the number of seaports connected to regular container shipping services. Up to early-2019, the numbers were increasing, but then started to decline, with a further dip as a result of the war in Ukraine.

The recent downward trend could be the result of shorter supply chains, combined with the process of industry consolidation. But the situation of each port differs depending on its infrastructure, market, hinterland and geographical position.

Figure 6.5 Number of container ports served by regular liner shipping services, quarterly, 2006–2022



Source: UNCTAD, based on data provided by MDS Transmodal, https://www.mdst.co.uk.

5. Consolidation and the supply-chain crisis

Over the past two years, shippers have been faced with historically high freight rates, congested ports, significant delays and unreliable services.[31] Finding it difficult to collect and return containers on time they have often had to pay costly demurrage and detention charges, further exacerbating problems for many importers and exporters.[32] Meanwhile, carriers have recorded record profits, leaving clients understandably unhappy and suspecting that the crisis may be a consequence of oligopolistic markets.

Shrinking competition will have contributed to high prices, but the supply chain crisis and congestion have had a mixture of causes. One is the pandemic. UNCTAD data show that at the end of 2021 compared to pre-COVID times, container ships spent on average about 20 per cent longer in port, thus reducing the available shipping capacity.[33] Another cause is the surge in consumer demand. The United States Federal Maritime Commission concluded that the supply chain crisis was the result of a surge in consumer spending leading to record congestion.[34]

These and other factors have contributed to record prices, even in markets without alliances and where there is much less market concentration. The highest increases since 2019 include the following.[35]

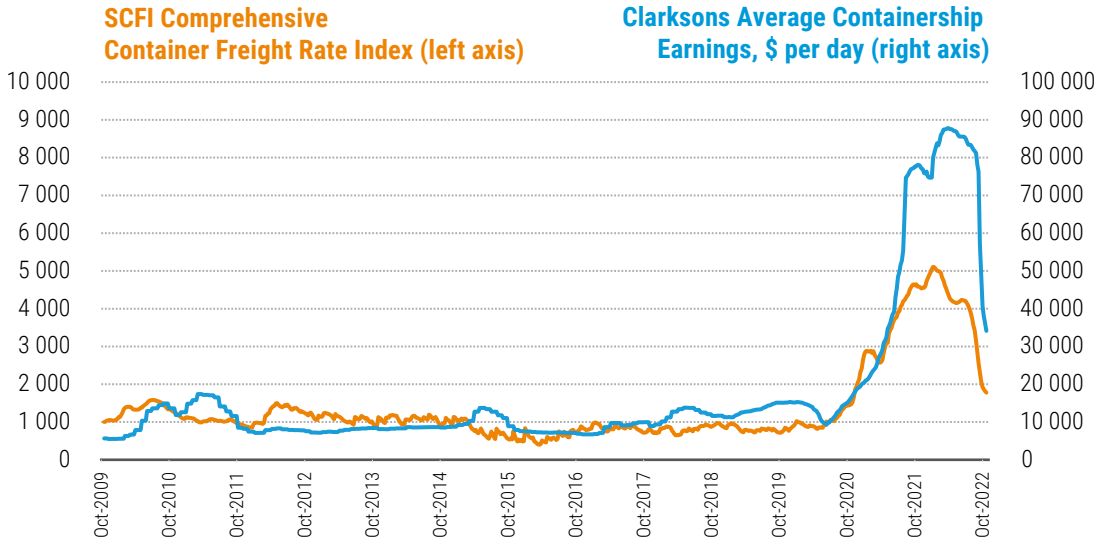
- Baltic Dry Index –up 14-fold between May 2020 and October 2021.
- LNG charter rates – up 11-fold between January 2019 and December 2021.
- Daily oil tanker earnings – up ten-fold between July 2019 and April 2020.
- Container ship charter rates – up nine-fold between June 2020 and March 2022.
- Container spot freight rate index – up seven-fold between October 2019 and January 2022.

The two latter increases are particularly telling, and are further illustrated in figure 6.6. The container freight rate index reflects the price that shippers pay for the transport of their containers, while the container ship earnings rate reflects what carriers pay to ship owners for chartering a ship.

However, it should be noted that during the COVID-19 pandemic, the prices that the less concentrated shipowners charged to the more concentrated container ship carriers was greater than the increase passed to shippers. Also, the price increases were even more pronounced in most other shipping markets.

In view of the high profits seen in the industry, shippers have a deepening mistrust of the industry's motives and practices.[36] During the ongoing supply chain crisis, shippers have expressed valid concerns about schedule unreliability, blank sailings, surcharges, and the withdrawal of shipping capacity, especially from smaller and vulnerable developing countries.[37] UNCTAD's assessments confirm that many developing countries are badly affected by higher freight rates and lower shipping connectivity. However, the causes of the crisis are many and complex and there is little evidence that the situation would have been any better had carriers not formed alliances or coordinated their schedules.

Figure 6.6 Container freight and vessel earning rates, 16 October 2009 to 21 October 2022



Source: UNCTAD, based on data provided by Clarksons Research Services, https://www.clarksons.net.

C. POLICY CONSIDERATIONS

Until the 1990s, despite some consolidation, most trade routes had more shipping lines competing for cargo. Asian lines entered the North Atlantic trade, for example, east-west lines entered north-south markets, and traditional regional lines were competing with the feeder services of larger lines.[38]

Since then, consolidation among shipping lines has been such that one-quarter of countries are now serviced by four or fewer container carriers, creating monopolies or oligopolies that can abuse their dominant positions.

Most vulnerable are the small island developing States for whom access to global container shipping networks is an important determinant of their competitiveness. They are often confronted with vicious cycles: not enough demand to attract frequent and competing shipping services, making services more costly and less competitive, causing volumes to drop even further.

Support smaller and vulnerable economies

Small island developing States and the least developed countries in particular, need support in capacity building for national regulators, and competition and port authorities. Their importers and exporters would benefit from more transparency and available indices for freight costs and surcharges, similar to those available for the main shipping routes.

Include alliances and consortia in competition assessments

Competition authorities should clarify what alliances and consortia can legally do, such as negotiating jointly with other supply chain partners. They could then fully analyse the impact on competition, service quality and efficiency, and impose appropriately designed remedies. Another option would be to impose reporting requirements. In analysing cooperation agreements, competition authorities need to look at price-related effects, as well as at the variety and quality of services provided to shippers, and the coordinated management of capacity deployment.[39]

Keep ports competitive

Vertical integration of carriers can contribute to modernizing facilities, improving services, and increasing the number of competitors and users in the ports, but they can also create problems of access or discriminatory treatment for competing users of port facilities. Terminals or entire ports are usually put out for tender through concessions by port authorities and operated by the winning firms for a period of two decades or more. When considering concessions, sectorial regulators, and competition and port authorities should work together to address competition concerns that may arise, ensure fair competition, and enhance the competitiveness of this segment of the supply chain.[40]

Seize opportunities for international cooperation

Shippers in developing countries are deeply frustrated at the apparent indifference of regulators and governments in developed regions to their collective experiences, and the perceived anti-competitive practices of the container shipping industry. Their governments may not have much influence over major shipping companies that are domiciled in third countries where decisions on regulations do not consider the effects on developing countries.

