

## C. PORT SERVICES AND INFRASTRUCTURE SUPPLY

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

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

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

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

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

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

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

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

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

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

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

From the perspective of port development, terminal investments by shipping lines can have a positive impact. For example, these investments can make it possible to secure more capital investment to upgrade port facilities to serve ever-larger vessels, increase efficiency and service reliability, and reduce costs and operating times (Zhu et al., 2019). Yet, increased vertical

integration between shipping and port services could also discourage other lines from calling at ports, limit choices available to shippers and influence approaches to terminal concessions (UNCTAD, 2018).

## 2. Impact of the pandemic and responses thereto

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

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

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

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

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

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

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

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

During the COVID-19 crisis, the role of information and communications technologies (ICTs) in promoting trade facilitation has become increasingly prominent. Digital trade facilitation commonly refers

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Source: UNCTAD, 2020b.

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

### *Leveraging automation and digitalization to develop port resilience*

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

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

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

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

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

## D. CONCLUSIONS AND POLICY CONSIDERATIONS

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

### *Managing capacity to cope with oversupply*

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

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

### *Leveraging technology to cope with disruption*

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



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

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

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

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

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

The COVID-19 crisis has revealed the importance of maritime transport as an essential service ensuring the continuity of trade and supply of critical supplies and the global flow of goods during the pandemic. Ensuring the proper functioning of maritime transport services is a precondition for economic recovery.

Policies that consider long-term objectives for the sector will be crucial to “build back better” in a future beyond the pandemic crisis. This means considering climate change as a global challenge that poses a threat of increased disruption to transport operations. It also means prioritizing investments that can bring simultaneous economic and environmental benefits, for example by expediting the adaptation of alternative fuels, as well as the use of wind and solar energy for ships. Reducing the carbon footprint of the fleet, either through fleet renewal or retrofits, represents a significant challenge (UNCTAD, 2020c). Given the characteristics of shipping markets and age of the fleet in many small island developing States and least developed countries, additional investment and capacity-building will be required.

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

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

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