

PORTS AND LOGISTICS SCOPING STUDY IN CAREC COUNTRIES

VOLUME II: PORTS AND SHIPPING

MARCH 2021



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ABBREVIATIONS

ADB	Asian Development Bank
ASCO	Azerbaijan Caspian Shipping Company
CAREC	Central Asia Regional Cooperation Program
CIS	Commonwealth of Independent States
EAEU	Eurasian Economic Union
ECO	Economic Cooperation Organization
EU	European Union
GR	Georgia Railways
ha	hectare
IMO	International Maritime Organization
KAZ	Kazakhstan
Km	kilometre
LAT	lowest astronomical tide
m ²	square meters
mt	million tonnes
mtpa	million tonnes per annum
OPIC	Overseas Private Investment Corporation
ра	per annum
РМО	Ports and Maritime Organization of Iran
PRC	People's Republic of China
ROK	Republic of Korea
Ro-Ro	Roll on-Roll off
RZD	Russian Railways
SEZ	Special Economic Zone
TEU	twenty-foot equivalent unit or 20' container
TITR	Trans-Caspian International Transport Route
tpa	tons per annum
TRACECA	Transport Corridor Europe Caucasus Asia
UKR	Ukraine
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific

1. Introduction

1.1 CAREC Countries' Access to Seaports

Landlocked Central Asia Regional Economic Cooperation (CAREC) countries include Afghanistan, Azerbaijan, Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, Turkmenistan, and Uzbekistan. Six of the 11 CAREC countries host seaports though three of these countries (Azerbaijan, Kazakhstan, and Turkmenistan) host ports on the landlocked Caspian Sea. Georgia has ports on the Black Sea that feed into the Mediterranean Sea through the Bosphorus Strait. Pakistan and the People's Republic of China (PRC) are the only two CAREC countries that host open-sea ports capable of serving large bulk and container ships. The PRC has the higher capacity port infrastructure that attracts the widest range of shipping services.

Before considering the significance of open-sea ports in third-party countries, it is important to note that international trade through seaports in Pakistan and the PRC cannot offer a total solution to the CAREC region as a whole. This is because the varied locations of traded goods to and from CAREC countries will dictate use of third-party ports and various modalities. These factors emphasize the importance of international seaports and transport corridors located in third-party countries to CAREC nations trade activity.

1.2 Ports and Hinterlands

In CAREC landlocked countries, production and consumption centers are mostly located more than 800 kilometers (km) away from the closest seaport. This equates to 2 or more days' travel time. In some CAREC countries the distances are even greater as illustrated in Table 1: CAREC Countries with Sea Port Access.

In an ideal world, landlocked countries would use closer ports as default gateways. However port hinterlands are defined not only by distance but by a series of factors such as the main origin and destination of cargoes, the maritime connectivity, with the hinterland enabled by reliable multimodal transport, availability of backhaul cargoes and institutional aspects (e.g., ease to cross borders,

CAREC Country	Landlocked	Seaport Access	Range to Nearest Seaport (kilometer)	Mode of Access to Nearest Seaport
AFG	Yes	Nil	1,200 – 1,600	Road
AZE	Yes	Caspian	800	Rail – Road – Canal
GEO	No	Black Sea		
KAZ	Yes	Caspian	3,000	Road – Rail - Canal
KGZ	Yes	Nil	4,500 - 5,200	Rail – Road
MON	Yes	Nil	1,700 - 6,000	Rail – Road
РАК	No	Arabian Sea		
PRC	No	Pacific		
TAJ	Yes	Nil	1,500 – 2,500	Rail – Road
ТКМ	Yes	Caspian	1,600	Rail – Road - Canal
UZB	Yes	Nil	2,000 - 1,800	Rail – Road

Table 1: CAREC Countries with Sea Port Access

AFG = Afghanistan, AZE = Azerbaijan, GEO = Georgia, KAZ = Kazakhstan, KGZ = Krygyz Republic, MON = Mongolia, PAK = Pakistan, PRC = People's Republic of China, TAJ = Tajikistan, TKM = Turkmenistan, UZB = Uzbekistan.

Source: UNCTAD, 2014 and Authors calculations.

security, trade and transport agreements). These factors explain that though Iran and Pakistan ports are closer to some Central Asian countries such as Uzbekistan, Turkmenistan, or Tajikistan (on the range of 2,000 km) they are less used than other ports located much further away (up to 4,000 km and 5,0000 km) in the Pacific or the Baltic. Port hinterlands also depend on the competitiveness of direct land transport vis-à-vis feedering. As an example, some cargoes to Georgia may use land transport from a Turkish port instead of using feeder services across the Black Sea.

Few landlocked CAREC countries can be described as captive hinterlands of particular ports. The closest to that notion would be Azerbaijan for Georgian ports and Afghanistan for Pakistani ports. However, in both cases their markets are also contested by ports in Turkey, the Russian Federation, or Iran. The most part Central Asia is a contested hinterland of several ports located east, west and south of their landmass. Thus the interest manifested by third-party countries in particular the PRC, but also the Russian Federation, and to lesser extent the EU, India, or Turkey in the development of new ports, intermodal transport corridors and trade and transport agreements to facilitate access to this vast hinterland.

In this study, ports and corridors linking landlocked CAREC countries have been clustered into six groups. Some of these corridors extend into the open-sea ports through non-CAREC countries, notably the Russian Federation, Iran, and Turkey. For each corridor the equivalence into CAREC corridors is mentioned. The assessment of ports, shipping, and multimodal corridors in this report has been structured according to these corridors, which are illustrated in Figure 1. This volume II includes a detailed description of main ports and shipping routes serving all these corridors.



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Ports are analysed in this report play four types of roles:

- Ports in CAREC countries that act as gateways for land transport corridors to other CAREC countries including: Poti and Batumi (Georgia); Karachi, Mhd. Bin Qasim, and Gwadar (Pakistan); and Lianyungang and Tianjin (PRC).
- Ports in non-CAREC countries that act as gateways of land corridors to other CAREC countries including: Riga (Latvia), Klaipeda (Lithuania), St. Petersburg (the Russian Federation) or Gdansk (Poland); Mersin (Turkey); Bandar Abbas and Chabahar (Iran); or Vladivostok and Vostochny (the Russian Federation).
- Ports in CAREC and non-CAREC countries being transhipment points for sea-land/land-sea serving multimodal corridors. This is the typical role of ports at the Caspian and Black seas.
- Ports in non-CAREC countries being transhipment points sea-sea, linking major container trunk routes with feedering routes serving CAREC countries including: Piraeus (Greece), Jebel Ali (United Arab Emirates) and Indian ports.

Some ports may play more than one role, e.g. Istanbul as gateway for land routes to the Caucasus and beyond and as transhipment port for shipping routes across the Black Sea.

A summary table of main features of ports included in this report is provided in the following table:

Table 2: Overview of Main Features of Ports

	Port Name	Year-round navigation	Total port area	Land area	Min. water depth alongside berths	Max. water depth alongside berths	Total quay length	Number of commercial berths	Port capacity	Combined	Container terminals capacity per annum	Containerized throughput	Ferry terminals capacity per annum
			(ha)	(ha)	(L	(m)	(km)		(mtpa)	(mt)	(,000 TEU)	(,000 TEU)	trailers (unless explicited)
ea	GDANSK	Yes	1,065.0	653.0	9.4	16.0	23.7	21.0	60.0	52.0	3,250.0	1,948.9	350,000
es c	RIGA	yes	6,348.0	1,962.0	7.9	15.0	18.0	21.0	63.0	32.8	1,100.0	467.0	190,000
altio	KLAIPEDA	yes	1,442.0	557.0	9.0	15.0	24.7	119.0	65.0	46.3	1,200.0	703.0	300,000
В	ST PETERSBURG	yes	NA	415.0	9.0	15.1	5.3	31.0	80.0	59.2	4,200.0	2,097.0	1
	ISTANBUL	yes	5,000.0	1,298.0	9.6	18.0	30.6	104.0	205.0	108.0	16,000.0	8,500.0	3,000,000
1	MERSIN	yes	400.0	110.0	8.5	15.8	3.3	29.0	48.2	32.5	2,600.0	1,960.0	150,000
eəs	PIRAEUS	yes	NA	500.0	9.0	19.5	24.0	44.0	93.8	50.9	7,200.0	5,650.0	1,100,000
rck ;	KOPER	yes	NA	274.0	6.0	18.9	3.2	28.0	37.0	24.0	1,300.0	988.0	200,000; 1.6 m cars
BIS /	SAMSUN	yes	NA	44.5	6.5	12.0	2.7	10.0	23.0	12.2	125.0	67.0	100,000
ึ นซ	VARNA	yes	NA	50.6	10.5	11.5	5.8	33.0	15.0	9.5	300.0	139.0	168,000 wagons
əut	CONSTANTA	yes	3,926.0	1,300.0	8.0	19.0	29.8	156.0	100.0	66.0	1,800.0	666.0	45,000
erra	ODESSA	yes	NA	141.0	9.0	14.0	9.0	54.0	50.0	21.7	1,400.0	650.0	NA
tib	ROSOV-ON-DON	No	NA	100.0	3.6	4.2	9.0	27.0	28.0	23.0	50.0	I	0
эM	NOVOROSSIYSK	yes	NA	95.0	6.8	13.9	5.4	11.0	200.0	154.0	1,600.0	755.0	40,000
	BATUMI	yes	NA	22.0	6.4	11.5	2.0	11.0	20.0	3.0	200.0	116.1	28,000 wagons
	POTI	yes	4,444.0	49.0	7.2	9.1	2.9	15.0	63.0	6.3	5500	510.0	36,000 units
	AKTAU	Yes	65.0	8.0	4.6	4.6	1.8	11.0	15.0	3.2	25.0	14.3	50,000 wagons
çea	KURYK	yes	23.0	NA	6.5	6.5	1.3	5.0	6.0	2.4	100.0	T	60,000 wagons
; ue	BAKU-ALAT	yes	400.0	117.0	7.0	7.0	2.1	12.0	15.0	4.6	500.0	35.1	75,000
ids	TURKMENBASHI	yes	375.0	152.0	7.0	7.0	1.8	8.0	17.0	8.3	400.0	19.0	75,000
вЭ	BANDAR AZALI	yes	142.0	NA	7.0	8.0	5.5	10.0	7.0	1.0	40.0	3.3	0
	ASTRAKHAN	yes	197.0	7.8	4.5	5.0	5.1	32.0	12.1	2.2	10.0	2.6	NA
นซอ	BANDAR ABBAS	yes	2,400.0	NA	10.0	15.0	12.4	37.0	130.0	100.0	3,300.0	2,600.0	NA
oco	CHABAHAR	yes	195.0	NA	14.0	16.0	2.3	7.0	8.5	3.1	100.0	25.0	0
usil	JEBEL ALI	yes	NA	13,500.0	17.0	18.0	NA	28.0	240.0	180.0	19,300.0	14,100.0	0
oul/	KARACHI	yes	NA	160.0	7.5	16.0	15.3	76.0	150.0	46.9	4,850.0	2,160.0	0
1692	MHD BIN QASIM	yes	NA	404.0	10.5	13.0	5.3	18.0	90.0	49.0	2,025.0	1,000.0	0
s ue	GWDAR	yes	6.4	NA	12.5	12.5	0.7	4.0	5.5	0.1	500.0	4.5	NA
rabi	NHAVA SHEVA	yes	2,500.0	142.0	15.6	15.6	3.3	10.0	118.9	70.7	7,700.0	5,050.0	NA
A	KANDLA	yes	253.0	15.0	14.1	14.1	3.1	2.0	180.0	115.4	600.0	244.0	0

continue to next page

Table 2 continued

ية م	0	0	000	000	NA
Ferry termina capacity per ann			190	150	
Containerized throughput	4,745.0	15,040.0	419.0	680.8	20,660.0
Container terminals capacity per annum	6,700.0	20,000.0	650.0	820.0	23,000.0
Combined throughput	228.0	433.0	28.0	7.5	400.0
Port capacity	330.0	680.0	60.09	12.0	0.066
Number of commercial berths	50.0	140.0	4.0	15.0	146.0
Total quay length	48.0	36.0	1.3	4.1	NA
Max. water depth alongside berths	15.0	18.0	15.8	15.0	17.0
Min. water depth alongside berths	7.9	12.5	13.5	8.0	15.0
Land area	1,000.0	NA	72.0	55.2	NA
Total port area	NA	20,000.0	NA	NA	30.7
Year-round navigation	yes	yes	yes	yes	yes
Port Name	LIANYUNGANG	NINAIT	VOSTOCHNY	VLADIVOSTOK	BUSAN
	ue	e)ces) o	ifior	гq

ha = hectare, km = kilometer, m = meters, mt = metric tonnes, mtpa = million tonnes per annum, NA = not available, TEU = twenty-foot equivalent unit.

Notes:

Port land area (combined all terminals) is the designated port land area with the boundary as described under control of the port administration. Total Port area is the designated port land areas and the sea boundary under control of the port administration. Water depth is measured at Low Astronomical Tide.

The port specifications and statistics are provided as a general guide having been gathered from various public available data and from field research undertaken in 2019 and 1st quarter 2020. Exact current port specifications and capabilities requires direct interview with the port administration and port authorities and terminal operators.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

2. Baltic Corridor (CAREC 1 and 6b, c)

The Baltic Sea is a semi-enclosed sea that measures about 415,000 square kilometers (km²). A narrow and shallow connection to the North Sea and the Atlantic Ocean limits the water exchange, which is intermittent and slow. Many rivers flowing into the sea additionally contribute to its brackish character. All these features have a negative impact on the Baltic's ability to rejuvenate and make it highly sensitive and vulnerable to external factors. The Baltic Sea is surrounded by nine countries; the catchment area extends over 1.7 million km² and is home to about 85 million people (Klopott, 2016).

Main Baltic Sea ports that connect with the CAREC region are shown on Figure 2. The majority of these are on the eastern seaboard of the Baltic Sea and have direct rail and industrial highway connectivity to hinterlands. In general, there appears to a level of competitive tension emerging between the Baltic ports in attempts to secure a nominated status as a Central Asian hub.

2.1 Gdansk Port, Poland

2.1.1 General Description

Gdansk is the second-largest container port on the Baltic, but it is catching up with St Petersburg, the leader. The Port of Gdansk comprises two principal sections with naturally diverse operational parameters: the inner port stretched along the Dead Vistula and the port canal, and the outer port affording direct access to the Gulf of Gdansk.

The inner port offers a comprehensive range of terminals and facilities designed to handling containerized cargo, passenger ferries and Ro-Ro vessels, passenger cars and citrus fruit, sulphur,



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Table 3: Gdansk Port General Description

Key Attribute	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	1065 ha
Land area: Hectares	653 ha
Port capacity: million tonnes per annum (m tpa)	60 m.tpa
Water depth alongside berths: LAT meters (m)	9.4 – 16 m
Total quay length: Combined all types kilometers (km)	23.7 km
Number of commercial berths	21
Combined throughput of million tonnes in 2019	52
Container Terminals / Capacity per annum	Yes / 3.25 million TEU
Container throughput 2018	1,948,974 TEU
Ferry Terminals / Capacity	Yes / 350,000 trailers

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

phosphorites, and other bulk. The other quays fitted with versatile equipment and infrastructure are universal in use and enable the handling of conventional general as well as bulk cargo such as rolled steel products, oversized and heavy lifts, grain, artificial fertilizers, ore and coal (Port of Gdansk, 2020). The outer port performs its operations on piers, quays and cargo handling jetties situated immediately on the waters of the Gulf of Gdansk. This section of the port offers state-of-the-art facilities suited to handling energy raw materials such as liquid fuels, coal and liquefied gas. The outer port also accommodates modern Deepwater Container Terminal, (Port of Gdansk, 2020). The key attributes of the Gdansk port are shown in Table 3.



The Gdansk container terminal expansion was completed in October 2016, making it the largest capacity deepwater container terminal in the Baltic Sea contributed to doubling the throughput capacity of the Deepwater Container Terminal (DCT) to 3.25 million TEU (Warsaw Business Journal, 2020).

2.1.2 Landside Connectivity

The Polish seaports of Gdynia and Gdansk have direct on-dock connections with the Trans European Transport Network (TEN-T) road and rail networks, see Figure 5. Rail connections have been modernized on the trunk railway line connecting the port including construction of a second track, increase in axle load, and operating speeds as well as reconstruction of rail bridges. All activities were completed at the end of 2018 at a cost of \in 76.2 million (European Commission, 2017). A 1.4 km underwater road tunnel passing under the river Martwa Wisla is Poland's largest infrastructure investment of this kind, and its first underwater crossing linking the right and left banks of the Port of Gdansk was opened in April 2017. This tunnel allows the port to connect with a new 10 km Slowacki road route that will link Gdansk's Lech Walesa Airport and the city's deepwater seaport without delays or diversions (Herrenknecht News Release, 2017).

In November 2019 Poland's Gdansk Port received the inaugural Euro-China Train (ECT). The new ECT connection, known as the Baltic Train, is the result of cooperation between the Port of Gdansk Authority, DCT Gdansk container terminal and Adampol,¹ which is the operator and administrator of the route. Adampol reports there is growing interest in the new service that cuts journey times from the PRC to Gdansk from 40–45 days via sea to 10–12 days via rail, (Dezan Shira & Associates, 2019).

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2.1.3 Investments

Gdansk port is planning to spend €2.8 billion (\$3.1billion) in the development of the Central Port area, which will include the construction of 19 km of new guays, 8.5 km of breakwaters, the building of nine terminals and the creation of four turning areas and three approach fairways. In addition, PSA International, the Singapore ports group and coowner of the DCT Gdansk, revealed plans to expand container capacity from 2.2 million TEU in 2018 to 2.8m in 2019 and longer-term plans to expand to 7m TEU over the next decade, (Bartlett, 2019). DCT Gdansk is already Poland's largest container terminal and was acquired by PSA International, (Bartlett, 2019). Poland has an ambitious plan to improve the railway network of the country, fully realizing its growing importance as a transit country. In its National Railway Programme until 2023, it promises to invest 15.5 billion Euro in the railway network. A total of 18,000 km of railway track will be modernized, (RailFreight.com, 2019).

2.2 Port of Riga, Latvia

2.2.1 General Description

The Freeport of Riga is a multifunctional port with facilities for dry bulk, liquid bulk, and has three container terminals, located in the Gulf of Riga where icebreaker assistance is provided to non-ice class vessels January-March, (Baltic Icebreaking Management, BIM, 2020). In 2019, cargo turnover at the port 32.8 million tons. Riga is the largest port in Latvia and handles approximately one-fifth of the Baltic region's total cargo turnover (Freeport of Riga Authority, 2018).

The Freeport status and Free Zone Regime allows companies that use land and invest within the territory of Riga port, meet certain requirements and conclude an agreement with the Freeport of Riga Authority to receive licensed company status. Thereafter such companies are entitled to the direct and indirect tax rebates.

Key Attribute	Description
Year-round navigation with icebreaker assistance Jan-March.	Yes
Total port area: Hectares (ha)	6,348 ha
Land area: Hectares	1,962 ha
Port capacity: million tonnes per annum (m tpa)	63 m.tpa
Water depth alongside berths: LAT meters (m)	7.9 – 15 m
Total quay length: Combined all types kilometers (km)	18 km
Number of commercial berths	21
Combined throughput of million tonnes in 2019	32.8 million tonnes
Containerized throughput 2019	467,000 TEU
Container Terminals 4 / Capacity per annum (p.a.)	Yes / 1.1 million TEU
BCT 600,000 pa	
RIGACT 240,000 pa	
RIGAUT 150,000 / Other approx. 100,000	
Ferry Terminals / Capacity	Yes / 190,000 trailers

Table 4: Riga Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Various - Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

The key attributes of the port are shown in Table 4:

In June 2019 the first container of freight was shipped from the Baltic Container Terminal (BCT), (Figure 6) in the Port of Riga to Ningbo, PRC marking the launch of the newly established Chinese (Ningbo port) - Latvian trans-border e-commerce hub. This e-commerce hub aims not only to facilitate imports of goods from the PRC, but also to ensure fast and efficient bilateral movement of goods and post processing of Chinese imported merchandise goods, (Freeport of Riga Authority, 2018).

2.2.2 Land Side Connectivity

The Freeport of Riga is in the southern part of the Gulf of Riga of the Baltic Sea at the estuary of the river Daugava and is one of the main logistic hubs in the Eastern Baltic Sea region. The port is strategically well-connected to the European TEN-T motorway and railway network, as well as the European Motorways of the Sea that enables fast and efficient transportation of cargo from the EU to the CIS (the Russian Federation, Belarus, Ukraine, Kazakhstan) and Asian countries and backwards.

The Eastern European railway network conforms to the Russian gauge and thus Riga as a port of the East-Western transport corridor is successfully connected to the Trans-Siberian Railway (TSR) having important role in transcontinental freight flows, especially containerized cargo. At the same time easy access to the South-North corridor connects the Port of Riga to the Middle East. Distances by sea from the biggest ports of the Central Europe—Rotterdam, Antwerp, Hamburg—to the ports of the eastern part of the Baltic Sea coastline are the shortest, providing advantage with regards to transportation costs and transit time (Freeport of Riga Authority, 2018).

2.2.3 Investments

The Riga Port Authority's current investment activities include deepening of the main channel fairway to 15 m and 17 m, increasing capacity at multifunctional dry bulk terminals on the Krievu sala area, modernization of the port's railway network in switch gear sidings and controls, and construction of a new railway bridge. Private sector investments at Riga have included oil products terminal in Bolderaja, liquified natural gas (LNG) terminal in Daugavgrīva, various dry bulk terminals on the Kundziņsala island (fertilizers, containers, grain, and logistics park), terminal for production and handling of bioethanol on 445 ha. Total port investment portfolio is €1.1 billion with the Port Authority's investment at €300 million (Ministry of Transport Republic of Latvia, 2017).



Source: (Baltic Container Terminal, n.d.).



In addition, The Freeport of Riga Authority announced a development program 2019–2028 in February 2019. This plan includes attraction of industrial development projects for vacant territories in the Freeport of Riga, in particular dry and liquid bulk and transhipment freight. The ambition of the port is to expand total throughput to 41 m tonnes and increase container cargoes to 1 m TEU by 2037 (Port Strategy, 2019).

2.3 Port of Klaipeda, Lithuania

2.3.1 General Description

The Baltic seaport of Klaipeda is in a narrow strait called the Sea Channel, on the northwest coast of Lithuania, which connects Kursiu Marios (the Curonian Lagoon) with the Baltic Sea. Klaipeda State Seaport is the northernmost ice-free port on the Eastern coast of the Baltic Sea. It is the most important and biggest Lithuanian transport hub, connecting sea, land and railway routes from east to west. Klaipeda is a multifunctional deepwater port, providing container terminals, dedicated port facilities for Ro-Ro ferries, and passenger ferries. Klaipeda forms part of the road and rail network linking into the Trans Asia Caucus route via Minsk in the south and Riga to the north. It is a port of significance as the Government of Lithuania plans to expand the container and ferry terminals on the outer port to the north of the existing port entrance, including deepening the sea channel (JICA, 2010). Klaipeda is also an important port within the context of the CAREC landlocked countries as it is part of the CIS Rail Ferries network with direct services from Sassnitz (Mukran) port in Germany and St. Petersburg in the Russian Federation. Klaipeda also operates as a node for the "Viking Train Service" that connects Klaipeda port on the Baltic Sea with port Ilyichevsk on the Black Sea running through three capitals Vilnius, Minsk, and Kiev, (Marco Polo Programme of the European Union, 2018).

The annual port cargo handling capacity is up to 65 million tons. The port can accommodate vessels up to 350 m in length with a maximum draught of 13.8 m (JSC Biriu kroviniu terminalas, 2020). The shortest distances connect the port with the most important industrial regions of the Eastern hinterland (the Russian Federation, Belarus, Ukraine etc.). Klaipeda attracts the main shipping lines to the hub ports of western Europe. The port operates 24 hours a day, 7 days a week, all year round. The port hosts facilities and provides port terminals for container ships, rail and Ro-Ro ferries, dry bulk, and liquid bulk, petroleum products, and LNG and hosts a major ship building and ship repair facilities (Klaipeda State Seaport Authority Board, 2019).

The key attributes of the port are shown in Table 5:

Key Attribute	Description
Year-round navigation (ice-free)	Yes
Total port area, including waterways: Hectares (ha)	1,442 ha
Land area: Hectares	557 ha
Port capacity: million tonnes per annum (m tpa)	65 m.tpa
Water depth alongside berths: LAT meters (m)	9–15 m
Total quay length: Combined all types kilometers (km)	24.7 km
Number of commercial berths:	119
Includes 50 repair & 15 Port Authority berths	
Combined throughput of million tonnes in 2019	46.26 million tonnes
Containerized throughput 2019	703,000 TEU
Container Terminals 2 / Capacity per annum (p.a.)	Yes / 1.2 million TEU
Klaipedos Smelte 600,000 TEU pa	
Klaipeda Container Terminal 600,000 TEU pa	
Ferry Terminals / Annual Capacity Combined Wagons+Trailers	Yes / 300,000 units

Table 5: Klaipeda Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: (Green Ports Lithuania, n.d.).

2.3.2 Landside Connectivity

Klaipeda has on-dock connections with primary highways and railways that link through to intercontinental routes, Figure 9. Lithuanian Railways operates direct rail freight from the port of Klaipeda connecting European and Central Asian markets, Lithuanian Railways' container train services include:

- Amber Train (Šeštokai/Kaunas-Riga-Tallinn [Mugga]);
- Containerships Train (Klaipeda [Draugystė]–Kiev [Brovary]);
- Merkurijus (Kaliningrad/Klaipeda-Moscow);
- Nemunas (Kaunas [Palemonas]-Vilnius [Paneriai]-Minsk [Koliadichi]-Vilnius [Paneriai]-Kaunas [Palemonas]);
- Saulė (Chongqing [PRC]–Antwerp [Belgium], by transit via Šeštokai [Lithuania]);
- Šeštokai Express (Poland-Lithuania-Belarus-the Russian Federation);
- Viking Train (Klaipeda–Minsk–Kiev–Ilyichevsk / Odessa);
- Vilnius Shuttle (Draugystė-Paneriai);

The East-West corridor running from Klaipeda port through Lithuanian cities of Vilnius and Kaunas to Belarus creates a railway link between the Baltic and the Black Sea. This project, known as the "Viking Train," extends the transcontinental connections of the Scandinavian countries and Black Sea countries using an international transport corridor via Klaipeda port on the Baltic Sea with port Ilyichevsk on the Black Sea running through three capitals Vilnius, Minsk and Kiev (Lithuanian Railways, 2020).