Dealing with cross-border anti-competitive practices requires international cooperation for which the appropriate mechanism is the United Nations Set of Multilaterally Agreed Equitable Principles and Rules for the Control of Restrictive Business Practices (UN Set of Competition Rules and Principles).[41]

Responsibility for ensuring the implementation of the UN Set of Competition Rules and Principles lies with UNCTAD which is most appropriate forum for cooperation between competition authorities and regulators in the maritime sector. At the next meeting of the Intergovernmental Group of Experts on Competition Law and Policy in 2023, member States could request the establishment of a joint specific forum or informal working group to facilitate the exchange of information between authorities and regulators. This would strengthen the monitoring and publication of data and facilitate research and transparency for users and providers of container shipping services. It would also promote international cooperation for more consistent and uniform measures. Member States could then address problems detected in structural ways and strengthen their monitoring and interventions. A more homogenous global regulatory framework would have the additional benefit of reducing compliance costs for carriers.

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END NOTES

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32 UNCTAD (2022a), Pro Publica (2022). See also chapter 3 above.

33 UNCTAD (2020), UNCTAD (2021a), UNCTAD (2021b), UNCTAD (2022b). See also especially chapters 1, 2, 3, and 4 above. See UNCTAD statistics for time in port based on data provided by MarineTraffic under http://stats.unctad.org/maritime.

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41 UNCTAD (2018b).

This chapter provides an overview of important international legal issues, including the commercial law implications of the ongoing COVID-19 pandemic, as well as recent regulatory developments relevant to international maritime transport and trade.

7

LEGAL ISSUES AND REGULATORY DEVELOPMENTS

A. COMMERCIAL LAW IMPLICATIONS OF THE COVID-19 PANDEMIC

The ongoing COVID-19 pandemic and related response measures have resulted in significant operational disruptions and delays across global networks, with important implications for the performance of international commercial contracts. In all cases where performance is disrupted, delayed, or has become impossible, legal consequences and claims arise, increasing the need for dispute resolution and giving rise to complex jurisdictional issues. Much global commodity trade is conducted on cost, insurance, freight (CIF) and free on board (FOB) terms and more than 80 per cent of the volume of global merchandise trade is carried by sea. To reduce the need for costly litigation and to help inform commercial contracting practice it is important to understand the legal implications of the pandemic for closely interconnected commercial contracts.

UNCTAD has provided advice and guidance as part of related technical assistance in the context of a multi-agency technical assistance project on transport and trade connectivity in the age of pandemics.[1] This highlights key legal implications for different types of commercial contracts and the need to allocate commercial risks through suitably drafted contractual clauses.[2] Relevant considerations vary, however, depending on the type of contract and the relative bargaining power of the parties.

Time and voyage charterparties involve individually negotiated contracts for the hire of an entire vessel. These contracts offer scope for carefully designed clauses that allocate the commercial risks associated with the pandemic. Line carriage on the other hand is a highly concentrated industry, dominated by few global carriers. In these cases, carriage is on the carrier's standard terms and not subject to negotiation. Typically, they allocate the risk of pandemic-related delay and disruption to the shipper/consignee, subject to the mandatory provisions of any applicable international cargo-liability regime. Further detailed information is available in several reports,[3] and as part of related training materials.[4] Relevant recommendations from UNCTAD's analysis include the following:

- For charterparty contracts, commercial parties should consider including contractual risk allocation clauses. Most standard form clauses shift the risk of delay to the charterer, though ideally relevant risks should be equitably apportioned between the two parties. These clauses can also affect parties to bills of lading and sub-charters, as the clauses mandate their incorporation into these third-party contracts. Relevant clauses should be amended to ensure that any provision which imposes indemnity obligations on the charterer is not subject to incorporation.
- For dispute resolution during the pandemic, parties may contractually agree on jurisdiction or arbitration in a forum that enables hearings to continue online; examples are the United Kingdom, the United States, or Singapore.

Contracting parties may also consider:

- Using amended force majeure clauses which refer to performance being 'hindered' rather than 'prevented' by the listed force majeure events. Voyage charterers should aim to agree clauses that cover both provision of cargo and loading/discharging of cargo. For use of a force majeure clause during the pandemic, it is important to be as clear as possible, to ensure that the operation of the clause is not limited to force majeure events that 'could not reasonably have been foreseen at the time of the conclusion of the contract'.
- Including an infectious diseases clause. In particular, there should be some provision for apportioning costs in the event of redirection caused by restrictions in the nominated discharge port. The costs of transhipment should not fall wholly on the cargo owner. A good example of a suitably balanced clause is the BIMCO Infectious or Contagious Diseases Clause for Time Charterparties, that was published in June 2022.[5]
- Including a deviation clause to deal with crew changes, and taking sick crew to a hospital on shore, and a mechanism for apportioning related costs.
- For voyage charters, parties may consider appropriate clauses to share the risk of pandemic-related delay; for instance, by using notice of readiness (NOR) provisions like in *The Linardos* [1994] 1 Lloyd's Rep. 28 (QB), so that time can start upon giving NOR at the relevant place but laytime will cease to count for time lost due to the vessel not actually being ready. Such a clause would place the risk of delay due to congestion on charterers, but with laytime interrupted for any additional delay caused by fault of the owners leading to additional quarantine due to crew testing positive. The risk of delay due to slower working practices at the port in loading and discharging operations would be on the charterer, but this could be assessed in negotiating the amount of laytime available to charterers when the fixture was being negotiated.

- For time charters, the charterers may negotiate for off-hire clauses to have the word 'whatsoever' added after 'any other cause'.
- Bill of lading clauses could be modified to ensure a more equitable distribution of pandemic-related risks, for instance by apportioning transhipment costs in the event of discharge at an alternative port; or by providing a contractual cap on container demurrage, and extension of free time, when the port of discharge is subject to delays in returning containers. Given the significant imbalance in bargaining power of the parties where cargo is carried on the carrier's standard terms, it is unlikely that in practice a carrier would agree to increase its liability beyond the mandatory levels in any applicable international convention. Some commercial pressure could, however, be exerted indirectly by CIF or FOB buyers: these parties could aim to include in their sale contracts a provision that requires the seller to tender a bill of lading which provides for a reasonable allocation of pandemic-related risks. Bill of lading clauses that are considered incompatible with the mandatory provisions on carrier liability contained in any applicable international cargo liability regime could be set aside as invalid by the courts.[6]
- Finally, in the light of the extraordinary circumstances of the ongoing COVID-19 pandemic, it would be hoped that commercial parties, in appropriate cases, also consider showing some restraint in exercising some of their legal rights and claims, so as to limit the need for costly legal disputes.

Related considerations for policymakers include the following:

- Crew changes should be allowed and facilitated at all times, to ensure that no-one is forced to remain at sea for longer than the maximum period stipulated in the Maritime Labour Convention 2006. Governments, international organizations and the industry need to collaborate and accelerate their efforts to address the ongoing crew-change crisis. States should also consider giving seafarers priority access to vaccinations, both in the interests of public and seafarer health, and to facilitate the logistics of international trade and transport, including in respect of essential goods and medical supplies.
- To address the issue of delayed documents and avoid costly legal disputes, the remaining legal and regulatory obstacles to the adoption of electronic documents in international trade need to be removed. Progress has been made with the recognition of electronic documentation in the Montreal Convention 1999, the widespread adoption of the IATA electronic waybill, and the provision for electronic documents in the CMR, but more needs to be done as regards electronic alternatives to sea transport documents such as bills of lading and waybills. The UK Law Commission's report on legislative reform regarding this issue is encouraging and it is possible that its suggested draft bill may be enacted in 2022. Other regulatory developments on electronic trade documents detailed further below (D.4) are also worth highlighting.
- With charges for the delayed return of containers rising significantly as a result of the pandemic, (see chapters 3 and 6), governments could consider mandatory controls on container demurrage accruing at their ports. In March 2020, the Government of India made recommendations to this effect[7] and in April 2020, the United States Federal Maritime Commission (FMC) issued its amended guidelines under the Shipping Act.[8] A further industry advisory regarding the assessment of container demurrage and detention charges was published by the FMC in July 2022, following the Ocean Shipping Reform Act of 2022 (Public Law 117–146), which was signed into law in June 2022.[9] States could also consider extending statutory protection against unfair contract terms, like the Unfair Contract Terms Act 1977 in the United Kingdom, to container demurrage provisions in bills of lading during times of (future) epidemics and pandemics.
- Governments should ensure that cross-border checks applicable to freight transport are kept to a minimum to avoid delay, in particular in the transit of goods by road.
- Finally, governments should consider strengthening institutions and mechanisms for formal and informal dispute resolution, so that these can cope with a likely increase in contractual disputes in the context of the COVID-19 pandemic.

B. REGULATORY DEVELOPMENTS RELATING TO INTERNATIONAL SHIPPING, CLIMATE CHANGE AND OTHER ENVIRONMENTAL ISSUES

1. Reducing greenhouse gas emissions from shipping

With international shipping accounting for around 3 per cent of global greenhouse gas emissions, decarbonization has become an increasingly urgent priority. In autumn 2021, just before the UNFCCC COP26, more than 200 maritime industry organizations signed the "Getting to Zero Coalition's Call to Action for Shipping Decarbonization",[10] urging the adoption of a sector-wide goal of zero emissions by 2050 and the commercial deployment of zero-emission vessels by 2030.

Among the results of COP26 was the call in the Dhaka-Glasgow Declaration by more than 50 developing countries for the IMO to work on establishing a mandatory GHG levy on international shipping.[11] Another positive outcome was the Clydebank Declaration[12] launched by 19 States with the aim to set zero-emission maritime routes between two or more ports.[13] Building on the Zero-Emissions Shipping Mission[14] established in July 2021, the initiative is designed to move forward the decarbonization targets set by the IMO in relation to sustainable shipping. The signatories committed to establishing six "green corridors" by 2025 – entirely decarbonized maritime routes (including land-side infrastructure and vessels) between two or more ports – to accelerate the development of zero-emission fuels, low-carbon enabling infrastructure and effective legislation and regulation. The plan is to extend beyond these six pilot corridors. Participation in the Declaration is voluntary, however signatory nations pledge to collaborate to:

- establish partnerships with all stakeholders, including ports and operators along the value chain to accelerate the sector towards a net-zero future.
- address the technical and operational challenges of green corridors, including regulatory frameworks, incentives, intra-network collaboration and infrastructure.
- include green corridor provisions in the development or review of national action plans.
- ensure that sustainability is at the forefront of plans when implementing green corridors.

As of March 2022, two green corridors had been established – one between Los Angeles and Shanghai, the other between Antwerp and Montreal.[15]

In addition, a Just Transition Maritime Task Force was launched at COP 26 with the United Nations and social partners and is now being operationalized to drive a people-centred approach to decarbonizing shipping and protecting workers and their communities through the transition to green shipping. It will provide policy recommendations to ensure an equitable, people-centred transition, focusing in particular on developing economies.[16]

The IMO MEPC, at its 77th session, in November 2021,[17] recognized the need to strengthen the Initial IMO GHG Strategy,[18] and agreed to initiate its revision, with a final draft to be considered in spring 2023.[19]

Also discussed during the MEPC session were several proposals for further mid-term GHG reduction measures. These include market-based measures, as well as a proposal to establish an International Maritime Research and Development Board (IMRB), funded by a mandatory $2-per-ton levy on ship fuel consumed, and expected to reach $5 billion (IMRF), which will contribute to research and development that will be available to all countries.[20] The proposal envisages among others, supplementary support to the IMO's Integrated Technical Cooperation Programme and GHG TC-Trust Fund to assist maritime GHG reduction efforts of developing countries, in particular LDCs and SIDS, encouraging funding for joint R&D projects between developed and developing countries, and ensuring differential treatment for companies and institutions in developing countries, as well as addressing concerns raised by governments about intellectual property rights. However, due to lack of time, no decision on the IMRB and IMRF was taken at MEPC in November 2021.

The proposals and relevant documents, including associated impact assessments, were referred to the next sessions of the Intersessional Working Group on Reduction of GHG Emissions from Ships ISWG-GHG 11 (14–18 March 2022), and ISWG-GHG 12 (16–20 May 2022), for further assessment. The MEPC also adopted a circular on 2021 Guidance on treatment of innovative energy efficiency technologies for calculation and verification of the attained EEDI and EEXI, particularly accommodating the use of wind propulsion as a complementary source of propulsion. In addition, new pledges were made by governments to support the work of IMO in helping implement the Initial GHG Strategy in developing countries, in particular SIDS and LDCs, through technical cooperation and capacity building through the IMO GHG TC Trust Fund.

A short-term measure to reduce carbon intensity was adopted by way of amendments to MARPOL Annex VI, in June 2021, including the energy efficiency design index for existing ships (EEXI) and the carbon intensity index (CII), which will be introduced from 2023 onwards and are expected to have a stronger impact than the current energy efficiency-related rules, EEDI (energy efficiency design index for new ships) and SEEMP (ship energy efficiency management plan).[21] The Intersessional Working Group on Reduction of GHG Emissions from Ships at its eleventh session (ISWG-GHG 11),[22] held in March 2022, considered proposals on how to keep the impacts of the short-term measure under review and proposals for the revision of the ship fuel oil consumption data collection system. At its twelfth session,[23] held in May 2022, ISWG-GHG finalized guidelines to support implementation of carbon intensity measures and agreed to further develop a "basket of candidate mid-term measures" including technical (for example, a GHG fuel standard and/or enhancement of IMO's carbon intensity measures) and carbon pricing elements.

The 78th MEPC session in June 2022,[24] noted the progress made by ISWG-GHG 12, and the need for additional information on the proposed mid-term measures. It also noted that the proposed IMRB/F would be further considered as part of the basket of candidate mid-term measures in the context of phase II of the work plan for the development of mid- and long-term measures. It encouraged proponents of measures to work together intersessionally with a view to exploring how different elements of these proposals could be combined in the context of a basket of mid-term GHG reduction measures. Member States and international organizations were invited to submit new documents to a future session of ISWG-GHG, including refined proposals to that purpose. Given the importance and urgency of the ongoing work on GHG emissions reduction, it is hoped that significant progress on further relevant measures can be achieved soon.

While global efforts are being pursued under the auspices of IMO, some regulatory proposals are also under consideration at the EU level to extend the EU Emission Trading Scheme (ETS) to maritime transport activities, with potentially important implications for intra and extra EU trade. The EU ETS is a cap-and-trade mechanism in operation since 2005 to promote the reduction of greenhouse gases across the EU. In June 2022, the European Parliament adopted its position to extend the scope of the EU ETS to include maritime transport.[25] A relevant legislative proposal had been issued by the European Commission in 2021[26] and is undergoing consideration and negotiation.[27] By mid-2022, the text of the proposed legislation, which is both extensive and complex, had undergone significant revision by the Council and European Parliament, and its final scope and content is therefore not yet clear. However, the latest amendments proposed by the European Parliament in June 2022[28] suggest that this could include 100 per cent of emissions (CO_2 and CH_4, as well as nitrous oxide (N_2O) from maritime transport within Europe; 50 per cent of emissions from maritime transport between the EU and third countries from 2024–2026, and 100 per cent from 2027. The amended text also acknowledges the international character of shipping as well as efforts to limit global maritime emissions through the IMO; and encourages the acceleration of these efforts to make progress in line with the Paris Agreement. Express reference is also made to a legal commitment under Article 2 of the EU Climate Law,[29] in force since July 2021, to take action to reach the Union's climate-neutrality objective by 2050 at the latest and the Union's aim to achieve negative emissions thereafter.