The Viking Train also connects corridors with more than 22,000 km rail via Kiev toward Moscow and also toward the final destination of Viking Train in Ukraine, seaports of Odessa, and Ilyichevsk. From Ilyichevsk cargo can continue to Near East, Caucasus using the two ferry lines from this port to Poti or Batumi (Georgia) and Derince (Turkey), while from Odessa it is possible to reach these and additional ports (Marco Polo Programme of the European Union, 2018).



2.3.3 Investments

The Klaipeda Port Authority unveiled an ambitious plan to build an artificial island of 120 ha with 17.5 draft with an annual capacity of 35 million tonnes. This "Port Vision" project would host a new container terminal and ferry facilities (Klaipeda State Seaport Authority Board, 2019).

Under private sector expansion plans is the Klaipedos Smelte² container terminal, which has design plans for 2015–2023 to increase capacity above 900.000 TEU. This development is being driven by Mediterranean Shipping Company (MSC) requesting the Klaipeda Smelte facility to increase its capacity to 8–900,000 moves per annum—the equivalent of 1.2 million TEU—by the end of 2020. The transhipment share at this facility has increased from around 40% in 2017 to 65% currently, with MSC seeking to see it rise further to 80% over time (Port Strategy Insights, 2019). The main destinations for cargo being transhipped via Klaipeda are St. Petersburg, Tallinn, Helsinki, and Rauma. To satisfy the requirements of MSC and other lines larger ships calling to the facility, a number of improvements are ongoing; lengthening of the shipto-shore (STS) crane rails, new STS cranes with an outreach of 21 containers, and 10 additional rubber tyred gantries will be added by end 2019. Over the longer-term, Smelte is planning to add a third berth of 347 m (with 16 m draft) by reclaiming the northern corner of the terminal. This new berth will be equipped with 4 ship-to-shire cranes, capable of handling 22,000 TEU vessels, while raising the terminal capacity from 800,000 TEU per annum to 1.3 million TEU per annum.

These new developments could be operational by 2022, subject to approval by the Klaipeda Port Authority. Under such development plans, Klaipeda is likely to become a transhipment hub port for the Baltic region, (Port Strategy Insights, 2019).

² Klaipedos Smelte Container Terminals is owned by TIL Investments of Geneva, Switzerland.

2.4 Port of Saint Petersburg, Russian Federation

2.4.1 General Description

The ports of St Petersburg and Ust Luga to the south handle nearly 70% of the container throughput of the Russian Federation, including transit volumes via Finland and Baltic countries. The container Port of St. Petersburg is the largest in the Baltic Basin. St. Petersburg is also recognized as a seaport gateway to Moscow and the large hinterland populations. In addition, the location permits reduction of the voyage time between main ports of transhipment in Northern Europe and the Russian Federation (Lorentzon, 2014).

The port of S. Petersburg is promoted as the European gateway of the Russian Federation, the most important transport link between the east and the west. JSC "Sea Port of Saint Petersburg" is the largest operator providing dry cargo transhipment in S. Petersburg port and the northwest of the Russian Federation. Founded on the base of Leningrad Sea Commercial Port, the enterprise has enjoyed successful development in the market environment.

2.4.2 Landside Connectivity

St. Petersburg port is recognized as a key feeder port for freight transiting between Central Asia and the PRC, and it has direct connectivity with both the Trans Asia Caucasus Route and Trans-Siberian Routes. The Port of St Petersburg has on-dock connectivity with major highways and road networks, Figure 10.

The Oktyabrskaya (October) Railway serves the Port of St. Petersburg and is part of the Russian Railways (RZD), the national rail carrier for the Russian

Key Attribute	Description
Year-round navigation	Yes ^a
Land area: Hectares (approx. all terminals, [ha])	415 ha
Port capacity: million tonnes per annum (combined terminals, [m.tpa])	80 m.tpa
Water depth alongside berths: LAT meters (m)	9–15.1 m
Total quay length: Combined all types kilometers (km)	5.3 km
Number of commercial berths	31
Combined throughput of million tonnes in 2020 (Nov 2020 annualized, [mil t])	59.2 mil. t
Containerized throughput 2020 TEU (Nov 2020 annualized [million])	2.097 mil.
Container Terminals 5 / Capacity per annum (estimated [million])	4.2 mil.
CTSP 900,000 TEU	
APM FCT 1.25 million TEU per annum (p.a.)	
ULCT 1.05 million TEU pa	
Logistika-Terminal 500,000 TEU pa	
JSC Petrolesport 500,000 TEU pa	
Ferry Terminals / Capacity - estimate unavailable.	Yes / trailers

Table 6: St Petersburg Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

^a The harbour master of St. Petersburg may declare the port closed to non-ice class vessels. Vessels with Ice1 and higher ice class will be allowed with icebreaker assistance or independently, with the permission and recommendations of the icebreaker and harbour master clearance. New ice restrictions introduced in St. Petersburg in case ice is >10–15 centimeters thick.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Federation. The second-largest rail network in the world, RZhD operates more than 86,000 km (53,000 miles) of carrier and industrial routes. The October Railway is the Russian Federation's oldest railway, stretching from the Leningrad Terminal in Moscow to beyond the Arctic Circle in Murmansk. The October Railway has more than 10,000 km (6.2 thousand miles) of rail, and its headquarters are located in the Port of St. Petersburg (World Port Source, 2019).

Additionally, St. Petersburg port acts as a terminal for vessels entering the Volga Canal connecting through to the Black Sea and Caspian Sea via Volga-Don. The Volga-Don transit and shipping connections are detailed in the Black Sea and Caspian Sea section.

2.4.3 Investments

Several large developments are planned at St. Petersburg port, including construction at berth No. 88 aimed at container terminal reconstruction intended for expansion of transhipment capacity for container ships of nominal length of 161.43 m, width of 25.2 m, loaded draft of 9.8 m, and terminal design capacity of 300,000 TEU per year. A similar project for constructing a new terminal for transhipment containers in St. Petersburg with the design capacity of 1.4 million TEU is a joint investment project with JSC Petrolesport.

Other key infrastructure projects include dredging operations in the channel and reconstruction of Lesnoy breakwater road stead and the part of Barochny Basin, building a turning basin in the Eastern Basin, reconstructing a number of berths, and carrying out dredging operations in the operational navigation areas. These enhancements will include construction of a new JSC "Baltic Bulk Terminal," to create a terminal for transhipment of mineral resources with the design capacity of 11.8 million tons per year (Ministry of Transport of the Russian Federation, 2020).

Private investment is planned by Russian terminal operator Global Ports to expand its capacity by roughly a quarter to grab a share from Finnish and Baltic ports, and which could potentially lower shipper costs. The company plans to expand capacity at its St. Petersburg terminal from 1 million TEU to 1.4 million TEU by 2021 involving the building of two berths totalling 365 m length, the addition of three cranes, and a 235,000-m² warehouse at a cost of \$80 million (Gerden E., 2017).

St. Petersburg benefits from EAEU customs union as a gateway to other CIS countries at the expense of other Baltic ports.

2.5 Baltic Shipping Routes

The Baltic Sea is one of the most heavily trafficked seas in the world, accounting for up to 15% of the world's cargo transportation. According to the Automatic Identification System for monitoring maritime traffic, there are about 2,000 ships in the Baltic marine area at any given time, and each month around 3,500–5,000 ships ply the waters of the Baltic (Helsinki Commission, 2009), see Figure 11. In 2014, the overall transport work increased by 2.2% yearon-year, while the total travelling distance of IMOregistered vessels decreased 1.2%. The simultaneous increase in transport work and the decrease in travel amount indicates an increase in average vessel transport capacity (Helsinki Commission, 2015).

In 2014, all Baltic Sea countries (including the Russian Federation) controlled about 7,000 merchant ships of 1,000 gross tonnage³ and above, representing 13% of the world fleet and 35% of the EU-controlled fleet (Boteler et al. 2015). The EU-controlled fleet (including Norway) has expanded by more than 70% in the Baltic Sea region from 2005 to 2014 (both in gross tonnage and DWT). However, the total number of vessels decreased by 31% for the same period indicating a trend towards larger ship sizes, especially for the cargo transport. Typical shipping routes connecting Baltic ports is shown in Table 7.

There are main intercontinental trunk route container services operating from the PRC and Southeast Asia direct to the Baltic and Gdansk receives many of these.



Note: Shipping density maps do not differentiate between ship type or size, thus not necessarily give an indication of volumes.

Source: e-Atlas Shipping Density Mapping, 2020.

³ Gross tonnage (GT) is a function of the volume of all of a ship's enclosed spaces. The numerical value for a ship's GT is always smaller than the numerical values of gross register tonnage (GRT).

Riga Freeport hosts three modern container terminals and a ferry terminal. There are no main intercontinental trunk route services operating direct to Riga. The main shipping connections are intra-Baltic states and Atlantic European ports.

Klaipeda port is central in many inter-Baltic shipping feeder routes and only a sample of those services is listed in Table 7. There are also direct services linking Atlantic coast European main ports and Mediterranean ports including the MSC service that connects transhipment containers from East Asia, the PRC, and Southeast Asia via Colombo. There are also frequent ferry services offering Ro-Ro and passenger connectivity with other Baltic and Scandinavian ports.

St. Petersburg hosts a modern container terminal operated by Global Ports Inc. Main intercontinental container trunk route services operate from Atlantic coast European ports and many container and ferry feeder services operate through Black Sea ports direct to St. Petersburg as included in Table 7. There appears to be an increase in container shipping activity to St. Petersburg in the past 24 months with major carriers increasing their capacity to service increased demand. Through the Sea of Azov, the Don River and the Volga-Don channel vessels can reach ports on the Volga River as well as on Caspian and Baltic seas linking to Astrakhan on the Volga River in the Russian Federation on the approaches to the Caspian Sea. Since 1992 the Dnepr is open for call to foreign ships allowing distribution of traffic flows from the Central and Eastern Europe to the Black Sea ports.

The general description of the Volga River is it is the longest navigable river in Europe at 3,692 km with a navigable depth > 3 m and connected to the Caspian Sea and Black Sea through the Volga-Don Canal and Baltic Sea through Volga-Baltic waterway ship locks dimensions: 290 x 30 m. For 3 months of the year the river is frozen for most of its length.

Table 7 is indicative of some of the main commercial shipping services connecting the featured ports of the Baltic Sea and a sample of those relevant to this scoping study of ports and shipping that are relevant to CAREC transport corridors.

Route / Operators	Ports of Call	Frequency
The People's Republic of China (PRC)/ Southeast Asia to the European Union Maersk Line, MSC	Gdansk-Bremerhaven-Rotterdam- Tanjung Pelepas-Shanghai-Xingang- Qingdao-Kwangyang-Ulsan- Ningbo-Shanghai-Yantian-Tanjung Pelepas-Algeciras-Bremerhaven- Gdansk	7 days
PRC/Southeast Asia	Gdansk-Wilhelmshaven-Piraeus-Port	7 days
OOCL, COSCO, CMA CGM, Evergreen Line	Klang-Hong Kong, China-Shanghai- Ningbo-Xiamen-Yantian-Singapore- Felixstowe-Zeebrugge	
SEAGO (Maersk)	Gdansk-Tallinn-St. Petersburg- Klaipeda-Gdansk	7 days
Atlantic EU ports	Riga-Teesport-Thamesport-	2 days
SIA-CSHIP	Rotterdam-Zeebrugge-Lubeck- Helsinki-St. Petersburg-Klaipeda- Aarhus	
Germany-Black Sea	Hamburg-Bremerhaven-Riga-	7 days
CMA-CGM	Klaipeda	
Feeder	Gdansk-Riga-Klaipeda-Gdansk	7 days
OOCL, COSCO, CMA CGM, Evergreen Line	Gdansk-Helsinki-Kotka-Gdansk Gdansk-St. Petersburg-Gdansk	

Table 7: Baltic Direct Shipping Sample Connections

Table 7 continued

Route / Operators	Ports of Call	Frequency
Feeder	Gdansk-Rotterdam-Klaipeda-Gdansk	7 days
Uni-Feeder Line	Gdansk-Hamburg-Bhaven-Hamburg- Riga- Gdansk	
TT Line Ferry	Trelleborg-Klaipeda-Trelleborg	2 days
DFDS Ferries	Klaipeda-Copenhagen	2 days
	Klaipeda-Fredericia	2 Days
	Karlshamn-Klaipeda	Daily
	Klaipeda-Kiel	Daily
CIS Rail ferries	Klaipeda-Ust Luga	7 Days*
	*schedule appears variable	
MSC	Sankt Petersburg-Kaliningrad- Helsinki-Rauma-Riga-Norrköping- Kotka-Stockholm-Gävle- Gdynia- Gdańsk-Tallinn-Klaipeda-Antwerp- Bremerhaven-Hamburg-Rotterdam- Le Havre	7 Days
HAPPAG LLOYD	Hamburg-Bremerhaven-Gdynia- Halmstad-Riga-Tallinn-Ust Luga-Sankt Petersburg-Kotka- Oslo-Rauma-Gävle-Norrköping- Klaipeda-Hamburg	7 days
Tallink-Ferry	Riga-Stockholm	Daily
Ferry	Nynashamn (Sweden) –Gdansk	Daily
POLFERRIES		
Maersk Line	Sankt Petersburg–Gdańsk– Wilhelmshaven–Bremerhaven– Norrköping–Baltiysk–Kaliningrad– Gdańsk–Klaipeda–Riga–Tallinn– Sillamäe–Ust Luga	7 Days
Volga-Don	Various Volga-Don Max class traders	
DFDS Ferries	Kiel-St. Petersburg	3 Days
St. Peter Ferry	Tallin-Stocklholm-Helsinki-St. Petersburg	3 Days
Finnlines Ferry	St Petersburg-Bronke (Finland)	3 Days

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

3. Mediterranean / Black Sea (CAREC 2 and 6a)

A. MEDITERRANEAN PORTS

The Mediterranean is classified as the intermediate point of Asia–Europe maritime trade routes, as it does not attract equivalent traffic to the corresponding port system in Northern Europe.

The CAREC routes 2 and 6a connect to seaports within the Mediterranean Sea and Black Sea. The land route connecting CAREC countries is as much a maritime trade route as it is an overland modal transport conduit. The identified European Mediterranean ports of key importance and of increasing interest are Istanbul and Mersin in Turkey, Piraeus in Greece, and Koper in Slovenia, shown in Figure 12. The Bosphorus Strait is also as important and covered under the shipping routes section of this chapter.

Included in this chapter is coverage of the Black Sea ports that border and connect Central Asian countries. Istanbul hosts many terminals and is the major container port serving the Black Sea, handling 60% of all volumes, (Sooredoo, 2019). Constanta, a 12% share and Novorossiysk with 8% share are the two other main ones. Other ports described in this chapter will be Poti, Batumi, Novorossiysk, Rostov-on-Don, Odessa, and Varna.

3.1 Istanbul, Turkey

Located at the mouth of the Bosphorus on the Sea of Marmara, Istanbul is the principal port of Turkey. It comprises several ports making up three main sections:

- The inner port is the area that lies within Karakoy (Galata) Bridge. This water area is also known as Halic or the Golden Horn.
- The Middle Port is the area that lies north of a line joining Ahirkapi Burnu Light and Kadikoy Breakwater Light (1.6n m southeast) and south





of a line that joins Dolmabahce Clock Tower and Kizkulesi Light (Haydarpaşa).

 The outer port is divided into two parts. The south part lies between the south limit of the port and the limit of the Middle Port and the northern part lies between the north-most limit of Middle Port and the north limit of the port (Kurucesme).

Istanbul, lying on the Mediterranean side, remains the main transhipment port for the Black Sea region. This is largely because of the physical cap Turkish authorities have imposed to ships larger than 10,000 TEU, known as Bosphorus Max Class.⁴ An example of a Bosphorus Max Class container ship is shown Figure 14.

As a result, Istanbul has developed into a transhipment point for large intercontinental trunk route vessels of sizes 10,000 to 22,000 TEU coming from East and Southeast Asia and North Europe, with vessels of between 2,000–5,000 TEU feeders via the Bosphorus Strait then serving ports inside the Black Sea (Port Strategy Insights, 2019).

Container terminal operations are spread throughout the Istanbul port zone at various sites operated by private and public-private partnerships. These includes Marport, located in Beylikdüzü, İstanbul.

The Marport main terminal was expanded in 2001–2003, bringing the annual throughput capacity to 1.9 million TEU (Figure 15). The Kumport container terminal is strategically located on the European side of Istanbul, 22 miles west of the Istanbul Strait. Turkey's first private port located in Beylikdüzü, İstanbul is Mardaş terminal. Evyapport is strategically located at the heart of the Marmara Industrial areas on the Istanbul Asian side, Kocaeli and Adapazarı hinterlands. Evyapport also offers intermodal transportation options to its customers by direct connection to the main railway network. Another advantage of Evyapport is that it is the closest port to the capital city Ankara and sufficiency of convenient transportation for inland cities. The port of Haydarpasa, also known as the Port of Haidar Pasha, is a general cargo seaport, Ro-Ro, and container terminal, situated in Haydarpaşa, İstanbul, Turkey at the southern entrance to the Bosphorus. The port is operated by the Turkish State Railways (TCDD) and serves a hinterland that includes the country's most industrialized areas. Celebi Port of Bandırma has direct links to İstanbul's main business and industrial hubs and to the Southern Marmara and Aegean regions. The Port of Bandırma enjoys being in a unique location at the southern Sea of Marmara serving as the gateway of the Marmara Region for bulk cargo trade. offering bulk cargo, general cargo, containers, liquid cargo, and Ro-Ro services, see Figure 16.

⁴ Under the Montreux Convention of 1936, commercial shipping has the right of free passage through the Straits in peacetime, although Turkey claims the right to impose regulations for safety and environmental purposes.



* MV CMA CGM Thames: Length: 299.95 meters (m) / Breadth: 48.2 m / Draft: 14.8 m / Gross Tonnage: 95,263. Container Capacity: 9,365 twenty-foot equivalent units (including 1,458 reefers). Source: VesselFinder.com, 2020.



Source: Terminal Investment Group Limited, 2020.

Key Attributes	Description
Year-round navigation.	Yes
Combined throughput of million tonnes in 2017	108 million tonnes
Port land area (combined all terminals [hectare, ha])	1,298 ha
Containerized throughput 2017	8.5 million TEU
Container Terminals 15 / Capacity per annum	16 million TEU
MARPORT 2.3 million TEU pa	
AMBARLI 1.84 million TEU pa	
KUMPORT 2.6 million TEU pa	
MARDRAS 1.8 million pa est.	
HAYDRAPASA 1.8 million TEU pa est.	
CELEBI BANDIRMA 1.6 million TEU pa	
Region others: 4 million TEU pa	
Ferry Terminals / Vehicle Throughput all types 2017	1.95 million

Table 8: Istanbul Main Container Ports General Description

TEU = twenty-foot equivalent unit.

Source: Republic of Turkey Ministry of Transport, Maritime Affairs and Communications.



3.1.1 Landside Connectivity

All container ports within the Marmara Sea and Istanbul range are connected to the Turkish rail network providing connection to the major industrialized cities including Mersin, Gaziantep, Kayseri, Kahramanmaraş and Konya, as well as international rail connectivity. Additionally, all ports have direct highway connections to the D-100 motorway and TEN-T (Trans European Motorway networks, Figure 17).



3.1.2 Investments

There are many ongoing investments in Turkey's maritime sector, albeit the container terminal port capacity in Istanbul and Sea of Marmara is suggested to be above present market demand by 40%–50% (Figure 15).

This is difficult to benchmark as the terminals are disparate and operationally segregated from each other. However, a scoping level analysis provides insight that capacity is well-spaced from the current demand.

The most recent large-scale changes to port ownership in Turkey has been the 2016 financial close of a deal by the PRC's two largest port operators COSCO Pacific and China Merchants Holdings and a third undisclosed investor that paid \$1 billion for a controlling stake in Turkey's Kumport container terminal. The Kumport terminal is a modern container facility in Turkey's Ambarli Port Complex, which is on the northwest coast of the Marmara Sea on the European side of Istanbul. It is the third largest container terminal in Turkey with six berths and a capacity of 1.84 million TEUs and room to expand to 3.5 million TEUs, (Port Strategy Insights, 2015).

A total of 41,112 vessels passed through the Bosphorus Strait in 2019, Turkish Transport Ministry reported. Some 43,000 vessels crossed the Bosphorus, one of the most strategic waterways of the world, in 2017 (that number has decreased in the past decade), making it one of the busiest maritime passages in the planet. The Bosphorus has nearly three times the traffic of the Suez Canal.

The \$20 billion, 45-km long Kanal Istanbul project linking the Black Sea and the Sea of Marmara (and thus the Mediterranean Sea), has already cleared approval procedures. It is projected to have a capacity of 160 vessel transits a day—similar to the current volume of traffic through the parallel Bosphorus Strait, where traffic congestion leaves ships queuing for days. Kanal Istanbul project also includes the construction of ports (a large container terminal in the Black Sea, close to the new Istanbul airport), logistics centers, and artificial islands to be integrated with the canal. Artificial islands will be built using soil dredged from the canal. The justification behind the new Istanbul Kanal is that it will relieve shipping traffic from the already congested Bosphorus, where a number of maritime accidents have occurred, and will increase capacity for shipping to and from the Black Sea.

3.2 Mersin, Turkey

Mersin International Port is ranked the 91st among the 120 biggest ports in the world. It is situated on Mersin Bay, a broad body of water that is open southward to the Mediterranean Sea. It is the main port for the Eastern Mediterranean Region's industry and agriculture. The port's rail link and its easy access to the international highway makes it an ideal transit port for trade to the Middle East (Digital Logistics Capacity Assessments, 2018).

Figure 18: Mersin Port General Description

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	110 ha
Port capacity: million tonnes per annum (m.tpa)	48.2 m.tpa
Water depth alongside berths: LAT meters (m)	8.5 m–15.8 m
Total quay length: Combined all types kilometers (km)	3.25 km
Number of commercial berths	29
Combined throughput of million tonnes in 2019	32.5million tonnes
Containerized throughput 2019	1.9 million TEU
Container berths 9 / Capacity per annum	Yes / 2.6 million TEU
Ferry Ro-Ro Terminals / Capacity	Yes / 150,000 trailers

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Mersin Chamber of Commerce & Industry, Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: Mersin International Port - PSA Group, 2020.
Mersin port is one of the largest container ports in the South of Turkey, serving a wide industrial hinterland in the region with a significant contribution to the country's foreign trade. It is connected to all main global ports through over 20 shipping lines making regular calls.

Mersin port was privatized in 2007 under a "Transfer of Operating Rights Agreement for [the] operation of Mersin Port for 36 Years." The private shareowners are IFM Investors, an Australian infrastructure fund management company with 40% share and Singapore government-owned PSA International, Singapore terminals of PSA International Ltd holding controlling share of 60% (Daily Sabah Business News, 2017).

3.2.1 Landside Connectivity

Mersin is the only Southern Turkish port with rail access running north toward Kayseri and then

northwest toward Ankara. Links to the east (toward Syria) also exist here. The Mersin International Container Port is connected to Gaziantep, Kayseri, Kahramanmaraş, Konya, Karaman, Ankara, and other industrial cities as well as railway stations across borders linking Iraq, Iran, and other regions. Inside the port area there is also a four-lane railway terminal that provides container handling and transportation facilities (Mersin International Port - PSA Group, 2020).

Road connectivity at Mersin International Port is directly linked by major highways to Gaziantep, Kayseri, Kahramanmaraş, Konya, and industrialized cities through cross border highways to the Middle East countries. Mersin was also chosen as an entry and exit access point to the rail TRACECA route and the rail Southern route, Mersin (Port)-Malatya-Dogukapi-Sadakhlo-Tbilisi (Newton, et al., 2008).



3.2.2 Investments

About \$453.5 million was invested in the Mersin port to increase its capacity by eight times, taking the total expenditure to \$1.2 billion in the last 10 years (Daily Sabah Business News, 2017). New investments are planned at Mersin International Port to expand the container terminal area of the port by 176,335 m², to be constructed in the south and west. The new project will result in the port losing the old cruise facility, but a new cruise port with an area of 11,845 m² will be established on the south of the existing cruise port. After completion, container capacity will be around 3.6 million TEU and the current storage capacity will increase from 2.1 million TEU to 2.9 million TEU. The expansion will cost \$173.21 million and will take 36 months to complete (Ports Europe, 2018).

3.3 Piraeus, Greece

Piraeus Port is one of the key gateways and transhipment ports in the Mediterranean with new investment partners and increased capacity and throughput in the last 10 years. The Greek port of Piraeus has two terminals handling containers: Terminal I (Pier I) and Terminal II (Pier II and Pier III). Terminal I, with a capacity of 1 million TEU, is operated by the Piraeus Port Authority (which has been majority owned by China COSCO Shipping Group since August 2016) (Arvis, Vesin, Carruthers, deLangen, & C, 2019). In 2017 the containerized throughput at Piraeus escalated dramatically to 4.145 million TEU—a 10.9% increase over the previous 12 months. This was mostly due to redirection of major intercontinental shipping lines altering their hub port arrangements including COSCO shipping line, which in turn redirected many feeder carriers to switch rotations and/or increase frequency to Piraeus port.

3.3.1 Landside Connectivity

The container terminals are connected with two Pan-European rail loops linked to TEN-T. There are four loading rail lines: three with stable and one with a mobile ramp. The Piraeus main rail station is located next to the port with a rail terminus for standard gauge railway services on the main axis to Idomeni via Larisa and Thessaloniki, and the Proastiakos to Chalcis and Acharnes Junction (Figure 22).

Ferry services for Ro-Ro freight and vehicles are daily with connections to Crete, the Eastern Aegean, and the Dodecanese.

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	500 ha
Port capacity: million tonnes per annum (m.tpa) estimate	92.8 m.tpa
Water depth alongside berths: LAT meters (m)	9 m–19.5 m
Total quay length: Combined all types kilometers (km)	24 km
Number of commercial berths	44
Combined throughput of million tonnes in 2018	50.9 million tonnes
Containerized throughput 2019	5.650 million TEU
Container Terminals / Capacity per annum	7.2 million TEU
Ferry Terminals / Capacity	670,000 cars
	1.1 million trailers

Table 9: Piraeus Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: China COSCO Shipping Corporation Ltd., 2020.



3.3.2 Investments

In 2016 the PRC national shipping line and terminal operator COSCO purchased the majority 51% stake in Piraeus port providing it a 35-year concession to upgrade and run container cargo terminals in Piraeus port. COSCO plans to turn Piraeus port into the biggest commercial harbor in Europe, spending about €600 million (\$660 million) to boost operations, including mandatory investments of €300 million by 2022 which once concluded will allow it to acquire an additional 16% stake in the port (Georgiopoulos, Koutantou, & Maltezou, 2019).