Worth mentioning in this context are contractual approaches to allocating commercial risks associated with GHG emissions-control measures and facilitate compliance with regulatory requirements. To this end, two standard form clauses have been developed by BIMCO for incorporation into time charterparties. The EEXI Transition Clause for Time Charter Parties 2021[30] allocates responsibility and costs between the contracting parties where technical modifications are required to comply with the EEXI as from January 2023, in particular where the power output of a ship's engine is limited. The ETS – Emission Trading Scheme Allowances Clause for Time Charter Parties 2022[31] allocates costs and responsibilities for obtaining, transferring, and surrendering GHG emissions allowances for ships operating under an emissions scheme, such as the EU Emissions Trading System (ETS). A further BIMCO clause is expected to be issued in late 2022, to facilitate compliance with the Carbon Intensity Indicator (CII) regime, as from January 2023.

2. Adapting ports and other critical transport infrastructure to climate change

The year 2022 has been marked by largely unprecedented weather and climate extremes are expected to increase in frequency and/or intensity under climate change. Effective adaptation requires multifaceted approaches, including strong legal and regulatory frameworks, along with strategies, policies and plans to reduce vulnerability. Also required are appropriate standards, guidance and tools to facilitate stakeholder action on the ground,[32] and some relevant progress has been made recently.

Thus, following the adoption of the EU Climate Change Adaptation Strategy,[33] and the EU Climate Law[34] in 2021, the European Commission published important new detailed technical guidance on climate-proofing of infrastructure projects for the period 2021–2027,[35] which will be relevant for environmental impact assessments required under EU law, and for EU infrastructure project funding. The guidance aims to mainstream climate considerations in future investment and development of infrastructure projects, and help investors make informed decisions on projects, in line with the Paris Agreement and EU climate objectives. In addition, complementing earlier industry guidance on adaptation of waterborne transport infrastructure,[36] a Technical Note of the World Association for Waterborne Transport Infrastructure (PIANC), published in 2022,[37] aims to help project owners, designers and financiers deal with climate change uncertainties – not only in relation to the selection, design and evaluation of options for new waterborne transport infrastructure, but also the maintenance or modification of existing assets.

While progress on technical guidance is encouraging, significant challenges remain, particularly in respect of port infrastructure finance and investment. Major scaling up of investment and capacity building for developing countries will be critical to 'building back better' after the pandemic and to support sustainable growth strategies.[38] Adequate and affordable infrastructure adaptation finance, including in the form of grants, rather than loans will be key for the sustainable development prospects of vulnerable developing countries, including SIDS.[39]

3. UNCITRAL work on climate change mitigation, adaptation and resilience

The United Nations Commission on International Trade Law (UNCITRAL) could play a key role in the area of climate change mitigation, adaptation and resilience. Existing UNCITRAL texts, do not explicitly refer to climate considerations, but can be interpreted and applied in ways that are beneficial for the climate. This is notably the case with the UNCITRAL texts relating to commercial arbitration, public procurement, and public-private partnerships. To facilitate and encourage the utilization of these texts, guidelines could be adopted to specify how certain provisions could be applied to support the achievement of climate goals.[40] In addition, legal texts on new topics could be contemplated. The Commission, at its 55th session in July 2022,[41] requested the secretariat to conduct further research in the area.

4. Protecting the marine environment and biodiversity

Recent regulatory actions for the protection of the marine environment and conservation and the sustainable use of marine biodiversity, include the following:

a) Air pollution prevention

To comply with the IMO 0.5 per cent sulphur limit, in effect since 1 January 2020 for ships operating worldwide, vessels can use a compliant fuel which is low enough in sulphur such as VLSFO or MGO, and/or using alternative fuels such as liquefied natural gas (LNG), methanol, liquefied petroleum gas (LPG), hydrogen fuel cells, or biofuels which emit very small amounts of SOx. Another approach adopted by shipowners and charterers is fitting or retrofitting their ships with exhaust gas cleaning systems (EGCS), also known as scrubbers. Scrubbers may be open loop – discharging wash water into the sea – or closed loop - discharging residues to adequate reception facilities ashore.

In November 2021, the IMO's MEPC adopted updated guidelines for exhaust gas cleaning systems which specify the criteria for the testing, survey, certification and verification of such systems, to ensure compliance with MARPOL Annex VI. They cover continuous monitoring requirements and discharge water quality criteria, including minimum pH, maximum PAHs (Polycyclic Aromatic Hydrocarbons) concentration. They also include provisions to minimize suspended particulate matter, including heavy metals and ash, and to prevent discharge of nitrates beyond specified levels. Such criteria should be reviewed in the future as more data becomes available.[42]

Black carbon emissions – a product of incomplete combustion of carbon-based fuels – contribute to climate change, and as such were a subject to study in the Fourth IMO GHG Study 2020.[43] To address these types of emissions, a resolution was adopted by IMO's MEPC in November 2021, which urged Member States and ship operators to voluntarily use distillate or other cleaner alternative fuels or methods of propulsion that could contribute to the reduction of black carbon emissions from ships when operating in or near the Arctic.[44]

In June 2022, MEPC adopted guidelines for risk and impact assessments of the discharge water from exhaust gas cleaning systems that Member States should follow when considering local or regional regulations. It also adopted guidance regarding the delivery of EGCS residues to port reception facilities.[45]

The MEPC also agreed to designate the entire Mediterranean Sea as an emission control area (ECA),[46] meaning that from 2025, ships will have to comply with more stringent controls on sulphur oxide emissions – the limit for sulphur in fuel oil used on board ships in ECAs areas is 0.10 per cent, while outside these areas the limit is 0.50 per cent. There are currently four designated sulphur oxides ECAs worldwide: the Baltic Sea area; the North Sea area; the North American area (covering designated coastal areas off the United States and Canada); and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands).

b) Addressing plastic pollution

Plastic pollution is a serious and growing problem. About 400 million tons of plastic material are produced each year, a figure that could double by 2040. Following the adoption in 2018 of the IMO Action Plan to address marine litter,[47] a dedicated strategy to address marine plastic litter from ships,[48] was adopted by the IMO's MEPC in November 2021. The strategy aims at reducing marine plastic litter generated from, and retrieved by, fishing vessels, reducing shipping's contribution to marine plastic litter, and improving the effectiveness of port reception facilities and treatment in reducing marine plastic litter. The strategy also aims to enhance public awareness, education and seafarer training, improve the understanding of the contribution of ships to marine plastic litter and the associated regulatory framework, strengthen international cooperation, and increase technical cooperation and capacity building.