Other investments reported in the Piraeus Port Authority Annual report 2017 for a total cost of 293.7 million Euros, included the following:

- Passenger Port Expansion (Southern Zone Phase A)
- Repair of Pier I RMG yard area and cranes
- Conversion of Pentagonal Warehouse into Cruise
 Passenger Terminal
- Underground Linkage of Car Terminal with Former ODDY Area
- Port Infrastructure Improvement and Maintenance
- Supply of Equipment
- Dredging of Central Port
- Construction of New Oil Pier
- Car Terminal Expansion (Herakleous)
- Improvement Infrastructure of Ship repair Zone

3.4 Koper, Slovenia

The Port of Koper lies on the shore of the Gulf of Koper in the northern Adriatic Sea, approximately 10 km south-southwest of Trieste and 80 km southwest of Ljubljana. Koper is the main seaport in Slovenia handling 24 million tonnes in 2017, including container traffic and Ro-Ro. Container volumes in 2017 were 988,000 TEU, this being massive increase over volumes of only 343,000 TEU 7 years prior. Koper port provides direct access to the city of Ljubljana and onwards via priority route 6 towards Maribor, Vienna, and Budapest and into Western and Central Europe (Luker Koper Group, 2018).

Koper is included in this review of CAREC ports as its geographic position in the northern Adriatic on the eastern shore of the Gulf of Koper lends itself to be a direct gateway to Central Asian countries. Slovenia has only one seaport and has decided to invest heavily in hinterland connectivity to create their sole seaport as a gateway for Eastern and Central European cargoes. The Adriatic transport route has significantly increased its importance over the last decade with Adriatic ports servicing the Central European markets. Consequently, some cargo has been diverted from northern European ports. Today, the Port of Koper holds a 40% share of container traffic in the northern Adriatic and is the largest terminal in the region. In 2019, they reached a historic milestone, a throughput of 1 million TEUs (Österreichische Verkehrszeitung, 2019).

Table 10: Koper Port General Description

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	274 ha
Port capacity: million tonnes per annum (m. tpa) estimate	37 m.tpa
Water depth alongside berths: LAT meters (m)	6.0 – 18.9 m
Total quay length: Combined all types kilometers (km)	3.2 km
Number of commercial berths	28
Combined throughput of million tonnes in 2018	24 million tonnes
Containerized throughput 2017	988,000 TEU
Container Terminals Capacity per annum estimate	1.3 million TEU
Ferry Terminals / Capacity estimate	1.6 million cars
	200,000 trailers

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, Port Source, Lloyds List Maritime and Port Authorities.



Source: OEVZ - Österreichische Verkehrszeitung, 2020.

3.4.1 Landside Connectivity

One of Koper port's main advantages is a good railway network and regular train connections with all terminals having direct rail loops (Figure 24). About 60% of all port's traffic is fed by railway services with an average of 62 cargo trains per day. The trains connect the port to hinterland markets including Austria, Hungary, Slovakia, Germany, the Czech Republic, Italy, Croatia, Poland, and Central Asia. Due to the expected growth of cargo volumes, railway and road accesses to the port are planned to be enlarged and upgraded. The new facility will reduce distances between storage areas and train loading points, improving productivity and flexibility of rail operations. This is the first major investment in 2020 to be completed at the car and Ro-Ro terminal. There are another two current investments-the new berth for car-carriers, which when completed will garage up to 6,000 cars, expected to be completed by end 2020. New rail connections have been added including Austria's rail cargo operator starting a new railway service connecting Koper Container Terminal with Bratislava and a second track on the 27-km-long railway linking the Port of Koper to the town of Divaca, improving the port's connection to the wider TEN-T European railway network and increasing freight capacity and volumes (Ports Europe, Feb 2020).

3.4.2 Investments

The extension of the container wharf of Koper port began in 2019. This is a key project for the port to boost capacity and international competitiveness. The project includes the construction of a quayside 98.5 m long and 34.4 m wide, and the construction of a hinterland area on the pier's southern side with a total size of 24,830 m². The length of Pier I on the southern side, designated for container handling, will be 695 m. The investment is expected to be completed in 2021 will result in a container terminal able to handle at least 1.5 million TEU.

In Jan 2020 Koper port completed the construction of the additional railway access for the car and Ro-Ro terminal at the port. The railway lines are routed to four 700-m long lines with dedicated hydraulic loading/unloading ramps and adaptive lighting to ensure proper visibility on both decks of railcars during night operations. In 2017–2018, the Luka Koper Group allocated the amount of €37 million to investments including additional plant equipment and bulk handing facilities (Ports Europe, July, 2019).



3.5 Shipping Routes-Mediterranean Sea

The Mediterranean Sea is among the world's busiest waterways, accounting for 15 % of global shipping activity by number of calls and 10 % by vessel deadweight tonnes (DWT). More than 325,000 voyages occurred in the Mediterranean Sea in 2016, representing a capacity of 3.800 million tonnes. Almost two-thirds of the traffic was internal (Mediterranean to Mediterranean), one-quarter was semi-transit voyages of ships mainly of small size, while the remainder was transit voyages, mainly by large vessels travelling between non-Mediterranean ports through the Mediterranean's various straits: the Straits of Gibraltar, the Straits of the Dardanelles, and the Suez Canal (EURO-MEDITERRANEAN PARTNERSHIP, 2006).

A sample of the main feeder and intercontinental container connections to key ports in the region is described in Table 11.

B. BLACK SEA PORTS

The Black Sea region accounts for only 2.5% of global seaborne trade, while the share of the North Sea region accounts for about 17%. However, the Black Sea is an important area of development due to its geographical size and resource base. The Black Sea container port system is among the world's fastest growing markets with a cargo growth rate year-on-year of 8.7% 2018. Sea container terminals of Ukraine, Romania, the Russian Federation, Georgia, and Bulgaria handled 2,927,016 TEU in 2018, including 2,188,153 full TEU (Hellenic Shipping News, 2019).

There appears to be a natural feeder conduit for each Black Sea port that includes gateway cargoes for their immediate host country and an increasing level of transhipment and transit freight, particularly containers and trailers to and from Central Asia and beyond (Ludwig, 2011).



Table 11: Mediterranean Sample Direct Shipping Connections

Route / Operators	Ports of Call	Frequency
Admiral Container Lines,	Ambarli, Gebze, Gemlik, Izmir, Mersin, Haifa, Ashdod, Ambarli	7 days
OOCL, CMA CGM, Evergreen	East Asia (China ports), Port Said, Beirut, Piraeus, Izmit, Istanbul, Constanta, Odessa, Istanbul, Mersin, Port Said, Far East	7 days
OOCL, CMA CGM, Evergreen, COSCO	Shanghai, Ningbo, Busan, Shekou, Singapore, Malta, Koper, Trieste, Rijeka, Venezia, Koper, Port, Said West, Jeddah, Port Kelang, Shekou, Shanghai	7 days
Arkas Line, Tarros Line	Genoa, La Spezia, Salerno, Piraeus, Istanbul (Marport), Gebze (Yilport), Mersin, Beirut, Alexandria, Salerno, La Spezia, Genoa, Casablanca, Leixoes, Setubal, Genoa	7 days
CMA CGM, EMES Feedering, Unimed Feeder Services	Piraeus, Istanbul, Novorossiysk, Odessa, Constanta, Istanbul, Piraeus	7 days
COSCO, OOCL	North Europe, Cagliari, Piraeus, Kumport, Gebze, Izmir, Salerno, North Europe	7 days
MOL, NYK, YML, K-Line	East Asia (PRC ports), Suez Canal, Ashdod, Piraeus, Istanbul, Izmir, Mersin, Suez, Far East	7 days

continue to next page

Route / Operators	Ports of Call	Frequency
Maersk Line	Istanbul, Gemlik, Istanbul, Poti, Constanta, Istanbul Busan-Shanghai-Ningbo-Chiwan- Singapore-Port Said-Izmit Korfezi- Ambarli Istanbul-Piraeus Istanbul-Ambarli Port-Gemlik-Poti- Constanta Guayaquil-Puerto Bolivar-El Oro- Balboa-Manzanillo-Port Tangier- Algeciras-Piraeus-Canakkale-Izmit Korfezi-Ambarli Port Istanbul-Yuzhny- Novorossiysk	3 days 7 days 7 days
Neptune Feeder	Derince, Yenikoy, Borusan, Piraeus, La Goulette, Civitavecchia, Marseilles, Sete, Barcelona, Tarragona, Valencia, Tanger Med, Koper, Piraeus, Efesan	7 days

Source: Authors research - selected shipping line schedules 2020.



Table 11 continued



3.6 Samsun, Turkey

Samsun port is the biggest port of Turkey in Black Sea region and has a large hinterland. Because of this feature, the port is a popular place for cargoes that come from and go to Anatolia. Samsunport is recognized as one of Turkey's main container handling ports in the Black Sea along with Trabzon Alport and the West Black Sea Turkish ports İnebolu and Bartın also performed smaller volumes of container handling. The current statistical data is difficult to locate due perhaps partly to the privatization of the port and its operations in 2008. Samsun has increased shipping volumes in 2015 and received 2,760 direct calls made up of Roro ships, rail ferries, container carriers, and bulk vessels and tankers.

3.6.1 Landside Connectivity

Samsun port is the only international Turkish port with railway connections in the Black Sea and it has ondock rail for container and dry bulk cargoes.

3.6.2 Investments

In May 2008, Ceynak Lojistik ve Ticaret AS gained the operating rights of Samsun Port for 36 years in a competitive tender offering \$125.2 million, carried out by Directorate of Privatization Administration. The port is now operated by CEYNAK Inc. under the management company Samsun International Port Management. CEYNAK Inc has diversified logistics and transport investments in Mersin, İzmir, İskenderun, İzmit, İstanbul, and Samsun. New investments since privatization have been construction of new warehouses, grain silos, and liquid bulk tanks. Storage and port machinery for cargo handling and increasing the port cargo area from 350.000 sqm to 445.000 m² (CEYNAK Inc., 2019).

Modernization works of the Samsun-Kalın (Sivas) railway line with the length of 378 km started in 2015 when the line was closed to traffic. The cost of the development funded largely by the European Union cost €259 million and was completed early 2019. However, delays to opening were caused by the lack of signalling gear (Railways News, 2020).

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha) estimate	44.5 ha
Port capacity : million tonnes per annum (m.pta) estimate	23 m.tpa
Water depth alongside berths: LAT meters (m)	6.5 m–12 m
Total quay length: Combined all types kilometers (km)	2.65 km
Number of commercial berths	10
Combined throughput of million tonnes in 2016	12.2 million tonnes
Containerized throughput 2018	67,000 TEU
Container Terminals / Capacity per annum	250,000 TEU
Ferry Terminals / Capacity estimate	100,000 trailers

Table 12: Samsun Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Türklim, 2015; UDH Ministry, 2015; TCDD, 2015; Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: Samsunport Samsun International Port Management A.Ş, 2020.



3.7 Varna, Bulgaria

Varna is operated by a public company, 100% state-owned with the Ministry of Transport & Communication as the sole shareholder. It is one of Bulgaria's major seaports on the western side of the Black Sea. The port of Varna has two terminals: Varna East Port Terminal, which is situated deep into the Bay of Varna, 1 km distance from the city center and Varna West Port Terminal at the northern Black Sea coast of Bulgaria. It is located at 30 km west of Varna city, on the west shore of Beloslav Lake (Varna Port EAD, 2020).

Varna port suffers from urban encroachment and the east port has immediate conflict with urban developments. The west port development undertaken over the last 30 years was in reaction to this issue. The port of Varna is relatively small from a general freight and container perspective with throughput less than 150,000 TEU per annum. Liquid bulk and dry bulk cargoes are the main activity along with the cost of sustaining a rail-ferry network developed from the Soviet era.

3.7.1 Landside Connectivity

Varna port has direct rail connections to the east and west terminals.

The development of Trans-European Transport Corridor No. 8 and its eastward expansion into TRACECA (Europe-Caucasus-Asia Transport Corridor) and optional No. 7 (Rhine-Main-Danube) is recognized as a conduit for the Eastern Black Sea and Central Asian countries and links the port of Varna. Varna has dedicated berths for ferry and container feeder services along Black Sea. Railway wagons transported via ferry services require gauge change from Russian gauge (1,520 mm in Central

Key Attributes	Description
Year-round navigation	Yes
Port Terminals Land area: Hectares (ha)	50.6 ha
Port capacity: million tonnes per annum (m.tpa) estimate	15 m.tpa
Water depth alongside berths: LAT meters (m)	10.5 m–11.5 m
Total quay length: Combined all types kilometers (km)	5.77 km
Number of commercial berths	33
Combined throughput of million tonnes in 2016	9.5 million tonnes
Containerized throughput 2019	139,000 TEU
Container Terminals 2 / Capacity per annum	300,000ª TEU
Ferry Terminals / Capacity est. rail wagons per annum	168,000 wagons

Table 13: Varna Port General Description

LAT = lowerst astronomical tide, TEU = twenty-foot equivalent unit.

^a Declared capacity is unavailable; estimate based upon throughput and growth including country statistics from the Trading Economics database and the World Bank Group database. Note: The KPMG Report lists Varna Port TEU capacity at over 3 million TEU, which is considered incorrect.

Source: Varna Port dataset, various port databases, Authors' calculation estimates.



Source: EISA Shipping Agencies - Rosen Donev, 2020.



Asia and Caucasia) to standard gauge (1,435 mm in Europe). This facility of gauge change is available at the ferry terminal at Varna which provides a direct railway link between Europe and countries in Central Asia and Caucasia (KPMG Georgia LLC, Dec, 2019).

3.7.2 Investments

In 2017, the port of Varna announced investments of about \in 5 million in infrastructure developments and the purchase of new equipment. A key milestone was the delivery of a new 144 tonne capacity mobile crane for port terminal Varna West, with other purchases of new mobile equipment such as loaders, tractors, trailers, all timed with the 110th anniversary of the port of Varna, (Maritime Herald, 2017).

The port plans to have its two main access channels dredged to a depth of 13.5 m (currently 11 m) to attract larger ships and improve the access to Varna West Port. The Varna lake part of the port and the turnaround channel will also be dredged as part of a €179 million government-funded project, which aims to attract cargo from the PRC's new Silk Road project and the new trans-Caspian transport corridor. Some 8 million tonnes of material will be dredged the channels and lake bottoms, and the channels' banks will be fortified. The project, which is currently in its planning stage, will be managed by the Bulgarian state-owned company Transport Construction and Renovation and is expected to be completed in 2022 (Ports Europe, Dec, 2019).

China Machinery Engineering Corporation (CMEC), a state-controlled company, has signed a €120 million (\$134.93 million) contract with Logistic Center Varna to jointly develop new infrastructure in the port of Varna. This is the first port project by a Chinese company in Bulgaria. (Ports Europe, April 22, 2019).

3.8 Constanta, Romania

Maritime Ports Administration SA Constantza acts as the management agency and Port Authority for the Constanta Port and its safety and security.

Constanta (Constantza) is Romania's principal port and the largest Black Sea port. It is located on the west coast of the Black Sea, at 179 nautical miles distance from

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	3,926 ha
Land area: Hectares	1,300 ha
Port capacity: million tonnes per annum (m.pta)	100 m.tpa
Water depth alongside berths: LAT meters (m)	8 m–19 m
Total quay length: Combined all types kilometers (km)	29.8 km
Number of commercial berths	156*
*16 non-operational	
Combined throughput of million tonnes in 2019	66 million tonnes
Containerized throughput 2019	666,000 TEU
Container Terminals 4 / Capacity per annum	1.8 million TEU
Ferry Terminals / Capacity per annum	45,000 trailers

Table 14: Constanta Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Constanta Port, Ports Europe and authors calculations. Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: DP World Constanta, 2020.

the Bosporus and 85 nautical miles from the mouth of the Sulina waterway through which the River Danube flows into the sea. Commercial barges operate along the Danube River from hinterlands of western Europe and enter the Black Sea via a Canal, which flows directly into the Constanta Port. The port handled a total of 66 million tonnes in 2019, made up of 41 million tonnes of dry bulk, mostly grains, cereals, and iron ore and 14 million tonnes of liquid bulk mostly petroleum products including crude oil.

Constanta has deepwater berths allowing Capesize 220,000 DWT and 165,000 DWT tankers. The port hosts two Ro-Ro terminals with a quay depth of 13 m and has nominal surface area capacity up to 4,800 vehicles providing annualized vehicle capacity of 235,000 per annum (National Company Maritime Ports Administration S.A. Constanta, 2019). In addition, there is a dedicated rail-ferry terminal located in the southern part of Constantza Port, which handles trains using the European train gauge. The rail-ferry terminal has a group of three railway lines of 750 m each, used for loading and departure of rail cars plus a group of 10 lines used for processed rail cars for loaded/unloaded on-off vessels with a total length of 450 m-500 m. Four container terminals are operated at Constanta by APM, Hutchison Ports and DP World (Constanta Port, 2020).

3.8.1 Landside Connectivity

Constanta is part of the TRACECA and TITR corridors with 300 km of rail networks within port limits connecting main lines to bordering countries Bulgaria, Hungary, Moldova, Serbia, and Ukraine, and into Western Europe and Central Asia. Romania has a maritime border with Turkey with many short sea feeder carriers operating between the two nations. Constanta is recognized for potential of developing into a major Central European gateway, a position which it fulfilled at various times in history. It considers itself as the (transportation) bridge between Central and Eastern Europe.



There are developments in all major modes of inland transportation connecting Constanta: Road-a major highway completed 2010; rail, and major electrification upgrade completed in 2011.

The 100 km of road and 300 km of rail track running within the port and the city limits link into the A2 highway and the national railways network, respectively. The port claims a pivotal role in pan-European corridors IV, VII, VIII (TRACECA) and IX. Corridor IV is the rail corridor between Dresden/ Nuremberg (Germany) and Romania, with branches to Thessaloniki (Greece) and Istanbul (Turkey). Corridor VII encompasses Danube River. The TRACECA (VIII) corridor starts in southern Italy and runs via Albania and Macedonia to Bulgaria, where it branches out to Romania, Ukraine, but also Turkey. A main route within this corridor is the combined "Viking" container-trailer train, running between Ilyichevsk and Odessa-Kiev-Minsk-Vilnius-Klaipeda and linking with pan-European corridor IX, to which Constanta is close (North-East Europe-Alexandroupolis, on the Aegean).

As earlier identified, river barges play a large part of the throughput of Constanta, which will benefit from the EU allocation of funds for Danube River improvement projects that are aimed at improving navigation conditions on the Danube and on the Danube's tributary waterways as well as within ports located on the central TEN-T, including the acquisition of multifunctional equipment and vessels for sustainability of commercial transport on the Danube.

With a length of nearly 2,900 km (of which 2,400 navigable) from the Black Forest in Germany to the Black Sea, the River Danube is the second longest river in Europe, after the Volga. It flows through and/or forms part of the borders of no less than 10 countries: Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Moldova, and Ukraine before emptying into the Black Sea via the Danube Delta in Romania and Ukraine.

In 1992, the 171 km Rhine–Main–Danube Canal was opened. Sixteen locks bridge a difference in altitude of 107 m (with a peak of 175). A total of 65 locks have to be passed between Vienna and Rotterdam. Since its opening, barges of maximum 110 m long and 11.45 wide can formally sail all the 3,500 km way between Amsterdam, Rotterdam, as well as Antwerp and Constanta (and vice-versa) and the various industrial centers and river ports in between. As such it forms pan-European transport corridor VII. On various parts of the waterway, substantially larger inland vessels can be accommodated. Major navigable rivers linked to the Danube are the Drava, Sava, and Tisza. In Serbia, a canal network also connects to the river; another canal joins up with the Oder flowing into the Baltic near Sczcecin (Poland) (Marghadi & Visser, 2009).

3.8.2 Investments

Constanta completed an extension of the Northern Breakwater of Constantza Port - extension by 1,050 m at the end of 2016. This was a necessity improvement to ensure the operating conditions of the port were safe by decreasing the waves agitation in the port. The result was increasing the safety of vessels by ensuring the protection of the port channels and reducing the destructive effects of waves on the port facilities. The project was financed by Sectorial Operational Programme for Transport (SOP-T 2007-2013), from EU structural funds and from the state budget at a value of \$2.09 million.

The port of Constanta has started dredging work within the investment project "Modernizing port infrastructure by ensuring the deepening of the channels and basins and the safety of navigation in Constanta Port." Port depth of the basin will be increased from 7 m to 9 m and includes work to protect the quays from slippage. The project is co-funded by the European Union from the Cohesion Fund through the Large Infrastructure Operational Program (POIM) (Programul Operațional Infrastructură Mare) 2014-2020, Priority Axis 1 – Improving mobility through the development of the TEN-T network and subway transport (Ports Europe, July, 2019).

The EU allocated €10.8 billion (\$12.088 bln.) under the Operational Program for Large Infrastructure for 2014–2020 (including government cofinancing) for various projects including:

- Development of a high depth specialized berth -\$5.35 million.
- Doubling the railway between Agigea Lock and Port Constanta \$3.51 million.
- Road bridge across the link canal (Flyover) \$35.14 million.
- Barge terminal second phase \$41.61 million.
- DAPHNE Danube Ports Network \$3.32 million.

Trans-Caspian International Transport Route (TITR) – Grampet – Grup Feroviar Român (GFR Romania), GR Logistics & Terminals LLC (Georgia) and ASCO Logistic CJSC (Azerbaijan) have signed an agreement to set up a consortium to operate a regular shipping between the ports of Constanța and the Georgian ports of Batumi and Poti (Ports Europe, Oct, 2019).

DP World Constanta, a subsidiary of the Dubaiheadquartered group, has renewed its concession agreement allowing it to operate its container terminal with a capacity of 1.3 million TEU in the Romanian Black Sea port of Constanta for another 30 years, until 2049, (Romanian Business News, 2019).

3.9 Odessa, Ukraine

The Odessa port is managed and owned by Odessa Seaport Authority, which is a state-owned business of the Ministry of Infrastructure of Ukraine. There are many business entities operating on port land under public-private partnerships.

Odessa port is in the north west of the Black Sea coast in the Black Sea-Azov, 592 km from the Bosporus. Having been the home port of former Black Sea Shipping Company (BLASCO), it was for many years the largest container port in the Black Sea handling more than 21.7 million tonnes of cargo in 2018. Container Terminal Odessa is the container terminal in the port of Odessa owned by German logistics holding HHLA. According to data from the Administration of the Ukrainian Seaports (AMPU), Ukrainian ports saw cargo traffic surge 19% year over year to 846,485 TEU in 2018, with imports rising 22% and exports up 13%. Odessa continued to be the most utilized port in the country, handling 70.7% of all containerized cargo, followed by Yuzhny seaport at 14.7%. The growth outstripped that of ports in the Russian Federation, which saw volume increase 9.8% to 5.08 million TEU (Gerden E., 2019). Odessa port is favoured by the major container shipping lines attracting the Bosphorus Express Service (BEX), weekly service of the Ocean Alliance, ZIM Med Pacific, weekly services to the far east and Middle East (ME3), weekly service of Maersk Line, which connects Odessa with the Middle East.

The geographic advantages of Ukraine's Black Sea ports have been leveraged by the government in recent years to demonstrate the attractiveness to shippers moving goods from Asia to the EU. The distance between Shanghai and Odessa, is 8,395 miles by sea, more than 3,000 miles shorter than St. Petersburg (11,432 miles), and Odessa is close

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	141 ha
Port capacity: million tonnes per annum (m. tpa)	50 m.tpa
Water depth alongside berths: LAT meters (m)	9.0 – 14 m
Total quay length: Combined all types kilometers (km)	9 km
Number of commercial berths	54
Combined throughput of million tonnes in 2018	21.7 million tonnes
Containerized throughput 2019	650,000 TEU
Container Terminals 2 / Capacity per annum	
Odessa port has two container terminals - HPC and BKP. HPC is a subsidiary of Hamburg Port Consulting, owned by HHLA group.	1.4 million TEU
Ferry Terminals / Canacity – trailers	Undetermined

Table 15: Odessa Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Odessa Port Authority and various other maritime databases; Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: Odessa Port Authority, note grain elevator and silos crowding container terminal.

to the borders of several Central European states, making it particularly attractive for shippers moving goods to places such as Romania, Bulgaria, and Serbia. Delivery times from Shanghai and other major Chinese seaports to Odessa average 22–25 days, compared with 35–40 days to St. Petersburg. In addition, port charges at Odessa are lower, currently starting at \$300/TEU (including surcharges) at the port of Odessa, compared with about \$450/TEU in St. Petersburg (Gerden E., 2019).

Odessa port suffers from a lack of landside space to cater for the multi-operational activities it is involved with. In addition, the port appears to be in natural competition with close port rivals in the Russian Federation and others in Ukraine including Ilychevsk and Yuzhniy ports. This is evident particularly in the container shipping arena, where any increase in handling capacity at one terminal is almost inevitably associated with a loss at another, a factor that is not lost on shipping lines that may exploit this oversupply by leveraging lower port charges and handling fees.

3.9.1 Landside Connectivity

Situated close to each other (by road around 30 km), Ilyichevsk and Odessa (as well Yuzhny, 40 km north of Odessa) share the same hinterland; they are all in the Odessa Oblast. A substantial proportion of the transportation of goods in the Ukraine is through Odessa Railway. In early 2008, a new rail link between Ilyichevsk, Odessa, Cherkassy, and Nikopol (the Russian Federation) was launched (Marghadi & Visser, 2009).

Not surprisingly, Ilyichevsk and Odessa consider themselves as junctions between (Central and East) Europe and Asia (Caucasus and Central Asia in particular). Crossing the Ukraine are several international TRACECA corridors, and thus of importance to the ports:



- III (Brussels, Aachen, Cologne), Dresden, Wrocław, Katowice, Kraków, Lviv, Kiev
- V Venice, Trieste, Koper, Ljubljana, Maribor, Budapest, Uzhhorod, Lviv, Kiev
- VII The Danube River (split in 6 different sections)

 Izmail is the largest of the three Ukrainian Danube ports (the others being Reni and Ust-Dunaisk), having handled 21,400 TEU in 2007 (+16%)
- VIII (coinciding with TRACECA): Bari, Brindisi, Durrës, Vlore, Tirana, Skopje, Bitola, Sofia, Plovdiv, Burgas, Varna. At Plovdiv (Bulgaria), the corridor branches out to Ilyichevsk and Odessa (and also to Constanta and Tukey)
- IX Helsinki, Vyborg, St. Petersburg, Pskov, Moscow, Kaliningrad, Kiev, Ljubashevka/Rozdilna (Ukraine, branch with Odessa), Chisinau, Bucharest, Dimitrovgrad, Alexandroupolis A main route within corridor IX is the combined "Viking" containertrailer train, running between Ilyichevsk and Odessa to Kiev, Minsk, Vilnius, Klaipeda and vice-versa (EGIS International / Dornier Consulting, 2013).