In March 2022, the United Nations Environment Assembly adopted a resolution "End plastic pollution: Towards an international legally binding instrument".[49] Negotiations on the treaty are expected to take between two and three years, under the auspices of the United Nations Environment Programme. A preparatory meeting took place in May 2022.[50] Scientific evidence-based negotiations have been highlighted as critical for success in developing an effective landmark treaty.[51]

c) Ballast water management

One of the greatest threats to the world's oceans and a major threat to biodiversity is discharge of untreated ballast water by ships, which is associated with the introduction of invasive species. Since 2017, MEPC has established an experience-building phase (EBP) associated with the Ballast Water Management (BWM) Convention, 2004,[52] to carry out a systematic and evidence-based review of this Convention, potentially leading to its review and development of a package of amendments. Following a data analysis report on the EBP, the MEPC in June 2022, agreed in principle to develop a BWM Convention Review Plan. The MEPC also approved revised guidance on methodologies that may be used for enumerating viable organisms for type approval of ballast water management systems, and guidelines for re-evaluations in cases where modifications have been made to a ballast water management system.[53] As of 15 July 2022, the BWM Convention had 91 Contracting States representing 92 per cent of the GT of the world's merchant fleet.

d) Liability and compensation for oil pollution from shipping

Bunker oil pollution is a matter of particular concern for vulnerable developing countries, including SIDS, that rely heavily on fisheries, aquaculture and tourism, and may be exposed to an oil spill from ever-larger vessels calling at their ports, or transiting in proximity to their coasts. As evidenced by the 'Wakashio' bunker oil spill, off the coast of Mauritius in 2020,[54] bunker oil pollution can have devastating consequences for the economy and tourism industry of the affected coastal States, as well as for ecosystems and biodiversity. From the perspective of those affected, the availability of adequate compensation for any losses sustained is a priority, irrespective of the type of ship that has caused the pollution. However, under the applicable international conventions, the available amount of liability and compensation for bunker oil spills differs significantly, depending on the type of ship involved and its size. The key IMO compensation treaty covering bunker oil spills from ships other than oil tankers is the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 (Bunkers Convention). However, the shipowner's liability under the Convention may be limited (Art. 6), in accordance with any applicable national or international regime such as the Convention on Limitation of Liability for Maritime Claims (LLMC), 1976, as amended in 1996.[55] As a result, the compensation available to claimants for bunker oil spills may be significantly lower – in some cases by an order of magnitude – than that available under the comprehensive international regime for compensation for oil pollution damage caused by spills from oil tankers.[56]

Despite the steady growth in ship sizes and the corresponding risks there is presently no indication that the international liability and compensation framework for ship-source oil pollution damage is likely to be strengthened in favour of the potential victims.

In 2021, three resolutions, providing for a unified interpretation on the statutory test for breaking the owner's right to limit liability under some of the key international conventions were adopted by the respective Parties to these conventions present during the 32nd regular session of the IMO Assembly.[57] The conventions concerned are the International Convention on Civil Liability for Oil Pollution Damage (CLC), 1992, which applies in cases of tanker oil pollution, and the LLMC 1976 and its 1996 Protocol, which, as noted above, may apply in cases of bunker oil pollution from other types of ship.

The unified interpretation highlights the virtually unbreakable nature of the shipowner's right to limitation of liability. While the resolutions acknowledge that "the courts in States Parties are the final arbiters on the interpretation of the Conventions […]", the unified interpretation promotes the most restrictive interpretation of the relevant provisions, thus preserving the shipowner's right to limitation of liability in virtually all circumstances. The party entitled to limitation of liability (in the case of the LLMC 1976 and its 1996 Protocol this includes "the owner, charterer, manager and operator of a seagoing ship") would only lose the right to limitation in two sets of circumstances. In case of its own "wilful misconduct" – a level of culpability that is "higher than the concept of gross negligence, since that concept was rejected by the 1976 International Conference on Limitation of Liability for Maritime Claims" and "would deprive the shipowner of the right to be indemnified under their marine insurance policy" – or in case of its own "recklessness", together with knowledge "that such pollution damage, damage or loss would probably result". In this context, "the conduct of parties other than the shipowner, for example the master, crew or servants of the shipowner, is irrelevant and should not be taken into account". Whether the unified interpretation will affect the outcome of legal proceedings remains, however, to be seen, as this depends on the approach to interpretation taken by the competent national courts.

Development of a claims manual for the 2001 Bunkers Convention

For the 1992 Fund Convention,[58] which provides a second tier of compensation in cases of tanker oil pollution, there is a Fund Claims Manual[59] but there is no corresponding manual for the Bunkers Convention. Therefore, since 2020 the IMO Legal Committee has been working on a claims manual for the 2001 Bunkers Convention to guide national courts, claimants, shipowners and insurers in their interpretation of the Convention. An initial draft was considered by the IMO Legal Committee in 2022, but further work will be carried out by a remote intersessional group.[60] As highlighted by UNCTAD, further consideration should be given to some of the key issues that are of particular interest to claimants. This would include matters relating to limitation of shipowner liability under international agreements referred to in Art 6 of the 2001 Bunkers Convention, in particular the 1976 LLMC, and its 1996 Protocol. It would also include differences between direct claims against shipowners or their mutual insurers, and formal legal proceedings under the Bunkers Convention against any of the parties falling within the definition of 'shipowner', as well as related considerations and procedural issues. Moreover, the claims manual should be transparent in respect of issues that may be subject to differing legal interpretation or controversial, such as the question of whether some claims might be considered to fall outside the types of claims subject to limitation under the 1976 LLMC and 1996 Protocol. Further information/guidance relevant to environmental damages and recovery of costs of reinstatement of the environment based on experience of the IOPC Funds would also be particularly valuable for potential claimants. As concerns reliance on the IOPC Funds Manual, due account should be taken of the specific differences highlighted by the IMO Legal Committee at its 108th session in 2021. The 109th session of the IMO Legal Committee noted the comments and suggestions made during the discussion and agreed that they should be considered by the correspondence group. Active participation in the ongoing intersessional work by countries concerned about being affected by a bunker oil spill, including developing countries and SIDS, is strongly encouraged.

Measures to assess the need to amend liability limits

The IMO Legal Committee, in March 2022, discussed proposals to develop methodologies for assessing the need to amend liability limits in a number of liability and compensation treaties, and established an intersessional correspondence group to develop a list of principles and policy considerations that will need to be decided by the Committee and begin developing elements that would need to be included in a draft methodology. The work will focus initially on the Convention on Limitation of Liability for Maritime Claims, 1976, as amended by the 1996 Protocol.[61]

C. SEAFARERS

Smooth delivery of trade goods by shipping and efficient handling of cargo by ports depend mainly on the ability of seafarers and labour force to fulfil their roles in an efficient, safe, and sustainable manner. Currently 1.89 million seafarers – most of whom from developing countries – are operating over 74,000 vessels in the global merchant fleet.[62] They have been at the forefront of the response to the COVID-19 pandemic, ensuring that supplies of food, fuel, medicine and other essential goods continue to reach their destinations.

1. The seafarer crew change crisis

At the height of the pandemic, around 400,000 seafarers were unable to leave or join ships due to COVID-19 restrictions. A significant proportion still remains affected – threatening the wellbeing, health and human rights of seafarers as well as the smooth flow of goods across supply chains.[63] In February 2022, UNCTAD, together with IMO, ILO, and WHO, issued a related Joint Statement,[64] urging continued collaboration to address the crew change crisis, safeguard seafarer health and safety, and avoid supply chain disruptions. The four organizations call on governments, national and local authorities, and all relevant stakeholders, including employers, to take the following ten critical actions:

(a) Provide seafarers with immediate access to medical care as well as facilitate their medical evacuation when the required medical care cannot be provided on board.

(b) Designate seafarers as "key workers", providing an essential service, to facilitate maritime crew changes and safe movement across borders, and recognize relevant documentation for this purpose.

(c) Prioritize the vaccination of seafarers, as far as practicable, in national COVID-19 vaccination programmes and exempt them from any national policy requiring proof of COVID-19 vaccination as the only mandatory condition for entry, in accordance with WHO recommendations.

(d) Provide or administer COVID-19 tests and appropriate PPE to seafarers, including PCR tests where necessary, to facilitate the identification of cases on board or at the port, and to facilitate the movement of seafarers, including shore leave and crew changes.

(e) Ensure the consistent application of internationally agreed protocols and standards, including those for seafarers' travel and vaccination documents, coordinate appropriately, and avoid punitive measures, fines and excessive costs.

(f) Adopt the latest legal instruments, including the MLC, 2006 and the Seafarers' Identity Documents Convention (Revised), 2003, as amended (No. 185), and ensure their implementation.

(g) Implement the recently updated WHO guidance for the management of COVID-19 on board cargo ships and fishing vessels, published in December 2021,[65] which, among other issues, highlights the importance of non-medical interventions, such as the use of face masks irrespective of vaccination status.

(h) Provide public key certificates associated with any health proof to relevant trust networks, such as ICAO for international travel.

(i) Continue to collaborate to ensure that guidance is regularly updated, in line with developments and evolving scientific insights; and mechanisms are in place to reduce and effectively respond to medical emergencies at sea.

(j) Undertake concerted collaborative efforts to keep seafarers safe, and limit disruption to supply chains, as well as prevent the unchecked spread of emerging VOCs, which could prolong the pandemic and its wide-ranging socioeconomic consequences.

In 2022, the ILO Committee of Experts on the Application of Conventions and Recommendations (CEARC)[66] reiterated its deep concern for the protection of seafarers' rights as laid out in MLC, 2006, as amended. It welcomed the fact that a number of Contracting States to the Convention have adopted measures to ensure seafarers' rights during the pandemic. These include: (1) ensuring a high number of safe crew changes at their ports; (2) ensuring medical care on board and on shore, including dental care; (3) attending COVID-19 outbreaks on board and providing care in national hospitals when needed; (4) keeping borders open for the transit of seafarers in line with strict national protocols; (5) revising previous temporary guidance on Seafarer Employment Agreement's extensions to comply with the requirements of the Convention; (6) reinitiating rigorous port State control inspections focusing on employment agreements and wages; (7) developing

services online to support shipowners and seafarers; (8) rehabilitating welfare services in port and keeping them open even if with some restrictions, for example, setting up wi-fi in ports to allow seafarers to establish contact with welfare services; and (9) prioritizing seafarers for vaccination within national programmes. The report, however, also expressed deep concern that violations of the Convention may further increase due to new restrictions adopted by governments to contain the variants of COVID-19.

A general observation[67] adopted earlier by the ILO CEARC, stresses that the notion of force majeure should not be regarded as a valid reason to deprive seafarers of their rights, as there are options available worldwide to comply with the provisions of the MLC 2006. It recalls the resolutions adopted by the Special Tripartite Committee, as well as the ILO Governing Body's Resolution concerning maritime labour issues and the COVID-19 pandemic,[68] and the UN General Assembly's Resolution on international cooperation to address challenges faced by seafarers as a result of the COVID-19 pandemic to supply global supply chains,[69] and urges all ILO Member States to designate and treat seafarers as key workers, facilitate crew changes, provide access to medical care ashore when needed, and prioritize seafarers for vaccination. In addition, ratifying States, which have not yet done so, are urged to adopt, without delay, all necessary measures to fully restore the protection of seafarers' rights and fully comply with their obligations under the MLC 2006.

In addition, a recent ILO statement[70] noted that "despite some countries recognising seafarers as key workers and shipping as an essential asset to the global economy, it is disturbing to note that many port States have again imposed disproportionate quarantine and travel restrictions on seafarers, despite the measures in place for infection control. The crew change situation remains critical and appears to be deteriorating, which jeopardises the safe and uninterrupted delivery of vital supplies. In certain areas of the world, seafarers are systematically denied access to medical facilities when in need of immediate care, causing an imminent renewed humanitarian crisis."

In May 2022, the ILO, at a meeting of the Special Tripartite Committee, agreed on new amendments to strengthen MLC 2006, based on lessons learned from the COVID-19 pandemic. These relate to: bolstering legal requirements for seafarers to be able to access medical care ashore and to facilitate repatriation of the remains of seafarers who have died on board; strengthening health and safety policies on board ships to protect against accidents and ensure that all deaths of seafarers are recorded and reported annually to the ILO and that the relevant data is published; and further facilitate seafarers' communication with their loved ones ashore. The meeting took place against the backdrop of the seafarer crisis in Ukrainian ports and the Sea of Azov. Governments reiterated their support for a related ILO resolution[71] calling for the swift and safe disembarkation and repatriation of the 500 remaining trapped seafarers. They called for the prompt delivery of critical supplies, such as food, water, and medicines to these key global workers caught in the conflict zone.

In advance of the ILO meeting, the International Chamber of Shipping (ICS) also published a report[72] outlining the impact of COVID-19 on shipping, seafarers, and maritime labour markets, including calls to action, to mitigate future crises. ICS had also released its latest medical guidelines for ship operators and shipping companies, covering seafarer health and wellbeing,[73] and vaccination best practices.[74] The guidance provides updated information on embarking and disembarking seafarers in accordance with relevant COVID-19 regulations, and new advice on the repatriation of deceased seafarers.

Earlier, in December 2021, a resolution[75] was approved at the IMO on issues related to crew change, access to medical care, "key worker" designation and seafarers' prioritization for COVID-19 vaccination. Also, guidance was approved on seafarers' training and certification during the COVID-19 pandemic, outlining that while States had to resort to the principle of force majeure, which is temporary, they should seek to revert to performing their obligations under the STCW Convention and Code as soon as possible.

In addition, in October 2021, a seafarers' rights and welfare Code of Conduct,[76] was published, which brings together shipowners, ship operators, charterers and cargo owners to drive positive change in the industry, through individual and collective action and increased transparency to deliver on seafarers' rights. Based on international labour and human rights standards and principles, the Code of Conduct focuses on the full spectrum of seafarers' rights and welfare, from fair terms of employment and crew protection to availability and appropriate management of grievance mechanisms.

As regards developments at the World Health Organization (WHO), in December 2021, the World Health Assembly established an intergovernmental negotiating body to start drafting and negotiating a convention, agreement or other international instrument on pandemic preparedness and response. Related meetings and public hearings have already started, and the work outcome is expected to be submitted for consideration by the 77th World Health Assembly in 2024.[77]

Furthermore, a Joint Action Group to review the impact of the COVID-19 pandemic on the world's transport workers and the global supply chain (JAG-TSC) was established at the meeting of the Director-Generals of ILO and WHO with the heads of international transport organizations on 6 December 2021.[78] An Ad hoc virtual UN inter-agency Task Force on the impact of COVID-19 on seafarers, was established on 14 January 2022 by the UN Secretary-General's Executive Committee in response to a request by the Director-General, in keeping with the Resolution concerning the implementation and practical application of the MLC, 2006 during the COVID-19 pandemic,[79] which had been adopted in 2021 by the Fourth Meeting of the Special Tripartite Committee of the MLC, 2006 – Part I.[80] Both groups are to finish their work by the end of 2022.

2. Seafarer abandonment

As of March 2022, an increase in abandonment cases as a result of the COVID-19 pandemic had been observed. According to information from the IMO/ILO joint database, 78 cases of abandonment had already been reported as of 15 August 2022. During 2021, a record 95 new cases had been reported. Of these, only 31 had been resolved. During 2020, the total number of reported cases was 85. Of these, 43 cases had so far been resolved. Of the cases reported since 2020, 21 were related to the COVID-19 pandemic. Discussion relating to a solution to this situation, was encouraged at IMO. Member States were reminded to ratify and implement the relevant international instruments, and to report incidents of abandonment to the relevant database. Flag States and port States were urged to take further action to ensure the presence of financial security, as required by the MLC 2006, Standard A2.5.2, and to take appropriate action when financial security is not in place.[81]

3. Seafarer issues related to the war in Ukraine

The war in Ukraine is also taking a toll on merchant shipping, with a growing number of ships being detained or remaining stuck in war-torn areas. This raises concerns for the wellbeing of thousands of seafarers, both at sea and ashore, who were already suffering the consequences of the COVID-19 crisis.