3.9.2 Investments

As highlighted in the introduction of this chapter, the volume growth in recent years at Odessa has been dramatic, although it appears to have reached a natural trade balanced ceiling. This is owned much to the customs reforms that were instituted in 2016– 2017 that may have resulted in cargo clearance times falling to between 1 and 2 hours. (Gerden E., 2019).

In late 2017, Hutchison Ports Company signed a preliminary agreement with the Ukrainian government for a 49-year concession at Chernomorsk, which handled just 127,000 TEU in 2018, despite having an estimated annual capacity of 1.15 million TEU. The outcome of such port developments may mean heightened intra-port competition may increase with cannibalisation of container volumes from one Ukrainian port to another. This is set against Chernomorsk currently having a container rail connection to the Lithuanian port of Klaipeda via the 'Viking Train', whereas Odessa and Yuzhny also offer rail services service to and from the ports of Riga, Latvia, and Muuga, Estonia, via Zubr, (Gerden E., 2019).

Separate investments at Odessa port include the expansion of port space and technical re-equipment program with more than €20 million investments allocated. A recent announcement from Government of Ukrainia has been the gearing up to offer concessions for part of the port of Odessa and for the ferry service at the port of Chernomorsk, both at the Black Sea, and for the Azov Sea ports of Mariupol and Berdyansk. This follows the successful tendering of the Black Sea ports of Olbia (Olvia) and Kherson.

The total amount of investments in the development of Kherson and Olbia ports in the next 5 years is expected to be €140 million (Ports Europe, Feb, 2020).

3.10 Rostov-on-Don, Russian Federation

This port node has been included as its importance to marine commercial traffic traversing the Volga-Don Canal and its geographic position at the headwaters of the Black Sea. Rostov Port is managed under the Joint Stock Company status as a seaport authority. The port is an international river port situated at around 30 km from Azov and open for inland barges from March to November. The maximum draught is 3.6 m–4.6 m. Cargoes handled comprise chemicals, clay, general cargo, grain, metal scrap and metals, ore, paper, salt in bulk, timber, and containers. Total annual liftings reach between 3 million and 4 million tons, of which 80% is combined export and transhipment.

The port arranges midstream at anchor transfer from large ships unable to berth at the shallow draft port via barges alongside at the Russian port of Kavkaz. The depth of the Kavkaz port anchorage allows receiving vessels up to 14 m draft. This is usually for dry bulk cargoes at a loading rate of 10,000 tons per day to large-tonnage sea fleet for coal, sulphur, grain cargoes of up to 70,000 tonnes.

3.10.1 Waterway Connectivity

The Volga-Don Canal system links the five seas: the Baltic Sea, the Black Sea, the White Sea, the Sea of Azov, and the Caspian Sea. The Volga-Don Canal is important to the CAREC region because it allows waterborne shipping from the Volga River to the Don River, through the Sea of Azov, and into the Black Sea.

The River Don, emptying in the Sea of Azov is navigable over a length of 1,800 km, from Tula, south of Moscow, until the Sea of Azov near Rostov. It freezes 4 months of the year. Original locks were constructed in the 1950s, with around 60 nautical miles of the Don–Volga Canal connecting the two rivers forming part of its name, therewith creating an all-water link between the Black Sea and the Caspian Sea (Figure 37).

The detailed description of the Volga-Don Canal, is described with linking the lower Volga River with the Don River at their closest point in the southwestern Russian Federation. The canal runs from Kalach-na-Donu, on the eastern shore of the Tsimlyansk Reservoir, for 101 km to Krasnoarmeysk on the Volga south of Volgograd. There are 13 locks along its route, which drops 88 m to the

Key Attributes	Description
Year-round navigation	No – Ice bound
Land area: Hectares (ha)	100 ha
Port capacity: million tonnes per annum (m. tpa) estimate	28 m.tpa
Container Terminal Capacity per annum estimate	50,000 TEU
Water depth alongside berths: LAT meters (m)	3.6 m-4.6 m
Total quay length: Combined all types kilometers (km)	9 km
Number of commercial berths	27
Combined throughput of million tonnes in 2019	22.95 million tonnes

Table 16: Rostov-on-Don Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: LLC Rostov Universal Port (RUP), 2020.





Volga and 44m to the Don. Three reservoirs—Karpovka, Bereslavka, and Varvarovka—occupy 45 km of its length.

The maximum allowed vessel size is 140 m length overall, 16.6 m wide and 3.5 m draft (Volga-Don Max Class).

An estimated 15.9 million tonnes of cargo were transported through the canal in total in 2018 (Media Group PortNews LLC, 2018). Most of the cargo was moved from the east to the west—90% were transported through the canal from the Volga/Caspian basin to the Don/Sea of Azov/Black Sea basin, and only 10% in the opposite direction. Just over half of all cargo was oil or oil products 51%, predominantly shipped from the Caspian region.

3.10.2 Investments

A 230,000 m² logistic center planned near Rostov-on-Don by Logopark Don (part of the Avalon Group) in cooperation with Raven Russia, a UK investment fund. The investment is estimated at \$166 million (LLC Rostov Universal Port (RUP), 2020).

The Russian Federation wants to increase the volume of goods transported by the Volga-Don route to over 20 million tonnes (in 2018, 16 million tonnes were transported) (Ports Europe, Feb, 2019).

3.11 Novorossiysk, Russian Federation

Identified as a port node within the CAREC corridors linking Kazakhstan, Kyrgyz Republic, Tajikistan, and Uzbekistan, the port of Novorossiysk is listed as a connecting gateway for transit trade via the north eastern reaches of the Black Sea. The port was originally built in the mid-1800s mainly for handling timber. It was rebuilt in the Soviet era and modernized over the past 30 years. The port is located at the top of Tsemesskaya Bay on the northern coast of the Black Sea near the Sea of Azov 165 km from Kerch and 815 km from the entrance of the Bosporus. It consists of two sections, Sheskharis oil harbor and the dry cargo port, encompassing facilities for a chemical terminal, fishing port, ship repair yard, timber export quay, and particularly in handling of liquid (crude oil) and dry bulk cargoes, including fertilizers, grain, metal, scrap, sugar and timber (Marghadi & Visser, 2009).

The port is managed and operated by Joint Stock Company - Novorossiysk Commercial Sea Port (NCSP Group), which acts as the port authority and beneficial owner responsible for safety and security of the facilities.

The Novorossiysk Container Terminal (NUTEP) was developed by the Delo Group in early 2000 and is a



Table 17: Novorossiysk Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port land area: Hectares (ha)	95 ha
Port capacity: million tonnes per annum (m. tpa) estimate	200 m.tpa
Water depth alongside berths: LAT meters (m)	6.8 – 13.9 m
MUTEP Deepwater container terminal	15m
Total quay length: Combined all types kilometers (km)	5.4 km
Number of commercial berths	11
Combined throughput of million tonnes in 2018	154 million tonnes
NCSP Containerized throughput 2019	422,250 TEU
NUTUP Terminal in 2018	332,750 TEU
Container Terminal Capacity per annum	1.6 million TEU
Ferry Terminals / Capacity	40,000 trailers

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: NSCP / NUTEP / Authors calculations.

modern terminal located in the southeast region of Novorossiysk seaport. The terminal was built on the territory of NUTEP. In 2012 NUTEP among other Delo Group stevedore assets was consolidated into a holding company DeloPorts Limited. NUTEP continues to implement its wide scale modernization initiatives and prepares to launch a new project on construction of deepwater berth in 2019 (Container Terminal NUTEP, 2020).

Having handled 154 million tons in 2018, it is the Black Sea's and Russia's largest port by total tons. Crude oil makes up for nearly 70% of that volume. In terms of containers, however, Novorossiysk is much smaller than St. Petersburg's as 2018 figures show—332,000 versus 2.13 million TEU, respectively.

3.11.1 Landside Connectivity

From Novorossiysk, roads and railways provide access to most industrial, agricultural, and population centers in southern and central areas of the Russian Federation, Transcaucasia, and Central Asia. However, it should be considered that the port's infrastructural conditions are not ideal, surrounded as it is by mountains. Road and rail are in a transitional status and mostly export-oriented. Bureaucratic procedures for imports in transit are not yet very supportive either. A single-track tunnel places a restriction on containers transported by rail, therefore accounting for maximum 15% of inland box transportation. Novorossiysk connections are not officially part of any of the international transport corridors and therewith



Source: European Commission TEN-T Network, note circuitous route viz mountains.

outside the international investment funds supporting such corridors. One of the main highway routes here is the A4 (Novorossiysk-Rostov-on-Don-Moscow), competing with the shorter route A10 (Helsinki-St Petersburg-Moscow) (Marghadi & Visser, 2009).

3.11.2 Investments

Widescale modernization initiatives of container terminal included: launch of railway infrastructure, transfer of old railway tracks allowing to increase storage capacity and creating potential for further increase, pavement works for additional port related operations (Joint Stock Company NCSP, 2018).

Consolidation of investments saw the NUTEP Delo Group after acquire controlling stake from NKK Company. Throughput capacity has since increased to 350,000 TEU due to terminal modernization and purchase of new STS cranes and mobile harbor cranes, and an expansion of container yard area. The new deepwater berth was launched in July 2019. The only berth in Novorossiysk able to serve container vessels up to 10,000 TEUs. Depth caters to vessels of a maximum draft of 15 m, Length of 389.7 m. The total throughput capacity will provide capacity to 700,000 TEUs per year (NUTEP Terminals, 2020).

3.12 Batumi, Georgia

The Black Sea Port of Batumi is a recognized port node on the CAREC corridor serving Central Asia, Caucasus, and neighboring countries. Batumi port has 5 terminals, 11 berths, as well one single point midstream mooring point in a designated area outside channels and fairways for loading liquid bulk petroleum products. The Batumi port is 85 km south from Poti and at only 20 km from the border with Turkey. The commercial port sits alongside the tourist city of Batumi, which is attracting fast-paced development in hotels, casinos and tourist precincts, and other hospitality developments, noting Georgia attracted record number of 8.67 million tourists in 2018 being a 9.3% increase over the prior year and Batumi airport arrivals being 23% above the prior year (Georgian Tourisim in Figures - Structure and Industry Analysis, 2018).

It is Georgia's second-largest port by tonnage, mainly consisting of crude oil and petroleum products. Crude oil exports have largely dropped from Batumi port as they were re-routed to the Baku-Tbilisi-Ceyhan Caspian Pipeline Consortium, while some fuel oil has been sent to the port of Taman in the Russian Federation and Georgia's other Black Sea port of



Source: Agenda 2020.ge.

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	ha
Land area: Hectares (ha)	22 ha
Port capacity: million tonnes per annum (m. tpa) *Operational Capacity liquid bulk 18 mtpa	20 mtpa*
Water depth alongside berths: LAT meters (m)	6.4 m–11.5 m
Total quay length: Combined all types kilometers (km)	2.034 km
Number of commercial berths	11
Combined throughput of million tonnes in 2019	2.986 million tonnes
Containerized throughput 2019	116,081 TEU
Container Terminals 1 / Capacity per annum	200,000 TEU
Ferry Terminals / annual wagon capacity	28,000 wagons

Table 18: Batumi Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit. Source: Batumi Sea Port, BICTL, Authors' calculations.

Kulevi, (owned and operated by SOCAR State Oil Co. of Azerbaijan). It was noted that Jan-Nov 2018 shipments of crude and refined oil products from Batumi totalled 978,705 tonnes, down from 1.906 million tonnes in the same period 2017. Oil exports peaked in 2013 with 5.8 million tonnes.

Furthermore, Batumi shifts dry (grain, ores, scrap, sugar) and neo-bulk cargoes (steel pipes, wood), and has facilities for rail and Ro-Ro ferries. The latest development is a container terminal at the back end of the port. The port statistics show that 578 vessels were served in 2019.

Batumi Sea Port was privatized in 2006, when it was acquired by the Greenoak Group, already involved in the operations since 1999. The operation fell into litigation and in February 2008 Kazakhstan's national oil and gas company JSC Kaz Munai Gaz acquired Batumi seaport from Greenoak Group for an undisclosed sum. Additionally, KazTransOil a subsidiary of JSC Kaz Munai Gaz owns and operates Batumi Oil Terminal Ltd.

The container terminal, Batumi International Container Terminal Ltd (BICTL), is under a 48-year concession to Philippine terminal operator ICTSI which commenced in 2007 and finishes 2055. ICTSI also holds an operating concession general cargo berth 6 and the ferry pier (ITF, 2019). There is an absence of a Port Authority at Batumi, which is recognized by the Maritime Transport Agency of Georgia as a needed mandate for government to implement.

Urban encroachment was observed during the study trip in November 2019, with container trucks lining up on public roads. The city plans mitigation measures to alleviate trucks parking on public roads with the expansion of a new port access roadways. This may have the downside of reducing public road widths and could still impact in peak times of port activity.

The Port of Batumi serves as an alternative to the Port of Poti but is less well served by the Georgian railways, which has only a single rail serving as the railway link for the port/quays. However, it seems to be the "Middle Corridor" preferred gateway as its operator is a member of TITR partnership.

3.12.1 Landside And Maritime Connectivity

Along with the overall increasing containerization in the Black Sea region, this underlines Georgia's geographical position as an east-west (between the Black Sea and the Caspian Sea) and north and south (between the Russian Federation and Turkey) natural gateway junction. While the surroundings of Poti's manmade port consist of flat land, Batumi's natural port is surrounded by mountains.



The Georgian railway system links directly with those of the other Caucasian countries of Armenia and Azerbaijan.

Odessa-based UKR Ferry, is one of the few companies offering intra-Black Sea freight ferry links, running between Batumi and Chornomorsk (Ukraine)⁵ and Poti. The ferry hubs other ports at Chornomorsk including; Varna, Constanta, Derince, Samsun, and Haydarpaşa (Istanbul). Following the sale of DRUJBA Line in 2017 to Polferries a replacement service commenced, the Bulgaria-based PB Ferry company that now operates a one-vessel Black Sea service from Burgas, Bulgaria to Batumi and Novorossiysk (the Russian Federation). PB Ferries operates the former Tirrenia ferry LAZIO (1994), which was acquired by the Burgas-based company PB Ferries in 2017 (Ferry Shipping News, 2017). The Varna-Kavkaz-Kerch-Poti-Batumi route operated by Russian Inter-Rail Black Sea Ferries Company ceased calling Batumi in 2010 and now only calls Poti.

There appeared to be heavy congestion in and around the Batumi seaport, mostly from articulated road trucks waiting to enter the container port. The proximity of Batumi port to the city and the highway leaves little options for alleviating congestion apart from tunnelling or creating a large overpass bridge sections of roadway. Both measures would require major capital investments and need land allocated for the exit ramps and multiple lanes inside the port area.

⁵ Chornomorsk relevance to container and ferry volumes has fallen in recent years with only 8% of total throughput being containers whereas Odessa was 35% container volumes. Chornomorsk does however feature with RoRo ferry links to Turkey and Georgia with Ukraine and Sealink ferries.

Some consulted stakeholders during the site visit conceded the fact that urban encroachment and the future of Batumi port on its present site needs to be confronted. Suggestions were aired as to creating an off-dock terminal (dry port) for all containers and decongesting the Batumi port by allocation of time slot bookings for heavy trucks.

An additional issue was observed at Batumi port relative to the unscheduled arrival of ferries and Ro-Ro ships. This condition was marked in most other ports where the legacy of providing dedicated infrastructure for rail-ferries was a prominent feature. The unscheduled arrivals of these vessels create a burden on port labour resources and freight volumes flows onto operating infrastructures. This was particularly evident at Batumi port where limited landside access is available and proximity to city roads and urban supply at peak period traffic is concentrated. The noticed condition is Batumi port is planning industrial developments at the same time as city planners are designing new tourist and residential precincts within very close proximity to one another.

3.12.2 Investments

Trammo Inc of the United States (US), is in talks to invest \$20 million in Georgia and build a new terminal in the Batumi port. Trammo Chief Executive Officer Edward Weiner said the investment decision was made because of Georgia's geostrategic position, business-friendly environment and stable country governance. Such a project would raise the profile of Batumi port as a hub for goods transiting between Asia and Europe.

Batumi as well as Poti ports are attracting increasing traffic of mineral fertilizers (urea), notably from Turkmenistan. Poti is planning to increase industrial capacities for the transhipment and storage of 1.2 million tonnes of mineral fertilizers per year. Though the terminal is planned to be equipped with hightechnology equipment provided with the latest systems of dust control and filtration, it is unclear that this kind of traffic is will be compatible in the long term for a port so close to dense urban environment.

Members of the TITR—Grampet–Grup Feroviar Român (GFR–Romania), GR Logistics & Terminals LLC (Georgia) and ASCO Logistic CJSC (Azerbaijan)—have signed an agreement to set up a consortium to operate regular shipping between the ports of Constanța and the Georgian ports of Batumi and Poti. Philippines-based International Container Terminal Services Inc. (ICTSI) has inaugurated the newly expanded Batumi International Container Terminal (BICT) in Georgia. Both the waterside and landside areas of the multipurpose terminal were expanded to optimize the processing of existing cargo flows and installing additional capacity. Following the expansion, the port's annual container handling capacity was increased to 200,000 TEU. A comprehensive dredging program, undertaken in cooperation with Batumi Sea Port, provides an 11.5-m draught in the port's fairway and alongside BICT's quay line allowing easy access for feeder-max vessels at the port and making it Georgia's deepest draught port. Landside improvements include a new container freight station with a 180-m rail spur to facilitate cross-stuffing from containers to rail cars, according to Madsen. Compared to Poti-Georgia's other major port-Batumi offers all-year round access without closures due to high winds, (World Maritime News, Feb, 2019).

3.13 Poti, Georgia

The Port of Poti is the largest port in Georgia, handling liquids, dry bulk, passenger and rail freight ferries and 80% of Georgia's container traffic (PricewaterhouseCoopers Georgia LLC, 2019). The multipurpose facility has 15 berths, a total quay length of 2,900 m, more than 20 quay cranes, some out of commission and 17 km of rail track inside the terminal yard, with some rail sidings out of commission with abandoned rolling stock lying idle.

The port lies on a natural low-level plain, where the Rioni River empties into the Black Sea, 265 km northwest of Tbilisi and 85 km north of Batumi. The port accommodates eight cargo handling complexes at 15 berths of the "northern port" and "inner basin" with the associated warehouses. There is a separate passenger facility and fishing fleet berths.

In 2008, the Government of Georgia sold 51% of Poti port area to Ras Al Khaimah Investment Authority (RAKIA-UAE). In 2011 RAKIA-UAS sold 80% of its stake in the port to APM Terminals and 15% to Manline Projects LLP. This arrangement allows APM Terminal freehold beneficial ownership and use of the port, subject to planning regulations as mandated by government authorities in Georgia. There is an absence of a Port Authority at Poti, which is recognized by the Maritime Transport Agency of Georgia as a needed mandate for government to

Table 19: Poti Port General Description

Description
Yes
4,444 ha
51.9 ha
63 m.tpa
7.2 – 9.1 m
2.873 km
15
6.345 million tonnes
510,000 TEU
550,000 TEU
36,000 units

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: APM Terminal, PACE Group, Authors' calculations.

<image>

Source: APM Terminals, 2020.

implement. A private company, PACE Group, leases a separate area of the port from APM for bulk and breakbulk cargoes. In October 2019, PACE Group announced the construction of a new terminal at Poti with funding from the International Finance Corporation and Overseas Private Investment Corporation (OPIC). PACE group is planning a new terminal to be constructed on 25 ha for general, bulk, and some container traffic.

The Port of Poti acts as a natural hub for freight between the EU and the CIS countries with railferry services connecting Poti with ports of Odessa, Ukraine, and Varna in Bulgaria. The Port of Poti is a multifunctional port, 2019 estimated cargo turnover was 2.9 million tonnes.

Container export/import flows through Poti remain imbalanced with a ratio of nearly 1:6, included in this is transit cargoes that for the purpose of evaluating imbalances are counted as imports, as opposed to the 36.4% imports, 23.2% export and 40.5% transit; (Laursen, 2019), (KPMG Georgia LLC, Dec, 2019). There was noted a large trade in containerized second hand motor vehicles, some as gateway cargo for the Georgian market and a majority for transit via crossdocking destined for other markets into neighboring areas including Azerbaijan, Armenia, and Central Asia. There is a very limited storage capacity within the terminal area for containers, which is mitigated by immediate transfer to off-dock storage areas. It was noted that 14 different off-dock terminals are operated by various private companies including APM who transfer 35%-45% of containers 2.5 km to their 112 ha off-dock terminal, (Laursen, 2019).

Advantages that the Port of Poti has over the Port of Batumi are: Poti is a shorter railway route to Tbilisi and Baku, rail between Batumi via Poti has limitations on the length of the train; Poti is much less affected by urban encroachment and has ample land for expansion, subject to government planning approvals. Certain limitations are evident and include, seasonal northwest storms in January to March restrict working and access of the port, which enforces a closure when wind strengths are consistently above >18 meters per second (Laursen, 2019). Heavy siltation occurs at Poti due to ingress of river silt from Rioni River system, made worse by broken locks within the riverine environment. Institutional inefficiency of statutory services limits overall productivity, with standard work hours being 9:00am-6:00 pm for Customs processing and clearing and releasing of cargoes. Night navigation of ships is restricted for vessel greater than 180 m in length. Aging infrastructure with pile strength at certain quays restricts heavy handling equipment and payloads traversing. GR has limited capacity to manage rail shunting in the port precinct and limited number of rail cars available for clearing the terminal, many delays were noted at Poti terminal (Laursen, 2019).

3.13.1 Landside Connectivity

Poti port is directly linked to the Georgian railway network with on-dock spurs but only to bulk terminals. The container terminal does not have direct rail access and hence containers need to be shuttled to an off-dock terminal 2.5 km away that includes a rail terminal for containers.

Containers to and from Armenia are partly railed on the regular train from Poti to Yerevan and partly carried by truck. Due to the non-competitiveness and non-transparency of rail tariffs, insufficient quality of service, shortage of rolling stock, and lack of container handling equipment at railway stations, longer transit times and customs issues, trucking to Azerbaijan either in containers or after unstuffing at Poti remains the preferred mode of transport. This applies to all cargo except for heavy loads, moving mainly in 20feet containers. Rail-ferries are accommodated at berth No. 2, which has a 1,520 mm Russian gauge. The complex includes a 10,000 m² lorry park. The nominal annual capacity is estimated at 700,000 tonnes, (EGIS International / Dornier Consulting, 2013).

3.13.2 Investments

APM Terminals and PACE Group have separately announced plans for expansion of terminal operations at greenfield and brownfield sites from Poti. Both planning concepts appear motivated by the need for modernized port and marine facilities to allow larger ships to access and berth, and increased payloads on wharves with greater capacity laydown areas within the terminal yard areas and undercover warehousing for general and weather sensitive bulk and breakbulk cargoes. The existing Poti port configuration appears to have been adjusted to meet modern port needs but has become stretched to the point that it is failing to allow efficiency and productivity to be achieved at several landside and maritime levels.



International port operator APM Terminals, along with Poti New Terminals Consortium, have submitted a conceptual design for the expansion of the APM Terminals' Poti Sea Port in Georgia. The plans were received by the Ministry of Economy and Sustainable Development of Georgia. The project plan entails a 14.5-m water depth at the 700-m quay wall and 25 has of land for the bulk operation for yard and covered storage facilities for various cargo types, including grain, ore, and minerals. The \$100 million new bulk port the partnership wants will handle cargo lots up to 60,000 tons/vessel. They say it will create new opportunities for cargo owners in Georgia, Azerbaijan, Armenia, and other Central Asian countries (Global Construction Review, Jan, 2019).

In February 2019, PACE Terminals committed to a \$50 million project funded through the OPIC. The total cost of the project is \$120 million, with the first

stage of investments being \$93 million, of which \$50 million will be financed by OPIC. The PACE Terminal development 2 includes dredging the harbor to 12 m allowing the port to accept vessels with up to 50,000-tonne capacity with cargo turnover anticipated to be increased by 2.5 million tonnes (Port Strategy, Feb, 2019).

In February 2020, APM Terminals Poti has reinitiated the process of obtaining the necessary permits with a firm intention to build the new deepwater multipurpose port in Poti. APM Terminals has clearly stated in recent discussions with the Government of Georgia its full commitment to expand the Poti Sea Port.

Up to 2020, it seemed that Anaklia project was putting on hold expansion projects at Poti, e.g., APM and PACE projects a situation that may be changing once Anaklia project was suspended. The issues related to the expansion of port capacity in Georgia are discussed in Section 6.3.3. in Volume I.

3.14 Shipping Routes – Black Sea

The Black Sea shipping intensity is typified by short sea feeder shipping that links hubs ports on the Bosphorus and others in the Mediterranean that operate regular shipping to ports in the Black Sea (Figure 45).

Regular ferry services also feature in the region. For most countries, the highest share of their short sea shipping of goods was with partner ports located in the same sea region or sea regions. There are some exceptions, like Latvia on the Baltic, where about half of the short sea shipping of goods came from or was destined to ports located in the North Sea. Romania and Bulgaria on the Black Sea were other exceptions, with the largest share of short sea shipping going to or from the Mediterranean Sea (European Union (EU), 2019). Black Sea container terminals of Ukraine, Romania, the Russian Federation, Georgia, and Bulgaria handled 2.927 million TEU in 2018, including empty containers, excluding transhipment. When considering full containers of the region 2.188 TEU, total growth achieved by these five countries in 2018 was 8.70%, compared to the same period last year (Hellenic Shipping News, 2019).

There is a degree of complexity within the Black Sea scheduled shipping routes with a concentration of services operating to and from the Bosphorus and Marmara ports. Samsun port in the South east of the Black Sea participates in sea transport with Georgia's ports of Batumi and Poti. The Russian Federation's ports of Sochi, Tuapse, Novorossiysk, Azov Sea ports connect with the Volga-Don and act as hubs for the northern Baltic. Ukraine's ports of Nikolayev, Odessa, İlichevsk compete with the Russian Federation for scheduled shipping services and feeder routes. Romania's ports of Constanta and Bulgaria's port of Varna are key links with European overland corridors inking with Black Sea shipping services to bordering ports in most other countries. Samsun port also have connections with Istanbul and all other world ports. In terms of port regionalization, the Black Sea region is divided into three multi-port gateway subregions—Black Sea West (Burgas, Varna,



Source: e-Atlas Shipping Density Mapping, 2020.