In April 2022, a resolution was adopted by the IMO's Maritime Safety Committee on actions to facilitate the urgent evacuation of seafarers from the war zone in and around the Black Sea and the Sea of Azov. IMO also encouraged continuing efforts to establish safe maritime corridors and the safe evacuation of seafarers from the affected area.[82] Earlier guidance had covered insurance and other financial security certificates.[83]

On 8 April 2022, the Director-General of the ILO and the Secretary-General of the IMO called for urgent action to protect seafarers and vessels stranded in Ukrainian ports and reached out to humanitarian agencies requesting urgent action to assist in the reprovisioning of the ships concerned.[84]

According to the 2021 Seafarer Workforce Report,[85] of the 1.89 million seafarers in the global merchant fleet, 198,123 (10.5 per cent) were Russian, of whom 71,652 were officers and 126,471 were ratings. Another 76,441 (4 per cent) were Ukrainian, of whom 47,058 were officers and 29,383 were ratings. Together, Russian and Ukrainian seafarers represent 14.5 per cent of the global workforce.

Also worth noting in this context is the establishment, in July 2022, of the Joint Coordination Centre (JCC) for the Black Sea Grain Initiative, to monitor implementation of this Initiative to establish a humanitarian maritime corridor to allow ships to export grain, other foodstuffs and fertilizers from Ukraine.[86] The JCC comprises representatives of the Russian Federation, Türkiye, Ukraine, and the United Nations. Two related United Nations task forces were established in parallel; one of which focuses on facilitating exports of Russian food and fertilizers and is headed by the Secretary-General of UNCTAD.

4. Women in shipping

The first IMO International Day for Women in Maritime on 18 May 2022,[87] provided a special platform to highlight and celebrate the achievements of women in maritime trade and transport in particular and identify areas for improvement of gender balance and diversity.

A 2021 IMO-WISTA (Women's International Shipping & Trading Association) Women in Maritime Survey Report,[88] found that women accounted for only 29 per cent of the overall workforce in the general industry and 20 per cent of the workforce of national maritime authorities in Member States. The report highlighted great variation amongst individual sub-sectors. According to data gathered from Member States, search and rescue teams in national maritime authorities account for significantly fewer women staff (just 10 per cent) as compared to female diplomats (33 per cent) and training staff (30 per cent).

Women seafarers make up just 2 per cent of the crewing workforce and are predominately found in the cruise sector, while in ship-owning companies, they made up 34 per cent of the workforce. This survey is a good first attempt, but a lot of work still needs to be done.

In addition, The Mission to Seafarers published the Women Seafarers Report 2022.[89] The report considers the unique challenges faced by women at sea and how organisations can tailor their support to contribute towards a better future for female seafarers.

The Fourth Meeting (Part II) of the Special Tripartite Committee of the MLC, 2006 (May 2022) adopted a Resolution on Harassment and Bullying, including Sexual Assault and Sexual Harassment, in the Maritime Sector[90] and, in a related matter, issued a statement on ensuring a safe working environment on board vessels where seafarers can live without fear of discrimination and physical or mental abuse.[91]

D. OTHER LEGAL AND REGULATORY DEVELOPMENTS AFFECTING TRANSPORTATION

1. Combating fraudulent registration and registries of ships

In 2021, the IMO Assembly, following earlier work on measures to prevent fraudulent ship registration and registries to which UNCTAD had contributed,[92] adopted a related Resolution to promote actions for the prevention and suppression of fraudulent registration and fraudulent registries, and other fraudulent acts in the maritime sector.[93] In March 2022, the IMO Legal Committee agreed to establish a study group on fraudulent registration and fraudulent registries of ships, and possible measures to prevent them. The study group will include UNCTAD, the World Maritime University, the IMO International Maritime Law Institute and other interested parties and is expected to present its final findings in 2024. In addition, agreement was reached on a definition of "forged/false documents".[94]

2. Encouraging ratification of the 2010 HNS Convention

The 2010 HNS Convention is the key IMO compensation treaty covering the maritime transport of hazardous and noxious substances (HNS) by ships. Its entry into force would bridge an important gap in the international liability and compensation framework for maritime transport. Following ratification by Estonia in 2022, only six further ratifications with the required contributing cargo are needed for the Convention to enter into force.[95] Once in force, the treaty will provide a regime of liability and compensation for damage caused by HNS carried by sea, including non-persistent oil and chemicals, and covering not only pollution damage, but also the risks of fire and explosion, including loss of life or personal injury as well as loss of or damage to property. An HNS Fund will be established to pay compensation once a shipowner's liability is exhausted. This Fund will be financed through contributions paid post incident by receivers of HNS cargoes. All countries are encouraged to ratify the Convention.

3. Multimodal transport: developments at UNCITRAL and UNESCAP

Despite numerous attempts, no uniform legal regime on multimodal transport has entered into force internationally.[96] Instead, the existing framework consists of a complex jigsaw of international conventions designed for unimodal carriage, regional and sub-regional agreements, national laws, and standard term contracts. This is associated with a lack of legal certainty and a need for costly evidentiary enquiries and litigation.

UNESCAP – Harmonizing multimodal legal frameworks in Asia and the Pacific

Based on the recommendations of expert group meetings held during 2020–2022, in which UNCTAD participated, and taking into account the results of a region-wide survey in 2021, UNESCAP has prepared guidelines for harmonizing the key common provisions for multimodal transport within national legal systems. Given that only a few countries of the region have national laws on multimodal transport, such a model instrument could help promote a unified approach to multimodal transport through relevant acts of national legislation.[97]

UNCITRAL – Negotiable multimodal transport documents

To facilitate the preparation of a new instrument on negotiable multimodal transport documents (NMTDs), two expert group meetings were held by UNCITRAL. In November 2021, experts discussed Part I of the Preliminary Draft Provisions on Negotiable Cargo Documents which mainly dealt with the negotiability aspects of a new instrument. At the meeting in March 2022, experts discussed the dematerialization aspects of NMTDs with Preliminary Draft Provisions (Part II) serving as basis for the discussion. Since the proposed new instrument is intended to operate in parallel with existing international conventions, which are still structured on the premise of the issuance of a "document" rather than on a system of information management, the secretariat has taken a cautious approach.

A number of concerns were voiced with respect to the "safety" issue regarding electronic documents as well as the relationship between government intervention and market choice. A concern was raised by UNCTAD as to how to address any potential implications that may arise in relation to liability issues, given that no international mandatory liability regime is in force for multimodal transport. If and when a multimodal transport bill of lading attains full legal recognition as a negotiable document/electronic record and can be traded in the same way as a marine bill of lading, along a string of buyers, there is a potential for unfair contract terms which could unduly affect the rights of a third-party consignee (such as

a CIF or FOB buyer) in a cargo claim. Therefore, the issue of liability should be considered as part of the negotiations of a new international instrument.

Given the broad substantive scope of the proposed future legal instrument on negotiable multimodal transport documents at UNCITRAL, public and private stakeholders in both multimodal transport and in all the different modes are encouraged to participate in any related further work. For small traders in developing countries, a key concern will be adequate liability for cargo loss or damage. UNCTAD will continue to participate in any related work under the auspices of UNCITRAL.

4. Other regulatory developments on electronic trade documents

A project on electronic trade documents initiated by the England and Wales Law Commission was implemented in 2021. Its outcome took the form of a report and a draft Bill[98] containing recommendations for legislative reform in the jurisdiction to allow for electronic trade documents to be recognized as possessable and to have the same legal recognition and functionality as their paper counterparts. The draft legislation on Electronic Trade Documents has been included in the UK legislative calendar.[99] If and when the legislation enters into force, it is expected to provide a significant boost to the use of electronic equivalents to traditional paper bills of lading, reducing the potential of delay in transmission of documents and associated problems.