Table 20): Black Sea	Sample I	Direct Ship	ping Co	onnections
	J. Diack Sca	Sumple			

Route / Operators	Ports of Call	Frequency
Admiral Container Lines	Alexandria, Port Said, Damietta, Novorossiysk, Odessa, Constanta, Alexandria	3 days
OOCL, CMA-CGM, Evergreen	E. Asia, Pt. Said, Beirut, Piraeus, Izmit, Istanbul, Constanta, Odessa, Istanbul, Mersin, Pt Said, E. Asia	7 days
MAERSK line CMA-CGM, MSC – Trunk Route	Istanbul-Evyap (Izmit), Istanbul- Ambarli, Constantza, Odessa. Ilichevsk, Istanbul, Piraeus, Port Said (SCCT), Singapore, Xiamen, Busan, Qingdao, Shanghai, Ningbo, Yantian, Chiwan, Singapore, Port Kelang, Istanbul-Evyap	7 days
MSC Extended Feeder	Gioia Tauro - Piraeus - Batumi - Chernomorsk - Constanta - Burgas - Gioia Tauro	7 days
MAERSK Line Feeder	Istanbul - Ambarli Port, Gemlik, Ambarli, Port Istanbul,	7 Days
	Ambarli Port Istanbul, Poti, Constanta	
ARKAS Line - Feeder	Marport, Burgas, Varna, Marport	4 days
	Marport, Varna, Constanta, Marport	
UKR Ferry Ro-Pax	Chernomorsk-Batumi-Chernomorsk	2 days
	Burgas-Batumi-Burgas	
	Geroite na Sevastopol	
	Chernomorsk-Varna-Poti	
PB Ferries	Burgas, Batumi, Novorossiysk	5 days
NaviBulgar Ferry Ro-Pax	Varna, Chernomorsk, Varna	7 days
	Varna, Poti, Batumi, Varna	
	Chernomorsk, Poti / Batumi, Chernomorsk	
Sea Line Ro-Pax	Karasu, Sakarya – Chornomorsk, Odessa	4 days

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

Constantza), Black Sea North (Odessa, Iliychievsk, Yuzhnyi, Mariupol) and Black Sea East (Poti and Batumi), and one separate gateway (Novorossiysk). The ports of Constanza, Odessa, Iliychevsk, Yuzhny, and Novorossiysk are called directly by shipping lines. During the last 15 years the size of the vessels, visiting these ports, grew to 8000 TEU whereas the maximum size is about 9000 TEU due to the navigational restrictions of the Bosporus strait. The smaller ports in the Black Sea region are called by feeder vessels and the ports of Istanbul, Piraeus, Damietta, Port Said, Gioia Tauro, Malta, etc. This shift occurred after the crisis in 2008 whereas the transhipment operations in the region declined in volume. Presently direct and feeder calls are almost evenly distributed within the network. The largest container vessels are handled in the port of Constanta. One of the major factors is the considerable investment of leading port operators (Varbanova, 2017).

C. CASPIAN SEA PORTS

The Caspian Sea is the world's largest inland body of water, variously classed as the world's largest lake or sea. It is an endorheic basin⁶ located between Europe and Asia and has a surface area of 371,000 km² and has no tidal range. It has a salinity of approximately 1.2% (12 g/l), about a third of the salinity of most seawater. It is bounded by Kazakhstan to the northeast, the Russian Federation to the northwest, Azerbaijan to the west, Iran to the south, and Turkmenistan to the southeast. The Caspian Sea has a north–south orientation and its main freshwater inflow, the Volga River, enters at the shallow north end (Leeden, Troise, & Todd, 1990).

Navigation rights for shipping are governed by the Caspian Status Convention that grants unrestricted rights to navigate on the entirety of the Caspian Sea, without considering the existence of any special maritime zones. Each bordering country has constructed their own port(s) infrastructure specific to the needs of the host nation including oil and gas exploration and industry support and commercial trading for dry bulk, liquid bulk, and general cargoes and containers (Figure 46). The Soviet era transportation task was typified by industrial rail linkages that linked with rail-ferry networks, much of which is maintained in primary port infrastructure in the Caspian region today.

A major issue for Caspian navigation is shallow waters and the need for dredging in most ports and access canals. Narrow and shallow canals leading to the mooring bridges in ports cause serious difficulties for ships in moving, turning and manoeuvring there. In addition to that, the Caspian is prone to strong winds and storms that add to the difficulties to access ports in bad weather, causing ports to stop operations temporarily.



⁶ A basin without outflows.



3.15 Aktau, Kazakhstan

The Port of Aktau is located on the eastern coastline of the Caspian Sea approximately 3,000 km from Almaty via the A2 highway. Compared to the overland routes to major centers in neighboring countries the shipping transits are relatively short—Aktau to Baku is 475 km, Aktau to Turkmenbashi is 550 km, and Aktau to Bandar Anzali 700 km by sea. There are other major seaports and shore base centers in Kazakhstan including Bautino marine supply port 124 km north of Aktau that serve as the marine and supply base and vessel maintenance facility (DLCA, 2020). Bautino supports the development of the Northern Caspian Sea offshore oil fields and is advertised as an alternative cargo port for handling of construction materials, dry bulk and container cargoes (Aktau Sea Port JSC, Feb, 2020).

The most important development affecting Aktau commercial operations was the official opening of Kuryk commercial port on 14 August 2018. This new port development has resulted in the transfer of all rail-ferry and Ro-Ro ferry operations to Kuryk port, which is also gearing up to seek new business in the dry bulk and break bulk sectors (Gubashov, 2020).

In addition to Kuryk port carving business away from Aktau, a new port concession was operationalized in with the adjacent facility of Aktau Marine North Terminal, operated by a joint venture of private business and state Joint Stock Companies including KAZ Rail (Aktau Marine North Terminal, 2020).

The volume handled at Aktau Port has dramatically reduced in the last five years from over 10 million tonnes to less than 3.5 million tonnes per annum in 2019.

The Port of Aktau has lost consecutive business over the last 10 years

- Oil has transferred from ship to pipeline
 - 2012 totalled 7.60 million tonnes of oil exports
 - 2019 totalled 2.136 million tonnes of oil exports
- Ferry operations have transferred to the new Port of Kuryk
 - 2012 totalled 1.4 million tonnes of ferry freight
 - 2019 estimated 0.02 million tonnes of ferry freight (limited to U308 Uranium oxide)
- Bulk Grain cargo is shared with the new port of North-Port private Terminal
 - 2012 totalled 3.4 million tonnes
 - 2019 estimated 1.2 million tonnes

Aktau remaining commercial activities are in the handling of containers, liquid bulk (petroleum products) and dry bulk (grain) and breakbulk cargoes (metal, steel products, sawn-timber, etc.).



Source: Aktau International Commercial Sea Port, 2020.

Table 21: Aktau Port General Description

Key Attributes	Description				
Year-round navigation	Yes				
Total port area: Hectares (ha)	100 ha				
Land area: Hectares	7.97 ha				
Port capacity: million tonnes per annum (m.tpa)	15 m.tpa				
Grain silo capacity 24,000 tonnes nominal					
Water depth alongside berths: LAT meters (m)	4.6 m				
Total quay length: Combined all types kilometers (km)	1.76 km				
Number of commercial berths	11				
2 berths out of commission					
Combined throughput of million tonnes in 2019	3.23 million tonnes				
Combined throughput of million tonnes in 2014	10.28 million tonnes				
Containerized throughput 2019	14,324 TEU				
Container Terminals (0) / Capacity per annum	25,000 TEU				
Ferry Terminals / Capacity per annum	50,000 wagons				
Ferry berth and terminal closed					

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Aktau Port ; Authors' calculations.
During the study trip in January 2020 it was noted that aging infrastructure and a private-owned and controlled rail siding linking the Aktau Port add to cost of operations. The port was last rehabilitated in 1999 and requires additional quay works to compensate for dropping sea-level in the Caspian.

3.15.1 Landside Connectivity

The Aktau Port is directly linked to the Kazakhstan rail network albeit a rail alignment of 15 km connecting the old Aktau Port is owned by a private consortium Kascortrans that has increased access charges to freight wagons connecting with the port (Metha, 2020).

The completion of the ongoing infrastructure projects in the region (Khorgos FEZ, Trans-Kazakh rail link to Aktau via Zhezkagan and Beineu, East-West rail corridor and Baku-Tbilisi-Kars railway) in theory links Aktau to play a role as container hub on this new alternative route from Asia to Europe and Turkey. It may represent an opportunity to divert commodity cargo-flows (grain in particular) from foreign routes and ports to domestic ones and to add shipments in containers to bulk ones, (Schoen & Gueriot, 2015).

During the scoping study tour of Aktau Port in January 2020 it was noted that grain was being loaded at the small grain terminal, which operates a single elevator from the modest silo storage of 24,000-tonne capacity. Grain to the port would be transferred by rail, however the per ship load volumes estimated at 3,000 tonnes to 6,000 tonnes observed would not create adequate economies of scale associated with dry bulk handling of grain.



3.15.2 Investments

A reform agenda for Aktau Port appears necessary along with the need for consistency of development initiatives associated with other ports investment in Kazakhstan. Without such, there is uncertainty as to the mandate each port should address, which could lead to oversupply and intra-port competition.

3.16 Kuryk, Kazakhstan

The Port of Kuryk is the most recent development in the maritime industry in Kazakhstan. This specialized port was developed in a strategic location linked by new rail operations that connect the port with road and railway services along the Kuryk–Tazhen Customs Point and Kuryk–Khorgos Gateway dry port (The Astana Times, Feb, 2018).

The Port of Kuryk is located 53 km south of Aktau Port via the R-114 highway. The port development has design features that demonstrate it was intended to replace Aktau as the major rail-ferry and Ro-Ro ferry operation for Kazakhstan. The port has a direct access to Kazakhstan railway network and is expected to link the Silk Way between Europe and the PRC. As per the official website, the ferry complex has already been operationalized and carried about 1.5 million tons of cargo in 2017. The total capacity of ferry complex is expected to reach 10 million tpa by 2030. The universal reloading terminal will handle about 3 million tons of container, general, and bulk cargoes. The liquid cargo terminal will handle 2.9 million tons. These two terminals are likely to be operationalized by 2022.

The observances of the Kuryk port and discussions with management in January 2020 allowed an understanding that they were keen to develop more than just rail-ferry operations and had been in discussions with several shipping lines and commodity groups in their attempts to attract new business (Gubashov, 2020).

Design attributes at Kuryk port include large-scale breakwaters of 820 m on the eastern side and 640 m on the western side of the port to mitigate intrusion of swell and surge into the harbor. The harbor master indicated that they do have a limit of safe working ships at 15 meters per second wind strength, which appears the standard level for ports within the Caspian and Black Sea.

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	65 ha
23 ha commissioned / 42 ha added by 2030	
Port capacity: million tonnes per annum (m.tpa)	6 m.tpa
Water depth alongside berths: LAT meters (m)	6.5 m
Total quay length: Combined all types kilometers (km)	1.3 km
Number of commercial berths	5
2 x dedicated Rail-ferry link span berths	
Combined throughput million tonnes in 2019	2.4 million tonnes
Combined throughput million tonnes in 2018	2.1 million tonnes
Combined throughput million tonnes in 2017	1.5 million tonnes
Containerized throughput 2019	0 TEU
Container Terminals (0) / nominal capacity per annum	100,000 TEU
Rail-Ferry Terminals / wagon capacity	60,000 wagons

Table 22: Kuryk Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Kuryk Port; Authors' calculations.



The current operators of rail-ferries to Kuryk is Azerbaijan Caspian Sea Shipping Closed Joint Venture (ASCO), with two rail ferries under Azerbaijan flag, providing a capacity for 80 passengers, 44 rail wagons or 54 rail tanks. The sailing time between Kuryk and Alat port is 18 hours, being is 4 hours shorter than Aktau to Alat. Kuryk Customs clearance is done in 3 hours and estimated average rail-ferry traffic is 45 ferries per month at Kuryk, (Gubashov, 2020). The rail-ferries do not operate on a fixed sailing schedule and depart load ports on the basis of cargo availability subject to loaded freight train arrivals at the ports of call. This is further discussed in the shipping routes section of this report.

At present there are no container or Ro-Ro ferries handled at Kuryk and development of shoreside facilities is ongoing including sheet pile wharf structures and revetments at reclaiming ponds to the eastern reaches of the port.

3.16.1 Landside Connectivity

Kuryk port is the major rail gateway for Kazakhstan connecting with the Russian Federation, Caucasus, and European countries via Middle Corridor.

3.16.2 Investments

Aspirational projects identified at Kuryk port include various types of cargo warehouses at the transport and logistics center with a temporary storage warehouse, for customs procedures at the terminals of Kuryk port as well as export and import operations, including cargo insurance. Production of caissons for other developments planned include a ship building and maintenance yard and petroleum/liquefied petroleum gas storage tanks to support Caspian Sea oil and gas projects (Kuryk Port Development, 2020).

3.17 Baku/Alat, Azerbaijan

The Port of Alat is the primary commercial port for rail-ferry, Roro ferries, and dry bulk cargoes in Azerbaijan. Other ports in Azerbaijan provide dedicated services to the oil and gas marine supply and exploration sectors. The city port of Baku was closed to commercial shipping in 2014, which coincided with the opening of the new ferry terminal, 65 km to the south, as part of the first stage of the construction of the New Port of Baku in Alat in September 2014. Thereafter, the phased development



of Alat moved ahead with the inaugurated new Ro-Ro terminal of the Alat port in May 2018. The port is managed and operated by the Port of Baku, which in 2015 was restructured by a government decree and became a close joint stock company (CJSC) (Port of Baku CJSC, 2020).

The phased development of the new Baku port at Alat is in three stages:

Stage 1

- General Cargo Quay 650 m (4 berths)
- Ro-Ro Quay 300 m (1 berth)
- Service Berth 450 m (multiple berths)

Stage 2 - 3

- Phase One: 10–11.5 million tons of general cargo + 40,000–50,000 TEU;
- Phase Two: 17 million tons of general cargo + 150,000 TEU;
- Phase Three: 21–25 million tons of general cargo + up to 1 million TEU.

3.17.1 Landside Connectivity

Baku/Alat Port is conveniently located at the crossroads of Azerbaijan's North–South road corridor (M1–M3) and the East–West corridor (M2) thus facilitating the movement of cargoes in all directions. Moreover, the completion of Baku's ring road (R6) allows cargoes bound to the north avoiding to move across the capital city.

The relocation of the rail-ferry operation to Alat beyond the construction of the rail-ferry complex itself included the construction of a new shunting yard within the port territory. This includes weighting facilities for wagons and is the area for customs clearance. Further, the nearby railway station Alat has been extended to serve the railferry complex. In addition to new construction of tracks for sorting at the railway station of Alat port. Altogether 11 tracks are available for shunting operations at the new Port of Alat (Schoen & Gueriot, 2015).

The Port of Alat provides good connectivity with their new facilities for rail ferries and Ro-Ro ferries and the two main shipping routes from Alat:

- Alat to Turmenbashi (Turkmenistan)
- Alat to Kuryk (Kazakhstan).

Table 23: Alat Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port area (includes sea and land): Hectares (ha)	400 ha
Total port land area: Hectares	117 ha
Port capacity: million tonnes per annum (m.tpa)	15 m.tpa
Water depth alongside berths: LAT meters (m)	7 m
Total quay length: Combined all types kilometers (km)	2.1 km
Number of commercial berths	12
7 used for dry cargo, 2 for ferries, 2 for Ro-Ro and Ro-Pax,	
one berth is for towing and auxiliary vessels of the port	
Combined throughput of million tonnes in 2019 est.	4.55 million tonnes
Containerized throughput 2019	35,152 TEU
Truck / Trailer throughput 2019	33,671 units
Rail wagon throughput 2019	44,175 wagon
Passenger throughput 2019	46,265 pax
Container Terminals / Capacity per annum phase 1	500,000 TEU
Rail wagon capacity pa est.	75,000 wagons

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Baku Port; Authors' calculations.

Figure 52: Baku / Alat New Port and Terminals





3.17.2 Investments

The new transport route is being created on the basis of the Trans-Caspian (Kazakhstan, Azerbaijan, Georgia, and Turkey) and Lazurite/Lapis Lazuli (Turkey, Georgia, Azerbaijan, Turkmenistan, and Afghanistan) corridors.

In December 2018, Baku port handled the first cargo transit operation on the international route Lapis Lazuli, linking Turkey to Afghanistan. On this route, cargo is transported by rail and via highways through the Afghan city of Turgundi and enter Ashgabat in Turkmenistan, to the Caspian Port of Turkmenbashi. The corridor continues to Baku, then through Tbilisi (Georgia) to Ankara (Turkey) with branches to Georgia's Poti and Batumi ports, then from Ankara to Istanbul (Ports Europe, Apr, 2019).

3.18 Turkmenbashi, Turkmenistan

Turkmenistan has opened a new seaport on the Caspian Sea that the country hopes will improve its export prospects and establish it as a regional hub connecting Europe and Asia. The opening of the \$1.5 billion cargo and passenger port in May 2018 is aimed at supporting Turkmenistan's ambitions to diversify its economy, which has been centered on natural gas exports. The port has dedicated terminals for ferry, container, general, bulk, and liquid commodities.

Turkmenbashi is the only port in Turkmenistan and forms part of the Middle Corridor. In 2018, the total throughput of the terminal was 8.315 million tons.

Port data as mentioned above point to a supply side strategy so that an ample capacity triggers the volume growth. This is more evident as regards to container handling capacity that has been set well above actual throughput.



Figure 55 - Turkmenbashi Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	375 ha
Port capacity: million tonnes per annum (m.tpa)	17 m.tpa
Water depth alongside berths: LAT meters (m)	7 m
Total quay length: Combined all types kilometers (km)	2.8 km
Number of commercial berths estimate	8 berths
Combined throughput of million tonnes in 2019	8.315 m tpa
Containerized throughput 2019	19,000 TEU
Container Terminals (0) / Capacity per annum	400,000 TEU
Ferry Terminals / Capacity	75,000 trailers

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Ministry of Finance and economy of Turkmenistan / (Gazette of Central Asia, 2018) / Authors' calculations.

3.18.1 Landside Connectivity

Turkmenistan has a railway link with the PRC through neighboring Kazakhstan and the new port could help win some of the cargo flows moving between the PRC, the Middle East, and Europe. The TRACECA corridor connects Port of Turkmenbashi to the hinterlands of Turkmenistan and Uzbekistan by a network of railways and roadways. It provides connectivity with Altynkol as well, which is the border between Kazakhstan and China for originating or destined for the PRC (KPMG Georgia



LLC, Dec, 2019). Azerbaijan Caspian Shipping Company provides regular ferry services between Port Turkmenbashi and Port Baku/Alat in Azerbaijan. Rail is directly linked to the port as shown in Figure 56.

3.18.2 Investments

For the port to become a successful investment, it needs to increase its role in the PRC-Central Asia-Europe trade flows. The new port, built by Turkish firm GAP İnşaat, covers over 152 ha and includes ferry, passenger, and cargo terminals. Its berths have a total length of 1,800 m and can service 18 ships simultaneously. The port can handle 300,000 passengers, 75,000 vehicles, and 400,000 TEU per year. Its total cargo capacity is 17 million tonnes (excluding the oil products). A shipbuilding and ship repair plant called Balkan was constructed as part of the port. It can process 12,000 tonnes of steel needed for the building of four ships and the repair of 20.

3.19 Bandar Anzali, Iran

The Port of Bandar Anzali is northern Iran's main port on the Caspian Sea and is located 260 km northwest of Tehran. Bandar Anzali is Iran's third largest port in general with a nominal cargo capacity of 11 million tons. It is near the Caspian's largest petroleum deposits, making it a vital terminal for Iran's oil operations.

It can receive vessels with bagged commodities up to 6,000 tons. The area of this port is 68/2 acres. It has 10 jetties with 5,000 tons of capacity each.

Table 24: Bandar Anzali Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	142 ha
Port capacity: million tonnes per annum (m.tpa)	7.0 mtpa
Water depth alongside berths: LAT meters (m) estimate	7 m-8 m
Total quay length: Combined all types kilometers (km)	5.5 km
Number of commercial berths	10
Combined throughput of million tonnes in 2019	1.034 million tonnes
Containerized throughput 2019	3,270 TEU
Container capacity per annum estimate	40,000 TEU

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Authors' calculations.



3.19.1 Landside Connectivity

Bandar Anzali is not connected to the Iranian rail network, there are plans to rectify this by 2021. Roadways and highways connect Bandar Anzali via Qazvin - Rasht Freeway / Route 1 and Route 2. The Government of Iran lists the advantages of transit trade through Iran to connect trade through north-south transit corridors, connecting the Russian Federation, Eastern Europe, Central Europe, Northern Europe, Central Asia, and Caucasus on one side, and southern Asia, Southeast Asia, far east, Oceania, and the Persian Gulf littoral states on the other side. Iran has the advantage of a shortened route in the northsouth corridor and the availability of facilities and infrastructures in various land-based transportation sections of the transit route. The ports of Shahid Rajaei, Amir Abad, and Bandar-e Anzali have also allow linkages on the north-south transit corridor. (Ports & Maritime Organization Iran, 2015).

3.19.2 Investments

In Feb 2020, the national railway companies of Turkey, Iran, and Pakistan agreed to resume regular operations of the Istanbul–Tehran–Islamabad (ITI) container train service. The ITI corridor was launched in 2009 within the framework of the Economic Cooperation Organization (ECO), an Asian political and economic intergovernmental organization. Test journeys were carried out, but it has not become a stable regular service as expected customer demand did not materialize. It is now hoped that newly unified tariffs and a reliable timetable in each country will change this.

In December 2019, Azerbaijan and Iran have agreed to build a railway between Rasht (Iran) and Astara, which will be part of the International North–South Transport Corridor. The decision was taken at the 4th meeting of the Working Group on the development of the North-South Western route of the International Transport Corridor held in Baku recently, (Ports Europe, Feb, 2020). Moreover, a \$10 million new Ro-Ro terminal operations is planned.

3.20 Astrakhan, Russian Federation

The Port of Astrakhan is significant to the CAREC corridors as it represents a node between Black Sea and Caspian Sea. The water-borne transportation by river ships bound to Caspian Sea ports through Rostov-on-Don at the entrance Volga River, via Astrakhan.

Navigation lasts all year round, subject to icebreakers and ice strength class ships. The Volga River is covered with ice from late November to early April. During this period, the movement of ships to the port and back is provided by icebreakers.

Port of Astrakhan is in southern Russia and the administrative center of Astrakhan district. The port is managed by a limited liability company, Central Cargo Port. There are some investments by Iranian companies in the port and cargo throughput was 800,000 tonnes in 2016. The Port of Astrakhan has terminals for processing of grain, metal, and timber with a capacity of the port 1.5 million tonnes per year. The port is important connection of Russian through Caspian Sea with Iran and other Central Asian countries with connectivity to seaports (Maritime Herald, 2016).

Astrakhan is not a container handling port as the statistics for 2019 show that Astrakhan handled 2,600 TEU (WCN, 2019). Rail ferries operate services to the Russian Caspian ports of Olya and Kavkaz that connect with Kazakhstan and Iran (IRU, 2020)

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	197 ha
Port capacity: million tonnes per annum (m.tpa) estimate	12.1 m.tpa
Water depth alongside berths: LAT meters (m)	4.5 m – 5.0 m
Total quay length: Combined all types kilometers (km)	5.1 km
Number of commercial berths	32
Combined throughput of million tonnes in 2019	2.2 million tonnes
Containerized throughput 2019	2,600 TEU
Container capacity per annum	10,000 TEU
Ferry Terminals / Capacity	N/A

Table 25: Astrakhan Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Astrakhan Cetra Port, 2019 ; Authors' calculations.



Source: Astrakhan Cetra Port, 2019.

3.20.1 Landside Connectivity

The closest CST railway station to Astrakhan port is a station Praviy bereg of (8 km) and Kutum (5 km). Delivery of goods from railway stations to the berths and back is accomplished by truck via road transport.

3.20.2 Investments

The Port of Astrakhan invested \$5 million during the next 5 years to 2021, in improvements of the infrastructure and terminal facilities. The port plans expansion of the grain terminal capacity, purchasing of tugs, and cargo-handling equipment. The investments include purchasing two bulk ship loaders, 40-tonne capacity port crane, expansion of the grain terminal capacity from 35,000 to 73,000 tonnes. (Maritime Herald, 2016).

Astrakhan and Olya mostly serve grain exports to Iran (80%). Until recently, the latter two were also heavily involved in exporting metals. However, Iran's strong development of its own metallurgical industry during the last 5 years has led to decreasing this type of cargo almost to zero. Still, the ports are believed to have a

strategic location at the northwest of the Caspian Sea for the Russian Federation-Iran trade.

Authorities have developed a strategy to increase container flows in Caspian ports up to 265,000 TEU, grain exports up to 7 million tons and other dry bulk cargoes up to 7 million tons per year (Louppova, Russia plans to develop Caspian ports, 2017).

Plans were recently announced in July 2020 to build a new port on the Caspian Sea near the city of Lagan to increase trade in the Caspian region. It will combine a container terminal with facilities for storing and loading a range of agricultural products, including a grain elevator with a storage capacity of 300,000 tonnes. Other terminals will handle vegetable oil and agricultural products. In total the port will have a design capacity of 12.5 million tonnes. This new port development is considered a response in part to the silting up of the main Russian Caspian port at Astrakhan, which recently forced the Russian navy to abandon it as a base (Global Construction Review, 2020).



3.21 Shipping Routes - Caspian Sea

Transportation of cargoes between Caspian Sea ports is done by fleets from each of the five littoral states (Ziyadov, 2012). Several types of vessels can be found such as general cargo vessels, tankers and ferries, and Ro-Ro, ro-pax vessels. However, there are no dedicated container vessels deployed in the Caspian Sea. On the other hand, Caspian ferries connect Kazakhstan and Turkmenistan, to Azerbaijan, for further transportation of freights by rail or road through Azerbaijan, Georgia, and Turkey to Europe (Mukhtarov, 2018).

An important condition of commercial shipping on the Caspian Sea is the limitation of vessels sizes, either imposed by the port capacity and depths at berths and/or the capacity of the Volga-Don Canal, which allows ships to transit to the Black Sea and beyond. Commercial ports operating on the Caspian Sea have an operational draft limit in channels and alongside berths no greater than 6-7 m. Indeed, the average depth alongside berths at commercial Caspian ports is 5.5-6 m, (see port details in earlier sections). The design limits vessels to have an overall maximum length of 139.95 m and a beam of 16.7 m. This size enables it to meet the size measurements for the Volga-Don Max class of vessel according to the Russian Marine Engineering Bureau and meet the size limitations of the Volga-Don Canal, (Marine Engineering Bureau, 2020). The draft for inland waterway operations is 3.6 m, equating to a deadweight of 4,520 tonnes. For open sea (saline oceans) operations, these figures can be increased to a draft of 4.7 m and a deadweight of 7,150 tonnes. Therefore, the size of vessels operating on the Caspian Sea fall into this category and/or if larger, cannot



Table 26: Caspian Sea Sample Direct Shipping Connections

Route / Operators	Ports of Call	Frequency
Various Volga-Don Max class	Black Sea-Volga-Don-Caspian Sea	various
ASCO	Turkmenbashi-Alat	3–5 days
ASCO	Alat-Kuryk	3–5 days
KAZMORTRANSFLOT	Aktau-Alat	5–12 days
BERKARAR TURKMEN	Turkmenbashi-Baku and Olya	8–20 days
Dry Bulk Carriers	Aktau-Bandar Anzali	Not fixed
Dry Bulk Carriers	Astrakhan-Turkmenbashi	Not fixed

Source: Authors' calculations, Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

transit outside the Caspian and trade commercially in other waterways. Draft and channel limits residing at Caspian Sea ports would theoretically impose a maximum limit of ship to 13,000 DWT (Ghasemi, 2018). The maximum sized Ro-Ro ferries operated by ASCO and Kazmotrasflot in the Caspian Sea are no larger than 6,000/7,000 DWT except for tankers.

Thirteen ferries operate between Kazakhstan and Azerbaijan, however, most of the ferries are outdated. The old ferries have a capacity to carry 28 railway wagons and the new ferries can carry 52–54 railway wagons. Four ferries operate between Turkmenbashi and Baku (two new and two old). The old ferries have a capacity of 34 trucks and the new ferries have a capacity of 52 trucks Aktau to Baku–12 to 13 hrs (KPMG Georgia LLC, Dec, 2019).

A feeder vessel has been started between Aktau and Baku on 24th April 2019, ferry operations by Azerbaijan Caspian Shipping Company, the main trade sea routes are Baku (Alat)– Turkmenbashi– Baku (Alat) and Baku (Alat)–Aktau–Baku (Alat). The distance from Baku to Aktau is around 450 km with approximately 24 hours of sailing time, while the distance to Turkmenbashi is 300 km and the sailing time is 16 hours. Shipping connections to key ports in the region is included in the following table.

4. Arabian Sea (Iran) Corridor (CAREC 3a, B and 6a, B)

The Arabian Sea provides important commercial links between the neighboring areas of Iran, the Arabian Peninsula (including Yemen, Oman, United Arab Emirates), Pakistan, the Horn of Africa nations, and India.

The Persian Gulf is also as important connecting waterway hosting some of the world's largest transhipment ports by volume, including Mina Jebel Ali with a nominal capacity of 21 million TEU in the UAE and is covered under the shipping routes section of this chapter.

4.1 Bandar Abbas (Shahid Rajaee), Iran

4.1.1 General Description

The Port of Bandar Abbas is composed of two sections. The new port area is called the Shahid Rajaee Port Complex, and the older port is called Shahid Bahonar. Shahid Rajanee container terminal was first developed in 1983 and today covers about 2,400 ha and handles 100 million tons of cargo per year. There are 31 commercial berths in the entire port system and the container terminals host 6 berths with plans to increase the capacity from 3.3 million TEU to 6 million TEU a year. The port also includes a large volume of general cargo and petroleum products handling berths and operations.

In 2017, container throughput climbed 22% to 2.6m TEU as the lifting of international sanctions helped to stimulate trade. The port has two terminals—SRCT 1 and 2—with a total capacity of 3.3 m TEU, (Lloyds List, 2018). This port is located 32 km west of Bandar Abbas city, at northern shore of the Strait of Hormuz and Qeshm Island, which serves as a natural feature to protect Shahid Rajaee Port against ingress of swell waves from the Persian Gulf and Oman Sea (Ports & Maritime Organization of Iran, 2020).







Source: iranthisway.com 2015.

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	2,400 ha
Port capacity: million tons per annum (m.tpa) estimate	130 m.tpa
National seaport network capacity	210 m.tpa
Water depth alongside berths: LAT meters (m)	10 – 15 m
Total quay length: Combined all types kilometers (km)	12.4 Km
Container terminals	1.825 km
Number of commercial berths	31
Number of container terminal berths	6
Combined throughput of million tons in 2017	100 million tones
Containerized throughput 2017	2.6 million TEU
Container Terminals (0) / Capacity per annum	3.3 million TEU

Table 27: Bandar Abbas Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Ports & Maritime Organization of Iran, 2020; Authors' calculations.

The sea ports are under the regulation and ownership of the port authority–Shahid Rajaee. The port of Shahid Rajaee is connected to Tehran and to other cities of the country by road and railroad.

4.1.2 Landside Connectivity

The Port of Bandar Abbas is connected through Turkmenistan and Iran via border crossing at Serakhs. There is the additional rail link from Akyayla (Turkmenistan) into northern Iran (Gorgan), which is part of the North-South corridor For Afghanistan, rail link Khaf to Herat is being completed. Connection through Turkmenistan is also possible via the cross border link Serhetabat (Turkmenistan) to Torghundi (Afghanistan). The railway from Atamyrat in Turkmenistan to the Ymamnazar border crossing point (85 km) and Afghanistan's customs facilities at Aqina (3 km) was officially opened in 2016. Development of the rail network at Shahid Rajaee port special Economic Zone with an existing 19 km railway section inside the port. Expanded in 2010 to 53 km the rail network inside the port enhancing connection of Bandar Abbas to Bafg and through to bordering country rail networks (Ports & Maritime Organization of Iran, 2020).

4.1.3 Investments

The Iran Maritime Ports Authority has announced plans for expansion of container terminal operations for SRCT 2 to add 2.2 m TEU to the terminal's capacity. Planned addition of 12 new STS gantry cranes is under way, with completion expected at the end of 2020, according to the port authority. A plan to build a third terminal at the port is also suggested, which will be able to accommodate ships of 18,000 TEU size. The first phase will see the construction of 800 m of berth, out of a total of 1,475 m, with a draught of 17–18m. The investment is being made by the Ports and Maritime Organization, (Iran Financial Tribune, 2017). A logistics center is also being planned, as the port is well-connected to road and rail networks.

Shipping lines: CMA CGM has joined Hyundai Merchant Marine, Maersk Line, and Mediterranean Shipping Co. in withdrawing its Iranian services because of US sanctions being imposed on the country, scrapping calls at Bandar Abbas, and adjusting its Asia-Middle East network. Before sanctions were imposed in 2012, Iran's container port handling enjoyed a five-year compound annual growth rate of 18% (Knowler, 2018).



4.2 Chabahar Port (AKA Shahid Beheshti Port), Iran

4.2.1 General Description

The port of Chabahar is in south-eastern Iran, north of the Oman Sea, with access to international open seas. Indian stakeholders have been central to the development of Chabahar as it offers an alternative for India to trade with Afghanistan and Central Asia bypassing Pakistan and the PRC.

The Chabahar port development plan and the inclusion in free trade zones (FTZ) will be a momentum in development of South-North transit corridor and consequently international trade in the region. Currently, Chabahar port consists of two port complexes, named Shahid Kalantari port and Shahid Beheshti port. Shahid Kalantari port is a traffic port and the vision of Shahid Beheshti port development is to transform it into a multimodal and fourth generation port, hence it can play as a regional hub port (Ports Europe, 2019).

Afghan traders have responded with enthusiasm to Chabahar ports potential as a reliable trade and transit offering. In August 2020, a transit memorandum of understanding was signed between Chabahar port and the private sector of Afghanistan. Afghan traders make up 165 of the 500 companies registered with the Chabahar Free Zone authority (Iran Ports & Maritime Organization, 2020). Chabahar is considered to offer better transit times for inland transportation to Afghanistan—e.g. it takes 14 days to cover the 1,520 km from Karachi to Kabul including transit clearance and border crossing protocols, while only 6 days to cover the 1840 kms from Chabahar to Kabul (IGPL, 2018) and (ADB, 2014).



In June 2020, it was reported that the delivery by ship of the fourth consignment of 300 TEU's of wheat cargo from India to Afghanistan was discharged at Chabahar port. This was part of a 75,000-tonne consignment of wheat that India is supplying to Afghanistan as humanitarian aid, (Manoj P., 2020). Export consignments from Afghanistan through Chabahar port that commenced in February 2019 as a trickle had started showing an upward trend with 76 TEU of agricultural export commodities being loaded destined to India (Manoj P., 2020).

Total freight handled at Chabahar in 2019 was 3 million tonnes of which 98.5% was imports. Of the total commodities handled at Chabahar, 37% were grain and other foodstuffs (classified as essential goods) and 59% were petroleum products (Iran Ports & Maritime Organization, 2020).

Chabahar port sits at the center of various geopolitical gambles. Firstly, it offers India with an alternative gateway port to access Central Asia as it finds restrictions to use Pakistan's ports. In addition, Chabahar port's importance has doubled for India due to the PRC's efforts to increase its influence on the region and its own bet on Pakistan's Gwadar port (see section on Pakistan sea ports), competing with Chabahar for the same Afghanistan trade.

Chabahar port also forms an element of the International North-South Transport Corridor INSTC, which includes the Russian Federation and Central Asian states. The trade between India and the Russian Federation was carried out through conventional ocean routes i.e., freight loaded/unloaded at JNPT (Mumbai) port and moved along the Suez canal route and unloaded at Saint Petersburg Port at the Russian Federation with a transit time of 40-60 days. The concept of the INSTC would allow freight loaded at India ports through ocean routes to Iranian ports (Bandar Abbas/Chabahar port) then via road to the rail head at Astara in Azerbaijan for forward journey up north, touching upon the Azeri capital of Baku on the Caspian Sea and Port Olya in the Volga delta. The transit time via INSTC is estimated to be around 25-30 days, 40% shorter and 30% cheaper than the conventional or standard route (Maritime Gateway, 2018).

The port of Jebel Ali (Dubai) in the UAE is one of the two ports in the Persian Gulf that features as a Deepwater port (allows largest container ships by

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	195 ha
Port capacity: million tonnes per annum (m.tpa) estimate	8.5 m.tpa
Water depth alongside berths: LAT meters (m)	14 m – 16 m
Total quay length: Combined all types kilometers (km)	2.3 km
Number of commercial berths	7
Combined throughput of million tonnes in 2019	3.063 million tonnes
Containerized throughput 2019	25,000 TEU
Container Terminals (0) / Capacity per annum estimate	100,000 TEU

Table 28: Chabahar Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Ports & Maritime Organization of Iran, 2020; Authors' calculations.

offering depths up to 18 m alongside the berths) (Saudi Arabia's Dammam port is also a deepwater port). Iran currently does not have a deepwater port and somewhat relies on Gulf ports that attract the mega container ships, which tranship Iran bound cargo to feeder ships. Ultimately, the construction and development of the port of Chabahar dredged to a depth that may attract deep draft container ships will eliminate the need for relying on the UAE for international trade. Furthermore, Chabahar, contrary to Bandar Abbas, od Jebel Ali is in the Gulf of Oman outside the troubled region of the Persian Gulf and the Hormuz strait with direct access to the Indian Ocean and major sea routes.

4.2.2 Landside Connectivity

Chabahar is 70 kilometers from Pakistan's port of Gwadar (which is under development by the PRC), 1,400 kilometers to Mumbai in India and 1,854 km to Kabul, Afghanistan. Through Iran's road network, the port provides access to Afghanistan to the east and Central Asia.

Iran, Afghanistan, and India signed a tripartite Transit Trade Agreement in 2015 to develop container berths at Chabahar and rail connectivity to Afghanistan to provide a trade route for India and Afghanistan. As an outcome of this agreement, India set up a Special Purpose Vehicle and formed a JV company with an Iranian port operator, India Ports Global Ltd.

The tripartite agreement is valid for 10 years and features a \$1.6 billion railway project connecting Chabahar in the south and Zahedan in the north, to

be jointly developed by Iranian Railways and India (Figure 66). Other planned investments include road extensions from the port and the 217-kilometer Zaranj-Delaram highway, previously the missing link between the Chabahar port and the 2,100-kilometer Afghanistan ring road, which runs through 16 of the country's 34 provinces, (CSIS, 2020).

On July 2020 Islamic Republic Railways (RAI) begun track laying on the Chabahar–Zahedan railway project following a ceremony held by RAI officials and representatives from the Government of Iran from the Ministry for Transport. Officials underlined the significance of the railroad and noted that due to its strategic position, Chabahar port is going to be a gateway for the country's trade (Maritime Gateway, 2020).

Upon completion the 628 km Chabahar to Zahedan railway will have 34 stations on its route, and operate passenger trains at 160 km/h and freight trains at 120 km/h. The Iranian ministry of roads and urban development estimates that upon completion, the railway will transport an estimated 927,000 passengers and 2.8 million tonnes of freight per year (Cuenca, 2020).

The railway will provide a link between Chabahar in the Gulf of Oman and connect with the Trans-Iranian Railway, allowing for direct rail freight services between Chabahar port and the rest of Iran, as well as landlocked Central Asian countries such as Kazakhstan, Turkmenistan, and Afghanistan. Iran hopes that the project could turn Chabahar into a significant transport hub for the region (Maritime Gateway, 2020).



RAI plans to complete the initial 150 km rail section by March 2021, the end current Iranian year, with the railway's full length planned for completion by March 2022 (Cuenca, 2020).

News reports in July 2020 indicate that India's future engagement with the project was uncertain after Tehran, in a recent communique to New Delhi, expressed disappointment over the Government of India's engagement and partnership, citing delays from India in funding and starting the project. Without naming the US, the Government of Iran said that "no third party's measures or restrictive policies such as unjust unilateral sanctions should be allowed to hamper the historical cordial relations between India and Iran."

India has reportedly begun shipping \$150 million worth of track equipment to Chabahar to build the line, for which India had pledged an additional \$400 million. Iran allocated another \$125 million to the project in December 2016. Indian Railways Construction Company (Ircon) chairman Mr S K Chaudhary, confirmed that additional funds had not been allocated from the Indian side in recent years, but said that the "project was on track, as he had not been told about any change in plans." India's Ministry of Railways spokesman, Mr D J Narayan, refused to comment, saying that the matter was being pursued by India's Foreign Ministry. These developments come on the back of reports of a Sino-Iran economic and security partnership agreement currently being developed that envisages \$400 billion in Chinese investments for infrastructure development over the next 25 years (Burroughs, 2020).

Iran is also taking active steps to build connections with international ports and countries, which are currently staging posts on new Silk Road. The national railway companies of Turkey, Iran, and Pakistan agreed in 2019 to resume regular operations of the Istanbul–Tehran– Islamabad (ITI) container train service. The ITI corridor was launched in 2009 within the framework of the ECO, an Asian political and economic intergovernmental organization.

4.2.3 Investments

The construction of the first phase of Chabahar port began in 2002 with \$86 million in initial investment from a joint venture by two state-owned Indian port authorities: Jawaharlal Nehru Port Trust and Kandla Port Trust. The two companies planned to invest a total of \$300 million in the port's construction. India's first foreign port project, Chabahar carries high geostrategic value for India—and increasingly for other Asian countries—as the port connects the Indian subcontinent to Afghanistan and Central Asia without passing through Pakistan. After concerns of sanctions, India postponed investment in the port, however in 2014 the investment was reactivated. (Centre for International Governance Innovation, 2019).

The development plan according to the Ports & Maritime Organization of Iran.

- 2017: 17 million m³ dredging to (-16 m) depth, approximately 1,650 m of breakwater extension, construction of two container berth (640 m) and three multipurpose berth (540 m)
- Reclamation of 195 ha by sediment

- 2018: Construction of a container berth (360 m)
- 2020: Construction of an oil berth / Construction of a multipurpose berth
- 2024: Construction of a container berth (360 m)

4.3 Jebel Ali, United Arab Emirates (UAE)

4.3.1 General Description

This global hub container port located in the Persian Gulf is included in this CAREC ports study due to its importance as a transhipment hub in the Arabian Sea and its capacity to offer reduced transit trade costs by leveraging economies of scale.

DP World is the primary operator of container terminal operations in Dubai, Jebel Ali port with volumes above 15 m TEU to hold a top 10 ranking in global ports index of largest container ports. DP World have consistently added capacity at this port and in 2017 another 1.5m TEU of capacity was added to its Terminal 3 via new equipment, bringing the total at that facility to 4 m TEU. The largest remains Terminal 1, with capacity of 9 m TEU, followed by Terminal 3, which could handle as much as 6 m TEU a year as of 2020.



Source: Port Technology Maritime Information Services, 2017.

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	13,500 ha
Water depth alongside berths: LAT meters (m)	17 – 18 m
Number of commercial berths	28
Containerized throughput 2019	14.1 million TEU
Container Terminals 4 / Capacity per annum (pa)	
Terminal 1: 9.0 m. TEU pa	
Terminal 2: 6.5 m. TEU pa	19.3 million TEU
Terminal 3: 3.8 m. TEU pa	
Terminal 4: 3.1 m. TEU pa (planned)	

Table 29: Jebel Ali Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

Geopolitical forces in the region affected Jebel Ali throughput, both negatively and positively over the last 10 years. This includes the blockade of Qatar by its neighbors and the added volume of transhipment container traffic destined to Iran as sanctions against Iran impacted direct shipping lines to withdraw services to Bandar Abbas. The Dubai port complex handled 15.4 m TEU in 2017, a rise of 5.3% year-on-year.

4.3.2 Landside Connectivity

As a transhipment port with over 75% of its volumes transferred from ship to dock and loaded onto another ship for onward shipment to there is no requirement for rail connectivity into the hinterland of UAE or neighboring states. It should be noted that neighboring states also have own transhipment containers ports competing for throughput.

4.3.3 Investments

DP World plans to spend between \$140 million and \$275 million to expand Jebel Ali free zone this year and seeks new acquisitions.

DP World has changed its port expansion plans amid a softening global shipping market, with the launch of Terminal 4 delayed until at least the second half of 2019, now extended to 2021. Terminal 4, a fully automated container terminal at the port operator's flagship Jebel Ali Port, will instead be used for spill-over cargo as DP World undertakes a redevelopment of Terminal 1 (Middle East Logistics, 2019).

4.4 Shipping Routes - Persian Gulf / Arabian Sea

The Persian Gulf has a commercial connection with CAREC corridors in as much as it is a major transhipment hub that connects the main shipping corridors from North and East Asia with intermediate trade routes including Pakistan and Iran. The shipping density map shows the large volume of commercial shipping leading to Jebel Ali in UAE, Abu Dhabi, Bahrain, and Qatar ports. The map shows a feeder route present from Dubai to Bandar Abbas, which is evidence of the transhipment volumes being directed via Jebel Ali and other Persian Gulf ports to Iran.

A vast array of global shipping lines provides direct services to Jebel Ali, whereas feeder services connect to Bandar Abbas from Gulf ports.

Shipping connections to key ports in the region is included in Table 30.

4.5 Shipping Routes - India West Coast / Arabian Sea

The shipping routes linking the west coast of India has a dominant connection with the Persian Gulf states, predominantly for crude oil imports. Another key shipping link is with Southeast Asia via the Malacca strait and with the transhipment port of Colombo, Sri Lanka.

The focus of this section of the report is the shipping links India has with CAREC countries, particularly with



Table 30: Persian Gulf Sea Sample Direct Shipping Connections

Route / Operators	Ports of call	Frequency
Global Routes	USWA, EUROPE, N.E ASIA, FEEDERS	7 days
	Samples as below	
Maersk Line	Port Qasim, Jebel Ali, Salalah, Dar es Salaam, Mombasa, Salalah, Port Qasim	7 Days
Maersk Line	Jebel Ali, Colombo, Laem Chabang, Singapore	7 days
CMA-CGM	Jebel Ali, Umm Qasr, Jebel Ali	
MAERSK Line / MSC	Shanghai, Ningbo, Kaohsiung, Shekou, Singapore, Port Klang, Jebel Ali, Dammam, Doha, Sohar	7 days
CMA-CGM	Sharjah, Khor Al Fakkan, Sohar, Jebel Ali,	7 days
COSCO	Port Qasim, NAVA SHAVA, MUNDRA, SUZ CANAL, NEW YORK, NORFOLK, SAVANNAH, Charleston, Port Qasim	7 days
MSC / MAESRSK Line	Rotterdam, Hamburg, Antwerp, London Gateway, Le Havre, Port Tangier Mediterrane, Salalah, Jebel Ali, Ningbo, Shanghai, Yantian	5 - 12 days
Islamic Republic of Iran Shipping Line. (IRISL)	Jebel Ali-Bandar Abbas	25 days
Not Disclosed	Indian to Chabahar	Not fixed

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

Afghanistan. The traditional accepted international shipping route linking to Afghanistan has been Pakistan's seaports of Karachi, Mhd. Bin Qasim, and to a lesser extent, Gwadar.

In recent years the development of the port of Chabahar (AKA Shahid Beheshti Port) in Iran has been a game changing option for imported goods destined to Afghanistan. In May 2020 it was reported that the port of Chabahar had for the first time had all five berths occupied with eight commercial ships simultaneously discharging cargoes (Financial Tribune News, 2020).

Analysis of commercial shipping movements shows that most of the vessels discharging freight at Chabahar have originated from Indian ports of Mumbai (Nhava Sheva) and Kandla port (Deendayal Port) and after calling at Chabahar most have also called at terminals at Bandar Abbas (AKA Bandar Khomeini port), (Ship Tracker, 2020). These ships plying between Indian west coast ports also extend their trading range to Southeast Asian ports of Singapore and those in Malaysia.

Types of vessels calling at Chabahar from Indian ports are commonly multipurpose vessels with capability to handle containers and general cargoes and most are Iranian-owned and Iranian flag-registered being operated by the Islamic Republic of Iran Shipping Lines (IRISL), (Figure 69). Other vessels calling at Chabahar include tankers carrying bulk liquid petroleum products and dry bulk carriers carrying fertilizer and grains.

The shipping density map shows volumes of commercial shipping to Jebel Ali in UAE, Abu Dhabi, Bahrain and Qatar ports, (Figure 70). The map shows a feeder route present from Dubai to Bandar Abbas, which is evidence of the transhipment volumes are being directed via Jebel Ali and other Persian Gulf ports to Iran. The Iranian port of Chabahar shown on Figure 71, indicates that still few commercial shipments took place to this port in 2018–2019 with spot fixed container vessels, bulk petroleum tankers, and dry bulk vessels calling infrequently at present.

Total container shipments to Chabahar in 2019 were around 25,000 TEU, or 500 TEU per week (PMO, n.d.). Gwadar port in Pakistan is suggested to be a rival to Chabahar port for transhipment cargoes originating from Southeast Asia. Pakistan has included Gwadar in the China–Pakistan Economic Corridor (CPEC) project and promotes Gwadar ports strategic location near the Iran border as providing access for Central



Source: MFAME, 2019.

Asia to the Gulf region and connecting global trade routes. To allow Gwadar port to become a credible gateway port for CAREC countries it will need to establish road and/or rail corridors to the border crossing points with Afghanistan and links to northern highways.





5. Arabian Sea - Pakistan (CAREC 5 and 6)

The CAREC corridors identify ports in Pakistan for connection through to Afghanistan and through into bordering states including the PRC, Uzbekistan, Kyrgyz Republic, and Tajikistan. This section details the Pakistan port operating characteristics of Gwadar, Karachi, and M. Bin Qasim and their development plans.

5.1 Port of Karachi, Pakistan

5.1.1 General Description

The Port of Karachi is owned and operated by Karachi Port Trust (KPT), which is not a port authority and thus has arguably, less oversight than a state-owned enterprise might have. Karachi Port has 34 dry cargo berths, 3 container terminals, 13 berths on West Wharves, 17 berths on East Wharves, and 3 liquid cargo berths for imports of petroleum products. Karachi Port founded in 1883 is the largest and oldest continuing commercial port in Pakistan handling some 50 million tonnes in 2016, made up of 35 million tons of dry cargo and 15 million tonnes of liquid bulk commodities. The main dry bulk commodities include coal and fertilizer, together with container and general cargo. In comparison to 2015 the dry sector witnessed an expansion of 16%; while the liquid bulk fuels increased by 12%. Imports of all types represent 80% of the total, with exports the balance (Hunter & Muchaneta, 2019).

Karachi Port locality is on the confluence of the Lyari and Indus river deltas and is subject to silting, urban encroachment, and congestion on roadways linking the port and its terminals. Capital and continual maintenance channel-berth dredging is required resulting from the ingress of river silt and seasonal flooding that occurs. Planned capital dredging of the harbor and channel is required to facilitate deeper



draft vessels and it was reported that contracts of \$35 million were signed with Dutch dredging firm Van Ord (Dawn Newspaper, 2016). Additional KPT funds will be required to fund further dredging programs announced at Karachi Port commencing 2020 (Mirza, 2019).

KPT berths and terminals have a nominal capacity of 150 million tonne per annum but achieve only 50 million tonne per annum in throughput 2018/2019 (Hunter & Muchaneta, 2019). Despite this underutilization; KPT approved concession of a new terminal (SAPT) with 3.4 m TEU Capacity with plans to add more capacity to add to the existing oversupply (Rana P., 2019). The three container terminals at Karachi Port operated under private sector buildoperate-transfer scheme.

Karachi's population has risen from 10 million in 2000 to over 15 million in 2018 and features formal and informal encroachment on main roads and rail corridors. Heavy vehicle traffic congestion (estimated 5-6,000 trucks per day) is a substantial issue. Various plans to link KPT terminals with the main highways have been proposed but failed to be materialized, including the Asian Development Bank (ADB) Cross Harbour Bridge 2012 and World Bank elevated road corridor 2017. Currently KPT port and terminals remain constrained with limited road access. Moreover Karachi Municipal Corporation has imposed truck circulation regulations (restricted times and itineraries), though compliance seems not to be generalized. All these add to the cost of doing business in Karachi Port.

Transit trade to Afghanistan suffers from recurrent delays to statutory clearances from the port, slow turnaround of cargo inspections, unofficial statutory fees, congestion on road access, and container guarantee fees. As identified in earlier works; an average dwell time for transit containers at Karachi Port from time of vessel discharge to container terminal stack to departing gate out is 5–6 days, (Sammons, 2014). At interview in Karachi, January 2020 with the Pakistan International Freight Forwarders Association little appears to have changed as the same issues were recounted and delays and costs for transit trade remain (Qamar, 2020). At the same interview, it was mentioned that Afghan traders are redirecting increasing volumes of transit trade through Iranian ports, which are transhipped via Jebel Ali in Dubai.

A critical and apparently intractable legacy issue for KPT is the control of dock labour and cargo handling by the Karachi Dock Labour Board. KPT has made progress to negotiate the wind down of this institution at an estimated cost of \$79 million (Rana I., 2018) and (Paksitan Business Recorder, 2007).