Relevant legislation was also adopted in Singapore in 2021, to ensure legal recognition of electronic trade documents.[100] In the meantime, industry associations have been collaborating on the development and adoption of relevant standards to facilitate the use of electronic bills of lading. For instance the Digital Container Shipping Association (DCSA), the Baltic and International Maritime Council (BIMCO), the International Federation of Freight Forwarders (FIATA), the International Chamber of Commerce (ICC) and the Society for Worldwide Interbank Financial Telecommunication (SWIFT) in February 2022, formed the Future International Trade Alliance and signed a memorandum of understanding to standardise digitalization of international trade, aimed at raising awareness about the importance of common and interoperable data standards and common legislative conditions across international jurisdictions and platforms.[101]

The use of electronic trade documents including electronic bills of lading in the shipping industry, is on the rise as confidence in the platforms increases, and as more countries start to adopt national legislation, including legislation based on the UNCITRAL Model Law on Electronic Transferable Records (MLETR), thus ensuring greater international harmonization of laws. The benefits of electronic trade documents including electronic bill of lading equivalents were brought into sharp focus during the COVID-19 pandemic when delays caused by difficulties in presenting paper documents have arisen. Their use is expected to result in faster transactions, lower transportation costs, better financing, cargo holding and document processing, as well as reduced fraud risks due to digital authentication, and increased trust among businesses. However, with increasing reliance on electronic interactions, stakeholders will also have to manage any associated cyber-risks and enhance their security in the use of ICT systems.

5. Negotiations on a legally binding instrument on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction

In 2022, under the auspices of the United Nations, negotiations continued on an international legally binding instrument under the United Nations Convention on the Law of Sea (UNCLOS), 1982 on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. (BBNJ) Negotiations focus on “the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, in particular, together and as a whole, marine genetic resources, including questions on the sharing of benefits, measures such as area-based management tools, including marine protected areas, environmental impact assessments and capacity building and the transfer of marine technology.”[102]

The fourth session, which was postponed due to the COVID-19 pandemic, was convened in March 2022.[103] Many delegations stressed that the new legal regime should be guided and underpinned by the principle of the common heritage of humankind. Several delegations recalled that it should not undermine relevant legal instruments and frameworks and relevant global, regional, and sectoral bodies. Some delegations emphasized the need to ensure the universality of the agreement, recalling that neither participation in the negotiations nor their outcome may affect the legal status of non-parties to the Convention or any other related agreements.

With regard to capacity building and the transfer of marine technology, further discussions would be needed on the obligation to provide those, and on how to overcome the binary division between provision on a mandatory and a voluntary basis. Other issues to be resolved, included: how to frame the obligations on capacity building and the transfer of marine technology; how cooperation with other stakeholders might be referenced; the terms on which the transfer of marine technology would be undertaken; and whether, and if so how, to provide an indicative and non-exhaustive list of types of capacity building and transfer of marine technology.

As regards marine genetic resources, including questions on the sharing of benefits, there appeared to be a general trend towards the development of a notification system for the collection of, or access to, marine genetic resources of areas beyond national jurisdiction, with delegations expressing flexibility. While there was general support for the understanding that the sharing of certain benefits should be mandatory, more engagement would be needed on the sharing of other benefits, including monetary benefits, and on benefit-sharing modalities.

With respect to measures such as area-based management tools, including marine protected areas, further consultations would be required, including concerning the relative roles of States parties and the conference of the parties in promoting coherence and complementarity in their establishment.

With regard to environmental impact assessments, continued engagement would be required on issues such as the trigger for the conduct of such assessments and which threshold should be used.

As regards cross-cutting issues, further effort would be needed to close the gap in respect of institutional arrangements. Also, further work was needed on the sources of funding to assist States parties in their implementation of the agreement, including on the question of mandatory contributions from States parties. In addition, common ground would still be needed on which dispute settlement procedures are to be employed under the agreement, and on the issue of the scope, if any, to seek advisory opinions from the International Tribunal for the Law of the Sea. There was, however, general interest in a joint proposal on an additional procedure for the settlement of disputes of a technical nature.[104]

The fifth session was held in August 2022 but was suspended without any agreement being reached. Discussions are expected to resume at a later date.[105]

5. Status of conventions

A number of international conventions in the field of maritime transport have been prepared or adopted under the auspices of UNCTAD. During the current reporting period, only the status of the International Convention on Arrest of Ships, 1999 has changed with one additional accession (Peru) in March 2022.[106]

E. SUMMARY AND POLICY CONSIDERATIONS

Commercial law implications of the pandemic

The legal implications of the pandemic for the closely interconnected commercial contracts involved need to be better understood, to avoid costly litigation and to help inform commercial contracting practice. UNCTAD has highlighted key legal implications for different types of commercial contracts and the need for commercial risk allocation through suitably drafted contractual clauses. Considerations vary, however, depending on the type of contract concerned and the relative bargaining power of the parties. Areas for policy intervention include possible mandatory controls on container demurrage at ports as well as stronger dispute resolution mechanisms, facilitating crew changes, and removing remaining legal and regulatory obstacles to the adoption of electronic documents.

Reducing greenhouse gas emissions from shipping and adapting ports to the impacts of climate change

Both mitigation and adaptation to global climate change are becoming increasingly urgent imperatives for policymakers and industry alike. Timely and effective climate change adaptation of seaports and other key transport infrastructure will be critical for vulnerable developing countries, including SIDS. However, securing adequate and affordable infrastructure adaptation finance remains a major challenge for developing countries.

At COP26 in Glasgow, some positive outcomes related to shipping include the Clydebank Declaration aiming to initially establish six zero-emission "green corridors"– entirely decarbonized maritime routes between two or more ports, by 2025. At IMO, work is underway on a revised IMO GHG Strategy, to be submitted for consideration in 2023, as well as on proposals for further mid-term GHG reduction measures, including market-based measures (MBMs).

Reducing pollution from shipping

As well as emitting CO_2 ships are a major sources of air pollution. From 2020, to comply with the International Convention for the Prevention of Pollution from Ships, ships operating worldwide, have had to use fuels that contain less than 0.5 per cent sulphur. In 2021, the IMO's Marine Environment Protection Committee adopted updated guidelines for exhaust cleaning systems, as well as a resolution urging the voluntary use of cleaner alternative fuels and alternative methods of propulsion for ships operating in or near the Arctic.

Another major form of maritime pollution is bunker oil spills. Risks are growing and the need to ensure the availability of adequate compensation deserves renewed attention. While work continues at the IMO on developing a claims manual for the Bunker Oil Pollution Convention, 2001, it will be important to ensure that the manual effectively responds to the needs and concerns of claimants, including in vulnerable developing countries.

In November 2021, reacting to the ever-growing crisis of plastic pollution the IMO adopted a strategy on marine plastic litter from ships. And in March 2022, UNEP adopted a resolution for an international legally binding instrument to end plastic pollution.

Seafarers

Many port States have again imposed disproportionate quarantine and travel restrictions on seafarers. Thus, the crew change crisis remains an important priority for further collective action by governments and industry stakeholders alike.[107] Based on lessons from the COVID-19 pandemic, amendments to the MLC 2006 were agreed at ILO to strengthen ship health and safety policies and improve seafarer access to medical care ashore and to communications lines. In addition, WHO has issued guidance for the management of COVID-19 on board cargo ships and fishing vessels and has started work on a convention, agreement or other international instrument on pandemic preparedness and response.

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END NOTES

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