KPT port handled 46.9 m tonnes in 2018/2019 being a reduction of 14% over prior year.

- Dry general cargoes dropped by 7% to 26 million tonnes
- Container volume dropped 4% to 2.16 million TEU
- Liquid bulk cargo dropped by 12.5% to 14 million tonnes
- Dry bulk cargo dropped by 36% to 7 million tonnes.

5.1.2 Landside Connectivity

Road is the primary medium for transferring dry bulk, breakbulk, and containers in and out of Karachi Port and associated terminals. As identified in several studies there is an urgent need to implement mitigation measures to alleviate bottlenecks and reduce the cost to importers and exporters, which transfers to the economy in the form of inflation on imported goods.

Increasing road capacity levels at Karachi Port to solve existing capacity bottlenecks (especially after opening of SAPT terminal) unlock its future potential, and reduce (environmental and social) risks is highly recommended A dedicated elevated port expressway (especially ensuring swift movement of trucks along NM Road) has been proposed under a PPP structure. (Maritime & Transport Business Solutions B.V., 2015).

The only container terminal at the Port of Karachi that has on-dock rail with internal rail connection is PICT owned under concession by ITCSI of Philippines. The new 3.4 million TEU SAPT terminal was constructed without rail connectivity and further away from the main northern highways creating an immediate addition to the task of road access into and out of the port zone.

At interview, PICT indicated that rail services are vital to the productivity of gateway cargo at Karachi and especially transit trade. A number of issues were cited as to improvements and matters to be addressed by Pakistan Railways including; increased level and guality of track maintenance required, locomotives were underpowered for the rail freight task, mitigation

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	160 ha
Port capacity: million tonnes per annum (m.tpa)	150 m.tpa
Water depth alongside berths: LAT meters (m)	7.5 m – 16 m
Total quay length: Combined all types kilometers (km)	15.25 km
Number of commercial berths	76
Combined throughput of million tonnes in 2019	46.9 million tonnes
Containerized throughput 2019	2.16 million TEU
Container Terminals 3 / Capacity per annum	4.85 million TEU
KICT-1996, capacity 700,000 TEU pa	
PICT-2002, capacity 750,000 TEU pa	
SAPT-2017, capacity 3.4 million TEU pa	

Table 31: Karachi Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

Figure 73: Karachi Port Facilities



Source: ProPakistani.PK, 2019.

measures were needed at level road crossings to reduce the high number of accidents and capacity payloads of the track required upgrading to achieve payloads that were common place in modern global ports. Other issues mentioned were the priority in standards and access provided to passenger services over freight and the limited number of rolling stock under management of Pakistan Railways needed increasing, (Khan, 2020).



Increasing rail capacity levels at Karachi Port is also highly recommended to solve existing capacity bottlenecks (especially with opening of SAPT terminal), unlock its future potential, and reduce (environmental) risks. Roughly a capacity of 2 trains per hour (incoming and outgoing) or 1 train per hour (one direction) is required to transport the forecasted volumes for containers and coal to/from Karachi Port. Rehabilitation of the East Wharf railway track and improvement of the West Wharf railway tracks shall provide KPT with a proper rail connection. It is proposed that KPT, especially for bulk transportation of goods to up-country dry ports shall maximize the use of railway as most of the dry ports have a railway connection. The abandoned section of railway track from Keamari Groyne to the city station area need to be rehabilitated. As a priority, this includes improvement of the railway connection from SAPT / Oil Installation area. All these sections lie within port

boundaries. (Maritime & Transport Business Solutions B.V., 2015).

5.1.3 Investments

Pakistan Railways have voiced concept plans to link the three KPT container terminals to nearby Pipri rail terminal as a mitigation measure to reduce congestion on roads. There may be issues with the rail corridor plan as many of the rail freight corridors are either partially or fully encroached by formal or informal dwellings and there are many public road crossings to consider.

The report, (Maritime & Transport Business Solutions B.V., 2015), recommended the following actions to address KPT road access:

- 4-lane dual carriageway from SAPT Gate to KPT Gate-1, to cater for PDWCP Traffic (10 Berths), Oil Tankers from Oil Installations and Coal Carriers for Coal Yard.
- 6-lane dual carriageway from KPT Gate-1 up to start of Jinnah Bridge, to cater for additional traffic from East Wharves, (Gate-I, PICT Gate, Gate 17, Juna Bunder & Coal Yard at Timber Pond).
- 6-lane high level Bridge across Chinna Creek, with access for boats at North end, West of Railway Bridge and present Jinnah Bridge/ Port Grand.
- 6-lane dual carriageway through Naval Stores area and along Mauripur Road and ramp down short of Layari Express Junction.
- 4-lane dual carriageway (for traffic from KICT Gate and Lloyds Gate), to ICI Roundabout joining the main expressway.
- 4-lane dual carriageway from MI Yard and joining the 6-lane main expressway.

KPT had started in 2015 the implementation of these projects and invited external transaction advisory consultants to provide a proposal to help KPT prepare and implement PPP concession. It is understood from discussions during the site visit in January 2020 with KPT and World Bank Group that the projects identified are still at concept planning stages. Consulted development partners seemed perplexed why the KPT had not made progress with recommendations from the 2015 Karachi Port Strategic Planning document.

5.2 Port of Muhammad Bin Qasim

5.2.1 General Description

Port Qasim is Pakistan's second major port complex located at 50 km from Karachi City and 15 km from the national highway. Marine access is via a 49 km navigation channel, which due to its limited width, allows only one vessel to transit at a time at an average time one-way through the channel of 2.5–4.0 hours, depending on the ship type. Despite significant seasonal dredging this channel's depth constraints the size of vessels that can be accommodated in Port Qasim, necessitating part loading of many vessels (Hunter & Muchaneta, 2019).

Qasim Port Authority was transformed to landlord status and private firms operate the three separate container terminals under concession arrangements. International port and terminal contractors are involved in running all port terminals at Karachi and Qasim ports. Port Qasim Authority has one operating container terminal concession under DP World, named Qasim International Container Terminals (QICT) (Shafi, 2020).

The port handled around 33 million tons of cargo in 2016, a growth of 11% over the previous year. This throughput comprised a combination of container handling, together with an extensive range of dry and liquid bulk commodities. This includes the recent expansion of both. liquefied natural gas and dry bulk coal imports in response to the country's growing power requirements needs.

Container handling at Port Qasim reached 1.1 million TEU in 2016. An increase of 15% over the previous year's figures. Outside of the container sector the port also handled a broad range of general cargo, notably: agricultural seeds, rice, cement, wheat, and steel exports; plus, chemical, fertilizer, and palm oil imports. Terminal facilities at Port Qasim comprise 15 berths, spread over dedicated terminals. Including the Port QICT, and the recently commissioned Port Qasim Dry Bulk Terminal, dedicated primarily to coal and cement imports. Bin Qasim has an abundance of industrial zoned land and free from any urban encroachment being constructed within a designed industrial area outside of Karachi City limits.

5.2.2 Landside Connectivity

Bin Qasim offers good rail and road connection and is not affected by encroachment as is the case of Karachi ports.

5.2.3 Investments

PQA has launched multifaceted strategy i.e., increase port parameters to accommodate larger vessels to benefit from economy of scales, strengthen the port with requisite crafts, and build additional berths and terminal for capacity enhancement. Some of the development projects include: deepening and widening of navigation channel, acquisition of tugs, establishment of second container terminal, grain and fertilizer terminal, LPG terminal, coal and clinker/cement terminal, World Trade Center, and development of waterfronts, etc. to facilitate industrial and commercial establishment at its industrial estate. PQA is also developing roads, providing water facilities, sewerage, and stormwater drainage in the eastern industrial zone at a cost of Rs.8.8 billion (Shafi, 2020).

Table 32: M-Bin Qasim Port General Description

Key Attributes	Description
Year-round navigation	Yes
Land area, including industrial zones: Hectares (ha)	4.856 ha
Land area for port and terminals: Hectares	404 ha
Port capacity: million tonnes per annum (m.tpa)	90 m.tpa
Water depth alongside berths: LAT meters (m)	10.5 m – 13 m
Total quay length: Combined all types kilometers (km)	5.3 km
Number of commercial berths	18
Combined throughput of million tonnes in 2019	49 million tonnes
Containerized throughput 2019	1 million TEU
Container Terminals 1 / Capacity per annum	2.025 million TEU
LNG cargo increased by 43% in 2019	12.5 million tonnes

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: Zameen.com, 2020.

In 2011 DP World Lahore inaugurated a Public-Private Partnership (PPP) project with the Ministry of Railways, to link container rail from QICT to an Inland Container Terminal (ICT) at Prem Nagar Dry Port (near Lahore) 1,000 km away, managed and operated by DP World Qasim. The inauguration follows the opening of Terminal 2 in Port Qasim, which expanded QICT's capacity from 900,000 TEU to around 1.2 million TEU. The ICT facility is built on 40 ha of land and is connected by an extensive network of railway lines and roads to some of the country's most populous areas. The terminal will be managed and operated by DP World in a joint venture with Premier Mercantile Services, one of Pakistan's largest maritime terminal operators. Due to lack of rolling stock and limited accessibility of track time due to passenger trains these commercial freight operations failed (Zamir, 2020).



DP World have indicated they are willing to develop and fund a second navigation channel to the QICT terminal at Bin Qasim at a cost of about \$120 million. However it is understood that planning permission from Pakistan Ministry of Maritime Affairs has not been forthcoming. The limited draft of 13 m at QICT Bin Qasim and lengthy channel transit coupled with priority provided to the increasing number of LNG vessels operating at Bin Qasim means that QICT container terminal is at a distinct competitive disadvantage as compared to the new deepwater terminal concession of SAPT at KPT Karachi Port. There is suggestion that QICT is not being granted permission to increase channel configuration and berth depth on the basis of the concessionary remuneration levels that are required under the terms of the SAPT contract (Zamir, 2020).

5.3 Port of Gwadar

5.3.1 General Description

Gwadar Port was initially developed as a deep seaport with technical assistance from the PRC in 2002 with a focus as a multipurpose port facility to serve the eastern Baluchistan region. The port was commissioned in 2007, located approximately 620 km from Karachi and is approximately 120 km from the Iranian border. It is administratively managed by the Gwadar Port Authority but was transferred under a concessionary lease for 43 years, to 2059 with Chinese port operator, China Overseas Port Holding Company.

Table 33: Gwadar Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	6.4 ha
Port capacity: million tonnes per annum (m.tpa)	5.5 mtpa.
Water depth alongside berths: LAT meters (m)	12.5 m
Total quay length: Combined all types kilometers (km)	0.9 km
Number of commercial berths	4
Combined throughput of tonnes in 2019	90,000
Containerized throughput 2018	4,500
Container Terminals / Capacity per annum	500,000.
Ferry Terminals / Capacity	n.a.

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

In 2015, the operational concession for the port was incorporated within the China–Pakistan Economic Corridor (CPEC) development program. Within this program the port will act as a primary import and export gateway for trade generated by the eastern CPEC corridor; linked by landside road and rail connections which are currently not in place. It is also envisaged that the port will seek to target transit trade related to Afghanistan and Central Asian countries.

Currently, Gwadar Port handles a limited range of container, general cargo, dry bulk and liquid bulk across its facilities. These comprise three deepwater berths, backed up by storage areas. On a broader perspective the port will be in proximity to the CPEC Special Export Processing Zone that is planned to be developed. Gwadar port has a 4.7 km navigation channel, sited on 6.4 ha and has 3 multipurpose berths, and a main quay length of 600 m. The key attributes of the port are shown in Table 33.

5.3.2 Landside Connectivity

Currently the port of Gwadar is connected by coastal road with Karachi (620 km away) where it links with Pakistan's main north-south corridor. Direct road connection with Quetta and Chaman at the Afghanistan border is poor. There is no rail connection from Gwadar port so far.

Pakistan has ambitious plans to develop both rail and road from Gwadar port to link it to Balochistan's capital Quetta and onwards to Afghanistan and also to the main north-south Indus valley axis. These plans include:

- New road Gwadar-Basima-Jacobabad
- New road Basima-Quetta-Chaman (Afghanistan border)
- New rail line Gwadar-Mastung
- New rail line Basima-Jacobabad

5.3.3 Investments

The Master Development Plan of Gwadar Deep Sea Port includes development of an area over 18,600 ha of land including various non-port schemes and structures as:

- Construction of East Bay Expressway, Gwadar Port
- Construction of Breakwaters, Gwadar Port
- Dredging of Berthing Areas and Channels, Gwadar Port
- Pak-China Technical and Vocational Institute
- Expansion of port over an area of 400 ha
- Export Processing Zone 47,000 acres located on land adjacent to port in East Bay
- Special Industrial Zone of about 4,000 ha lying to the north of the town
- Oil refinery of 1,000 ha located to the north east of the town
- Residential area of 400 ha stretching north of existing town to Western Bay
- Facilities of Fresh Water Treatment, Water Supply
- China-Pakistan Friendship Hospital



Source: The Maritime Executive LLC, 2018.



- Source: Pakistan Railways. Presentation at First Meeting of the Central Asia-South Asia Transport Platform. Tashkent, February 2020.
- Coal-based Power Plant at Gwadar
- Construction of Gwadar International Airport

Most projects are envisaged to be developed with financial assistance from the PRC under the China– Pakistan Economic Corridor initiative (CPEC). Strained public finances in Pakistan may slow down and eventually scale down some ambitions (Notezai, 2019).

5.4 Shipping Routes - Pakistan/ Arabian Gulf

In south and west Asia, Colombo, Sri Lanka is the most connected container port. The port provides services for goods imported to and exported from Sri Lanka, but over 75% of traffic is transhipment other South West Asian countries. Colombo benefits from cabotage restrictions in India, as these discourage carriers from trans-shipping in Indian ports, for which they are required to use Indian flagged ships (United Nations Conference on Trade and Development, 2020).





The shipping route density map clearly shows the concentration of transhipment through Colombo and thereafter feeder services to Pakistan and India West coast. Secondary research shows Gwadar port is only occasionally serviced, estimated at less than 3 commercial ship per month, see Figure 113.

The oversupply of capacity in Karachi is impacting the balance of port selection by container shipping who are exploiting the deeper draft facility of SAPT at the southern terminal in Karachi. The negative impacts of this are being felt at DP World facility at QICT in Bin Qasim who has lost business as result of lines switching, (Zamir, 2020).

Shipping connections to key ports in the region is included in Figure below.

Route / Operators	Ports of call	Frequency
Global Routes	USWA, EUROPE, N.E ASIA, FEEDERS	
	Samples shown below	
COSCO	Port Qasim, Nava Shava, Mundra, Suz Canal, New York, Norfolk, Savannah, Charleston, Port Qasim	7 days
MSC / Maersk Line	Jawaharlal Nehru, Mundra, Port Qasim, Salalah, Mombasa, Pipavav, Jawaharlal Nehru	7 days
Maersk Line Feeder	Karachi, Jebel Ali	5 days
MSC / Maersk	Shanghai, Ningbo, Shekou, Nansha New Port, Singapore, Port Klang, Jawaharlal Nehru, Karachi, Colombo	7 days
COSCO	Shanghai; Ningbo; Singapore; Karachi; Mundra; Port Klang; Singapore; Hong Kong, China; Shanghai	7 days
COSCO	Shekou, Gwadar / Ningbo, Gwadar	Not fixed

Table 34: Pakistan Sample Direct Shipping Connections

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.
6. India Ports to CAREC Region Corridors

A specific section is added to give an overview of the ports sector in India and its connectivity with the CAREC region. Though not a CAREC member, India has an impact on Arabian Sea routes and corridors, notably to Afghanistan via Iran. India has 12 major and 205 notified minor and intermediate ports. Under the National Perspective Plan for Sagarmala (Ministry of Shipping, 2020) six new mega ports will be developed in the country (Ministry of Shipping, 2019).

The increasing importance of the Indian Ocean as a global maritime trade facilitator is reinforced by the fact that the bulk of the world's shipping passes through the region. Against the backdrop of trade liberalization, and because of the export-import orientation of many trading countries and their energy imports, maritime trade passing through the Indian Ocean has dramatically increased (Chaturvedi, 2009). The main shipping routes served are bulk petroleum products from Persian Gulf states to India and Southeast Asia and north Asia, merchandise trade from southeast and north Asia to Europe via the Red Sea and Suez Canal. Transhipment connectivity at ports in the region have increased in importance including Colombo, Sri Lanka and Jebel Ali, UAE, and Port of Salalah, Oman.

A focus of this section deals with the maritime advantages to several of the region's littoral states in terms of their strategic location along the Indian Ocean and Arabian Sea.

The main Indian seaports are shown in Figure 82. The key ports that have recent records of connecting



with the CAREC region are Nhava Sheva (Mumbai) and Kandla, (Vesseltracker GmbH, 2020). These are on the eastern seaboard of the Indian continent and allow a ship transit time of 2.4⁷ days. These Indian ports have direct rail and industrial highway connectivity to hinterlands.

A centric focus for India has been the cooperative development of Chabahar port in Iran that provides a sea-land access route into Afghanistan and Central Asia through Iran's eastern borders. The project is considered a strategic venture for development of regional maritime transit traffic to Afghanistan and Central Asia. Iran and India have signed heads of agreement approving the integration of the Chabahar port with the Free Zone operating in the area and the opening of a branch by an Afghanistan bank (Manoj P., 2020).

6.1 Nhava Sheva (JNPT), India

6.1.1 General Description

The Port of Nhava Sheva lies on the east of the Port of Mumbai about six nautical miles away across the Thane Creek. It is also commonly known as the Jawaharlal Nehru Port (JNPT) as it is run by the Jawaharlal Nehru Port Trust. It is the busiest port in India and deals with almost half of the country's imports and exports, (XChange Solutions GmbH, 2019). The Port of Nhava Sheva and the Port of Mumbai have a common entry channel that stretches about 21 km (33.9 miles) and at a depth of 15 m. Hinterland connections serve Mumbai and its surrounding industrial area and most parts of north India.

When JNPT initiated operations at Nhava Sheva in 1989, shipping lines were reluctant to move their business to the new port from their embedded operations at the old Mumbai Port. The catalyst was severe congestion at Mumbai Port forcing shipping lines to move their business to Nhava Sheva Port. Nhava Sheva is now India's largest port by volume of trade and ranks 28 on the world's top 100 container terminals (Lloyds List, 2018).

There are five container terminals at the Nhava Sheva Port and four of them are privately managed. The state-owned terminal is the Jawaharlal Nehru Container Terminal (JNCT), DP World runs the Nhava Sheva (India) Gateway Terminal (NSIGT), and Nhava Sheva International Container Terminal (NSICT), APM Gateway Terminals India Pvt Ltd is run jointly by AP Moller-Maersk and the Container Corporation of India. The fifth terminal inaugurated in February 2018 is PSA International's Bharat Mumbai Container Terminals (BMCT) (XChange Solutions GmbH, 2019).

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	2,500 ha
Total container yard area	142 ha
Port capacity: TEU per annum estimate	7.7 million TEU
Port Capacity million tonnes per annum (m.tpa)	118.9 mtpa
Combined throughput 2019	70.71 million tonnes
Water depth alongside berths: LAT meters	15.6 m
Container terminals quay length combined	3.322 km
Number of container terminal berths	10
Containerized throughput 2017 / 2018	4.8 / 5.05 million TEU

Table 35: Nhava Sheeva Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Lloyds List, 2018; Authors' calculations.

⁷ Container/general cargo ship at economical speed of 14 knots loaded from Nhava Sheva to Chabahar.



Source: Jawaharlal Nehru Port Trust, 2020.



Source: TENtec GIS, 2020.

6.1.2 Landside Connectivity

The Port of Nhava Sheva is connected through both rail and road (Figure 84). It is estimated that 27% of the ports cargo moves via railway and roads take up 73% of the ports cargo. Road connections with the container terminals at Nhava Sheva with its hinterland are through an existing 45 km 4-lane road which is expected to be turned into 10 lanes in the next 5 years, (XChange Solutions GmbH, 2019).

The primary highway connections the port to other parts of the country are through NH-8 (Ahmedabad), NH-3 (Delhi and Kolkata), NH-4 (Bangalore) NH-17 (Goa/Mangalore). Port traffic must move through Eastern Express Highway, Western Express Highway and Sion-Panvel Highway through busy city roads, (Secretariat for the Committee on Infrastructure, 2012).

6.1.3 Investments

Approved by the Cabinet in March 2015, the Sagarmala project is a specific initiative of the Government of India for comprehensive development of India's navigable waterways and maritime sector. One of the core directives of Sagarmala is to provide enhanced connectivity between the ports and the domestic production/ consumption centers. More than 235 connectivity projects at an estimated investment of more than \$60 billion. The government has stated that there is an urgent need to augment port connectivity, the government has undertaken 70 road and railway projects worth \$4.87 billion, 55 of which are rail connectivity projects, Out of these 55 rail projects, 15 have been completed and 40 projects with a cost of \$4.47 billion are under implementation being undertaken by the Ministry of Railways for completion in 2019, (India Times, 2019).

The development of a new special economic zone (SEZ) at JNPT in Nhava Sheva is underway. The JNPT SEZ is will require and an extension of Nhava Sheva Port with an additional area of 277 ha and just 5 km away from Nhava Sheva. This project aims to improving export-oriented industries by providing infrastructure to support clusters of supportive industry near the export port. The SEZ will include a multimodal transport access to the New Mumbai airport (under construction) and a new rail corridor. The SEZ is auctioning 300 acres of land close to the port, available only to manufacturing companies. As of February 2019, 16 companies have already bought 75 acres of land. The bidding process is expected to in 2020 (XChange Solutions GmbH, 2019).

6.2 Kandla Port, India

6.2.1 General Description

The Port of Kandla (Also known as Deendayal Port), port is located on the Gulf of Kutch on the north west coast of India some 256 nautical miles southeast of the Port of Karachi, Pakistan and over 430 nautical miles north-northwest of the Port of Mumbai. Located some 90 km from the mouth of the Gulf of Kachchh on the Kandla Creek, the Port of Kandla was opened as a natural deepwater harbor in the 1930s to serve the hinterland of and beyond the state of Gujarat.

The Port of Kandla Special Economic Zone was the first SEZ to be established in India and in Asia. Established in 1965, the Port of Kandla SEZ is the biggest multipleproduct SEZ in the country. Covering over 310 ha, the SEZ is just 9 km from the Port of Kandla.

Kandla port has a capacity of 115 million tonnes and specializes in the handling and storage of dry bulk cargo including coal, grain, fertilizer, minerals, ores, steel, edible oils, The Port of Kandla is India's hub for exporting grains and importing liquid bulk crude oil. This self-sufficient port is one of the highest-earning ports in the country. Major imports entering the Port of Kandla are petroleum, chemicals, iron, steel, and machinery, but it also handles salt, textiles, and grain.

Infrastructure at Kandla port includes 12 dry cargo berths with a total quay length of 2,532 m, six oil jetties, and a total bonded port area inside the port of 253 ha. Kandla offers midstream ship moorings for cargo exchange with one deep draft mooring and four cargo moorings in the inner harbor area. The container handling facilities offer two berths at 14.1 m with a quayline of 545 m on 40 ha of container yard.

Kandla container terminals have posted a dramatic increase in container volumes since opening in 2005. The port statistics show Kandla handled 137,000 TEUs in fiscal 2008–2009; and 244,000 TEU in 2017–2018 (JOC.com, 2016).

6.2.2 Landside Connectivity

In terms of the cargo hinterlands, Kandla port serves a landlocked hinterland of North and North-West India covering the states of Gujarat, Punjab, Rajasthan, Haryana, Himachal Pradesh, Western Uttar Pradesh, and Uttaranchal. The hinterland is strong in agricultural production being the largest grain producer and exporter

Table 36: Kandla Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	253 ha
Total container yard area	15 ha
Port capacity: tonnes per annum estimate	180 million tonnes
Port capacity TEU per annum	600,000 TEU pa
Port throughput: tonnes 2018–2019	115.4 million tonnes
Water depth alongside berths: LAT meters (m)	14.1 m
Total quay lengths combined kilometers (km)	3.077 km
Number of container terminal berths	2
Containerized throughput 2017 / 2018	244,000 TEU

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Lloyds List, 2018; Authors calculations.



Source: Deendayal Port Trust, 2020.

in India. Kandla port modernization is relatively recent with complementary infrastructure being added in the period of the container terminals developments from 2005 onwards. Kandla port is relatively unrestricted when compared to Mumbai portm which is 150 years old and surrounded by a mega city the hinterland making connectivity a major issue. Mumbai port hinterland connection potential is restricted as land and transport access corridors are scarce. In comparison, Kandla hosts a modern container port which has availability of industrial land with the national highway up to the port gate and a rail track up to the berth (Parmar, 2017).

6.2.3 Investments

The container terminal Kandla International Container terminals (KICT) is a Special Purpose Vehicle formed in February 2016. It has been awarded a contract by the Kandla Port Trust to upgrade, operate and maintain two existing berths (no. 11&12, which have been non-operational since FY2014) at a container terminal at Kandla port. The container terminal has a capacity to handle 6 million TEU per annum. KICT commenced commercial operations from both the berths in FY2018 and has attracted in excess of 500,000 TEU throughput post inception, (ICRA, 2019).

Kandla Port Trust (KPT) has announced major investments in expanding bulk liquid handling and storage capacity including seeking private investment for additional capacity for 1.5 million tonnes of liquid storage capacity. KPT planning two additional berths that would add 9 million tonnes additional capacity of dry bulk handling capacity from the current 120 million tonne capacity to 180 million tonnes by then end of 2020. KPT is looking for a partner for setting up a 3 million tonne LNG cargo terminal to compete with Mundra port. KPT is investing further in oil jetties. Currently, all the six oil jetties are almost fully occupied. However, KPT has begun planning for four new crude oil jetties which are awaiting environmental clearance (Umarji & Sohini, 2017).



7. Pacific Trans-PRC (CAREC 1,2,5)

The CAREC corridors identify ports in eastern China for connection through to all CAREC countries and even beyond, to Europe. This section details the Chinese port operating characteristics of Lianyungang and Xingang-Tianjin, which are the main gateways for Central Asia and Mongolia trades, and their development plans.

The capacity and throughput of the selected Chinese ports are compared with the selected ports in Russia's Pacific coast and Busan in the Republic of Korea (see next section).

7.1 Port of Lianyungang

7.1.1 General Description

Lianyungang Port was commissioned in 1933 as a marine link for Lianyungang-Lanzhou railway in the central and western parts of the PRC. In 1949, several

river ports were merged and named Lianyungang. It now is recognized as one of the 25 major ports and 12 main regional hub ports in the PRC and one of the major ports in the Yangtze port cluster. Lianyungang Port acts as a primary cross-border transportation passage in the areas along Lianyungang-Lanzhou railway and Lanzhou-Xinjiang railway and the Central Asian countries. Development of rail terminals in and around the port link the transcontinental rail network and is part of the PRC's comprehensive belt and road transportation planning (Major Ports of the World, 2018).

The port has over 50 berths handling cargoes including containers, alumina, coke, coal, ore, bulk grain, liquid chemicals, Ro-Ro passenger and breakbulk cargo. The bulk terminal can handle vessels up to 300,000 d.w.t. and container terminal can handle the world's largest container vessels with depth alongside of 18 m. It is the east coast start of the Silk Road transport route into inner PRC and Asia, (FINDa-PORT, 2019).





Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.



Source: Vessel Tracker Ports.

In 2014, the Singaporean government enterprise; PSA International entered into an agreement with Lianyungang Port Group to purchase operating rights of the new LYG-PSA container terminal at Lianyungang. The new 5 berth deepwater terminal commenced operations in 2015 and has a designed capacity of 2.8 million TEU and a water depth alongside of 16.5 m and equipped with Super-Post Panamax quay cranes (23-row outreach) (Container Management International, 2013).

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	1,000 ha
Port capacity: million tonnes per annum (m.tpa) estimate	330 m.tpa
Water depth alongside berths: LAT meters (m)	7.9 m – 15 m
Total quay length: Combined all types kilometers (km)	48 km
Number of commercial berths	50
Combined throughput of million tonnes 2017	228 million tonnes
International throughput million tonnes 2017	123 million tonnes
Containerized throughput 2018	4.745 million TEU
Container Terminals 4 / Capacity per annum	6.7 million TEU

Table 37: Lianyungang Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit. Source: CEIC Data, n.d.; Lloyds List; Authors calculations.

7.1.2 Landside Connectivity

The Lianyungang rail terminals three cross-border passages to Alataw Pass, Khorgos and Almaty are developed on the land, over 10 container domestic lines and two international container lines to Almaty and Moscow are launched with support of nine inland logistics yards,

Hong Kong, China-based global freight-forwarder, Kerry Logistics launched rail services from Lianyungang through Kazakhstan to the Caucasus and Turkey. Starting from Lianyungang the new westbound rail freight service will bring shipments across Kazakhstan and the Caspian Sea to multiple destinations in Turkey through the newly built Baku– Tbilisi–Kars railway. Full block train and single-wagon services are being offered, with a transit time of 18–20 days. In yet another rail initiative, German state rail operator Deutsche Bahn and Georgian Railway have signed a strategic partnership to strengthen the European and Asian multimodal transportation corridors (Baker, 2019).

The Kerry Logistics trial shipment from Lianyungang to Izmit was a partial success, with some transit delays encountered due to weather and some pilferage of goods from the block train, resulting in a transit of 65 days, (Bariev, 2020).

7.1.3 Investments

In 2014, the Ministry of Transport and Communications of Kazakhstan signed an agreement with Lianyungang to open a rail terminal within the seaport precinct aimed at handling and transhipment of Kazakhstan's transit goods, originating from South and East Asia and other global origins. The investment amounted to \$98 million in joint venture funds from Lianyungang Port and the Kazakhstan national railway company. The Lianyungang Port set aside an area for a container yard of 220,000 m² and 3.8 km of railway with an estimated annual capacity of 410,000 TEU (Pierce, 2014).

The PRC's State Council has given the green light to the expansion and liberalization of Lianyungang Port, based on a "one body, two wings" concept. Lianyungang is the province's main container and dry bulk port. In line with the provincial government's plan, Lianyungang's sub-port, Guangyun, has built two 30,000 tonnes-class berths at terminal one and two 50,000 tonne-class berths at terminal two in recent years. An artificial canal links Guanyun to the Yangtze River. Anticipating growing cargo volumes, Guanyun plans to build another 50,000 tonnes-class berth at terminal three, a logistics park with an area of 100,000 m² and a bonded warehouse (Li, 2019).



Lianyungang Port holding Group and Chinalco Co., Ltd. signed a letter of intent for the alumina project of Chinalco Lianyungang (Ganyu) to build 4 million tons per year alumina production base and supporting red mud yard project, the total investment of the project is about CNY11 billion (SMM News, 2019).

CCCC Shanghai Dredging Co., Ltd. signed a contract with Lianyungang Port for dredging of 300,000 tonnes from the channel at Lianyungang Port, with a value of CNY259 million and a construction period of 13 months. The project involves the dredging of Xuwei inner channel, Xuwei with a designed bottom elevation of -13.3 meters and total dredging quantities of 21.776 million m³ (Dredging Today News, 2012).

Lianyungang Port Group has signed an agreement with the government of Khorgos for the development of an intermodal hub in the city. The project will involve the construction of a logistics center combining both railway and road connections and bonded warehousing facilities. The PRC is increasingly looking to Kazakhstan as a key hub for its transcontinental PRC to Europe routes. Currently Lianyungang Port has a direct container train connection with Khorgos. In 2017, Lianyungang Port, in partnership with COSCO, took a 49% stake in the Khorgos Dry Port (Asia Shipping News, 2019).

7.2 Port of Tianjin-Xingang

7.2.1 General Description

Tianjin-Xingang is the world's fourth largest, serving gateway imports and exports for Beijing, being 116 km away and NW PRC and Mongolia. The port including Tanggu port area, covers 62 km of coastline with

Table 38: Tianjin-Xingang Port General Description

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	20,000 ha
Port capacity: million tonnes per annum (m.tpa) estimate	680 m.tpa
Water depth alongside berths: LAT meters (m)	12.5 m – 18 m
Total quay length: Combined all types kilometers (km)	36 km
Number of commercial berths	140
Combined throughput of million tonnes in 2017	433 million tonnes
Containerized throughput 2018	15.04 million TEU
Container Terminals 6 / Capacity per annum	20 million TEU

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Lloyds List; Authors' calculations.



reclamation up to 22 km from the original coastline. The port handles just about every type of cargo and is undergoing major expansion with the port doubling in size over the next 20 years. On completion of the expansion it aspires to be one of the world's two largest ports. Tanggu port handles coal, breakbulk, construction materials, chemicals, bitumen, petroleum products, and bulk liquids. Whereas Tianjin-Xingang primarily handles containers, general cargo, dry, and liquid bulk cargoes. The port handled in excess of 550 million tonnes in 2016, a rise of 22.22% over the prior year. This growth can be partly attributed to Tianjin's ability to process ultra large container vessels, which saw Tianjin-Xingang handle 16 million TEU in 2018, (LLoyds List, 2018).

Tianjin Port Holdings is the Shanghai-listed arm of state-owned Tianjin Port Group, the port's main operator. In April 2018, Tianjin applied a unified operation system to limit six container terminals at the port. Tianjin's total cargo throughput fell 8.9% yearon-year to 433 million tonnes in 2017. This was largely due to a ban on coal. transport by trucks from the port, as part of Beijing's clampdown on pollution, which led to a substantial decline in volume of the commodity. Further down the road, the government is planning to consolidate Tianjin and other ports in the PRC's Hebei province. As the largest port in that area, Tianjin's role is expected to grow bigger, (LLoyds List, 2018).

The world's largest container vessel by carrying capacity, MSC Gulsun, has made Tianjin a regular port of call on its schedule services Qingdao, Tianjin, Shanghai, Algeciras, Gdansk, Kaliningrad, and Rotterdam.

7.2.2 Landside Connectivity

Tianjin Logistics Development Co was established in 2009 as the coordinating logistics unit of the Port of Tianjin. This unit operates 1,800,000 m² of storage yard, with a capacity for 500,000 TEU of containers, and is responsible for the establishment and

management of the dry port network and intermodal routes, as well as being the principal drayage provider.

Two main service rail lines service the Beijiang and Nanjiang areas of Tianjin port respectively. The Jinji Railway connects these lines as a de facto ring railroad. About 60 km of internal railways connects directly to the wharves and storage yards of the Beijiang area. A major expansion of intermodal capacity was completed in 2016, which provided a Third Port Railway system (Ministry of Railways Engineering, 2016).

The main arterial road of the Port is the S11 Haibin Expressway, which runs north-south and roughly represents the Port's western boundary. The main east-west feeder roads are the S40 Jingjintang Expressway, which merges into the Jingmen road; the S13 Jinbin Expressway and the G103 Highway, which both merge into the Xingang Fourth Road; and the S30 Jingjin Expressway, (Northern China News, 2014).





The hinterland of the Tianjin Port includes the municipalities of Beijing and Tianjin, and the provinces of Hebei, Henan, Shanxi, Shaanxi, Ningxia, Gansu, Qinghai, Tibet, and Xinjiang, amounting to over 5 million km², or 52% of the PRC's area, and covering 17% of the country's population. Tianjin is also one of the railheads of the Eurasian Land Bridge, (Shipping Online China, 2016).

Dedicated Container Train Routes: TPL owns and operates 15 different scheduled railway routes, dispatching 50-car (100 TEU) trains to 15 different cities in the PRC, including Erenhot, Alashankou, and Manzhouli border crossings, (Wang, Q, & Huang, 2018).

7.2.3 Investments

Investment by Tianjin Port in Jin Tang International Container Terminal at the neighboring port of Tangshan, Tianjin's transhipment volume within the Bohai Bay has also increase from 804,000 TEU in 2016 to more than 900,000 TEU in 2017 (LLoyds List, 2018).

Tianjin Lingang Port Group plans to expand its port facilities this year at its Dagukou port with 12 new general cargo handling berths. Lingang is to build twelve 100,000 tonne-class and 150,000 tonneclass multipurpose berths and an 11 km² bonded area. When the whole port project is completed, its handling capacity will exceed 100 m tons. It will also open night navigation in the port area of Dagukou this year to improve its service quality, (Seatrade News, 2019).

Three Chinese container shipping terminals at Tianjin have entered into a consolidation agreement designed to reduce operating costs. Tianjin Port Container Terminal will remain as the surviving entity of the merger, absorbing Tianjin Five Continents International Container Terminal, and Tianjin Orient International Container Terminal. The shareholders will hold equity interest in the new Tianiin Port Container company. COSCO Shipping Ports is a substantial shareholder of Tianjin Orient and Tianjin Five Continents, while China Shipping Terminal and China Merchants are substantial shareholders of Tianjin Five Continents. Upon completion of the merger, the group will hold a 76.68% equity interest in the new Tianjin Port Container entity. The group anticipates reduced the operating costs, coordinated operational resources, unification of the service standard and enhanced the usage efficiency of terminals and depots (The Maritime Executive, 2019).

7.3 Shipping Routes - the PRC/Pacific Ocean

The massive freight task to and from the PRC is demonstrated in the intensity of ship traffic shown in the shipping route maps in Figure 93.

There are too many direct shipping services to list in the table, so a snapshot sample is presented, which can be considered as a multiplier many fold over as every direct container shipping service is linking the PRC to intercontinental routes.



Table 39:Sample Direct Shipping Connections

Route / Operators	Ports of call	Frequency
All Global Lines	All Intercontinental port calls	Daily
MSC / Maersk Line Inter Asia Service	Dalian, Xingang-Tianjin, Qingdao, Lianyungang; Singapore; Surabaya; Jakarta; Pelepas; Singapore; Hong Kong, China; Keelung	7 days
MSC / Maersk USA Express Service	Xingang, Yantian, Busan, Houston, Mobile, Tampa	7 days
MSC/Maersk Europe Express Service	ShanghaiXingang, TanjungPelepas, Colombo, Suez Canal, Felixstowe, Rotterdam, Bremerhaven	7 days

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

8. Pacific Trans-Siberia (CAREC 3,4)

Trade across the Sea of Japan is only moderate, since most of Japan's trade is with countries not bordering the sea. Consequently, the most important Japanese ports are located on its Pacific coast. Important ports of the Republic of Korea (ROK) are Busan, Ulsan, and P'ohang, located on the southeast coast of the country, but most of the shipping in and out of these ports is also destined for countries not bordering the sea. Primary Russian ports are Vladivostok and Vostochny.⁸ Trade between countries around the sea, however, has increased, spurred by the growth of the ROK economy, and by the development of trade agreements with the Russian Federation.

The CAREC corridors identify ports connecting intercontinental rail with cargoes from the ROK and Japan and other East Asia countries bound to CAREC countries and beyond to Turkey or Europe. This section details the Russian port operating characteristics of Vostochny, and Vladivostok, as well as Busan in the ROK and their development plans.



⁸ Vostochny and Vladivostok are favored ports with the major global carriers and feeder carriers linking the ROK, Japan, and the Far East. A third port in the region, Nakhodka, is mostly used for dry bulk (coal), logs, petro-chemicals, steel, and fisheries.

8.1 Port of Vostochny, the Russian Federation

8.1.1 General Description

The commercial port of Vostochny is situated in Vrangel Bay and Kozmino Bay, on the eastern coast of Nakhodka Bay (or Nakhodka Gulf), in the Sea of Japan. Port is open all year round. The period of ice navigation in the port is generally from December to March and is as per harbour master's orders.

Vostochny Port is at the eastern end of the TSR. The largest stevedoring firm in the port is JSC Vostochny Port, which specializes in coal handling with conveyor equipment, where the export volume achieved 23.5 million tonnes in 2016. Vostochny Port also consists of VostCo Dry Dock, which was the construction site of the concrete gravity base structures LUN-A and PA-B for the development of the Sakhalin Island offshore oil fields. Another division of Vostochny Port is the Special Sea Oil Terminal, which is located in Kozmino Bay, with cargo throughput of 15 million tonnes in 2016 (Vostochny Port Co, 2020).

Container handling is concentrated at the Vostochnaya Stevedoring Company (VSC) container terminal, which is under the concessionary management of APM Terminals. VSC is owned by Global Ports group (GPI), which has two joint shareholders; Delo Group and APM Terminals (APM Terminal Vostochny, 2020). Vostochny remains ice-free even in the most severe winters, and reaches depths of 22 m in the fairway, allows large-capacity, Capesize-type bulk vessels of 180,000 tonnes DWT to enter for loading. The port is remote from residential and industrial areas.

8.1.2 Landside Connectivity

Vostochny Port has been linked to the TSR since in 1976 when the port was first developed for general freight cargo. Rail and road approaches provide JSC Vostochny Port with access to the country's most important trunk roads. Through the Nakhodka Vostochnaya railway station, the port is connected to the TSR, which, together with the far eastern ports, forms a unique transport bridge between Europe and Asia (Liliopoulou, Roe, & Pasukeviciute, 2006).

Coal is one of the main commodities that uses rail at the port of Vostochny and in 2016 the terminal unloaded 324,000 gondola "tipping" cars (Vostochny Port Co, 2020). The APM container terminal in Vostochny has three dedicated railway areas with total capacity of 269 flatcars at one time within the terminal precinct (APM Terminal Vostochny, 2020).

Key Attributes	Description
Year-round navigation	Yes
Total Container port area: Hectares (ha)	72 ha
Port capacity: million tonnes per annum (m.tpa)	60 m.tpa
Water depth alongside coal berths: LAT meters (m)	13.5 m
Water depth alongside container berth LAT meters	15.8 m
Total quay length: Combined all types kilometers (km)	1.284 km
Number of Container commercial berths	4
Coal throughput of million tonnes in 2019	23.5 million tonnes
Container throughput TEU in 2018	419,000 TEU
Combined tonnage est. 2018	28 million tonnes
Container Terminals 1 / Capacity per annum	650,000 TEU
Ferry Terminals / Capacity	Yes / 190,000 trailers

Table 40: Vostochny Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: APM Terminals; Lloyds List; Authors' calculations.



Source: Vessel Tracker gallery.



Source: European Commission - Rail Facilities Portal.

8.1.3 Investments

Vostochny Port has implemented the most ambitious private investment project on construction of the coal terminal's Phase 3 including the construction of the federal railway infrastructure. The project costing over RUB40 billion was implemented through public-private partnership without involving state financing. Phase 3 will let the terminal increase its throughput to 50-55 million tonnes per year. The port almost doubled its storage capacity and has built two new berths. The new coal-handling complex will be able to accommodate Capesize bulk vessels of up to 180,000 deadweight tonnes. Vostochny has extended the existing Nakhodka Vostochnaya rail station near the port to increase throughput capacity. The firm built two rail yards for receiving and dispatching at the station. Coal shipments from Vostochny are expected to stay flat or slightly increase this year from 2018, port management said. The port handled 13 mn t of coal in the first half of the year, a 6 pc year-on-year increase. The main volumes of coal were exported through the port in the first half of 2019 to the ROK; Taipei, China; and Japan. Export destinations for coal through the port are expected to be unchanged at the end of the year. Exports through Vostochny in 2018 accounted for a fifth of all coal exports through Russian ports and for 30% of exports through Russian far east ports, (Argus Media, 2019).

At the Eastern Economic Forum in Vladivostok, Vostochny Port JSC signed a memorandum on joining the Digital Transport and Logistics Association (DTLA). The purpose of DTLA is to create and develop a digital space for multimodal transport and logistics in the Russian Federation with the most extensive involvement of synchronized digital services and software of Russian companies.

8.2 Port of Vladivostok, the Russian Federation

8.2.1 General Description

The Port of Vladivostok is situated on north-west of the ice-free Golden Horn Bay, 140 km from the border with North Korea. The port is open to Russian and foreign vessels all year round. It serves 16 lines, including 10 container lines, 4 Ro-Ro and 2 passenger lines. Vladivostok Container Terminal (VCT) operates two dedicated berths since 1983. Today VCT is a large container operator sustainably increasing its handling capacity.

Being historically oriented for domestic cargo handling, the port was introduced to foreign trade in 1991. Since then Vladivostok Commercial Port has been constantly increasing its export-import turnover. The port provides services for containerized, bulk, breakbulk and fisheries cargoes. A large shipbuilding and engineering complex is located at Bolshoy Kamen. Open to navigation throughout the year but broken ice may be encountered from December to March. It is advisable for a vessel calling at the port to have an adequate category of ice strengthening. Vessels that have no ice strengthening

Key Attributes	Description
Year-round navigation	Yes
Land area: Hectares (ha)	55.2 ha
Port capacity: million tonnes per annum (m.tpa) estimate	12 m.tpa
Water depth alongside berths: LAT meters (m)	8 m – 15 m
Total quay length: Combined all types kilometers (km)	4.1 km
Number of commercial berths	15
Combined throughput of million tonnes in 2017	7.5 million tonnes
Containerized throughput 2017	680,760 TEU
Container Terminals 1 / Capacity per annum	820,000 TEU
Ferry Terminals / Annualized Capacity	150,000 trailers

Table 41: Vladivostok Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Vladivostok Port; World Port Source; Authors' calculations.



Source: Vladivostok Far Eastern Shipping Company.

category shall only manoeuvre within the port with the assistance of an icebreaker and tugs, (FESCO, 2020).

The key attributes of the port are shown in Table 41.

8.2.2 Landside Connectivity

The Trans-Siberian freight railway connection has a terminus at Vladivostok and the port company has its own lines on-dock that link directly to the network. Each berth at Vladivostok port has its rail tracks. Total length of the port rail tracks is 20 km. The capacity of port's railway station is 1,000 wagons (Vladivostok Commercial Port, 2020).

Furthermore; FESCO the container port operator has arranged weekly departures of container block trains, (Vladivostok Commercial Port, 2020), connecting the TSR as follows: Moscow 14-16; Saint Petersburg 1; Novosibirsk 2-4; Krasnoyarsk Krasnoyarsk 1; Ekaterinburg 2-4; Belarus 1; Uzbekistan (transit) 1-2; Suifenhe 1.

8.2.3 Investments

DP World Russia, the joint venture of the UAE port operator and Russian Direct Investment Fund, has signed a letter of intent to acquire a 49% stake in FESCO, (World Cargo News, 2020).

In 2007, the Russian Federation's Far East Shipping Company (FESCO) concluded a deal to buy 100% in M-Port, the parent company of the Commercial Port of Vladivostok concluding 2010. A joint venture of Russian Railways and Far Eastern Shipping Company (part of FESCO Transport Group) is to launch the construction of a new container terminal in the Port of Vladivostok worth a total of over RUR2 billion (about \$77.22 million). The first stage of the construction will give a capacity of up to 120,000 TEU a year and will be completed and put into operation in 2010. The second stage is to be completed in 2011, to be completed in 2014, the terminal is expected to reach its projected capacity of 250,000 TEU a year, (Seatrade Maritime News, 2007).



The Port Development Strategy announced in 2015 included projects to enhancement cargo turnover up to 8.5 million metric tons, including expansion plans to handle more containers up (to 650,000 TEUs), as well as high-valued cargo namely cars and heavy-duty vehicles, heavy lifts and project cargo. Reclamation of land was planned in order to expand its territory outwards as part of modernization plans to increase the length of berthing front by 770 meters and to build railway line extensions of 1,000 meters (Global Agricultural Network, 2015).

MAERSK Line is trialling a northern sea route voyage from Vladivostok via the North Sea route of the Russian Federation using one of its 3,600 TEU iceclass container ships. The 2018-built Venta Maersk is sailed from Vladivostok to St. Petersburg, according to a report in the Financial Times. The Arctic Sea route can reduce transit times from northern Asia to Northern Europe by up to 2 weeks, but the complications of the ice transit through Russian waters, which require icebreaker escorts, mean it has not been commercially viable except for occasional non-containerized cargoes (Lloyds List Intelligence, 2018).

The ROK carrier Hyundai Merchant Marine (HMM) announced that it will expand its cooperation with Russia's FESCO on an existing service between the PRC, ROK, and the Russian Federation. HMM has been jointly operating a PRC-ROK-Russian Federation weekly service named CRN (China Russia North) with FESCO and France's CMA CGM. With the expansion of cooperation, the current CRN will be reorganized and two new direct services connecting ROK and the Russian Federation, named KR2 (Korea Russia Service 2) and KRS (Korea Russia Service), will be introduced, according to HMM. HMM will deploy one 1,000 TEU container vessel onto KR2, which directly connects Busan and Vostochny, while FESCO will place one 1,200 TEU vessel onto KRS with direct service between Busan and Vladivostok. The commencement dates for KR2 and KRS took place in May 2019. The current CRN will also change its port rotation to

Qingdao-Shanghai-Ningbo-Vladivostok-Qingdao in May 2019, removing Busan and Vostochny ports from the network (Seatrade Maritime News, 2019).

8.3 Port of Busan, the Republic of Korea

8.3.1 General Description

Busan port is included in this CAREC ports scoping assessment given its importance as a gateway port for Korean exports of finished merchandise consumer goods and motor vehicles destined for European and Central Asian markets. The port also acts as a transhipment port for trans-pacific trade particularly goods from North America and Australia. In 2018 transhipment containers at Busan accounted for 52.9% of its total throughput, (Busan Port Authority Euro Office, 2018). (Busan Ports Authroity, 2020).

The Port of Busan is located at the mouth of the Naktong River in the ROK. It is the sixth busiest container port in the world and the largest transhipment port in northeast Asia. The port was the 10th busiest port in terms of total tonnage and the sixth busiest in terms of 20-foot TEUs of containerized cargo in 2018, (World Shipping Council, 2020).

The Busan port is administered by the Busan Port Authority (BPA) with responsibilities for management and operations of the free trade zone (FTZ, Distripark).

The BPA reported that container throughput at the Port of Busan grew 5.8% year-on-year to 21.66 million TEUs in 2018 and establishing a new yearly record. Owing to sluggishness in the domestic economy, exports and imports totalled 10.22 million TEUs, remaining nearly unchanged from the previous year. In contrast, transhipment containers surged 11.5% to 11.46 million TEUs, the highest volume since the port became operational. Shipping companies from the ROK and others were responsible for 65% and 35% of the total container lifting, which also remain nearly unchanged. The BPA has set a target of processing 22.5 million TEUs of containers in 2019, up 3.8% from 2018, including 12 million TEUs of T/S containers (Japan International Freight Forwarders Association Inc., 2018).



Source: Busan Port Authority.

Key Attributes	Description
Year-round navigation	Yes
Total port area: Hectares (ha)	30.7 ha
Port capacity: million tonnes per annum (m.tpa)	990 m.tpa
Water depth alongside berths: LAT meters (m)	15 m – 17 m
Total quay length: Combined all types kilometers (km)	12.5 km
Number of commercial berths	146
Combined throughput of million tonnes in 2017	400 million tonnes
Containerized throughput 2018	20.66 TEU
Container Terminals 10 / Capacity per annum	23 million TEU
Ferry Terminals / Capacity	trailers

Table 42: Busan Port General Description

LAT = lowest astronomical tide, TEU = twenty-foot equivalent unit.

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

8.3.2 Landside Connectivity

North port and New port container terminals are rail served, although only the North Terminal regularly receives and dispatches trains at present. Korean Railways (Korail) operates container trains mostly between Uiwang ICD near Seoul and Busan. Trains, comprising 33 wagons (66 TEU), are hauled by electric locomotives to the Busan New Port station, about 6 km north of Terminal 1. At this station, traction is changed to diesel and trains are hauled directly into the loading/unloading tracks at Terminal 1. There are 4 such tracks, each with a length of about 1,000 meters. (UNESCAP, 2018).

Busan port is handling an increasing volume of cargo to/from Vladivostok, either for loading to/from the TSR or for transfer between northeast PRC and ROK or between Chinese origins and destinations. For example, automobiles for Moscow move from Busan via Vladivostok and the TSR, while cargoes originating in Heilongjiang Province of the PRC move by rail to Vladivostock and thence by sea to Chinese ports via Busan, for distribution to other Chinese provinces. The latter cargo flow occurs because the rail distance between the origin in Heilongjiang Province and Vladivostok is only 300 km, whereas the rail distance to the nearest Chinese port (Dalian) is 1,000 km. Chinese rail rates are too expensive to transport cargo directly by rail, (UNESCAP, 2018).

8.3.3 Investments

The ROK is planning to invest a total of \$35.2 billion to expand capacity at 12 ports across the country over the next 20 years. The ambitious plan includes expanding cargo handling capacity at the 12 ports to 1.85 billion tonnes by 2040 from 1.32 billion tonnes in 2017, container handling capacity to 48.73 m TEU from 27.17 m TEU in 2017, according to the ROKs Ministry of Oceans and Fisheries. Busan port alone will receive W13.6 return of investment. Located on the southern coast, Busan port is the ROK's main sea gateway and the world's sixth busiest container port, handling 21.6m TEU in 2018. The Government of ROK plans to improve Busan port infrastructure by adding 21 berths and making it capable of accommodating 25,000-teu containerships (Seatrade Maritime News, 2019).

Reconnecting and modernizing railways between the two Koreas (north and south) would bring about a fundamental change in ROK's geographical position. If the connections were completed, rail shipments would be possible from ROK ports to the PRC, CAREC countries, and Europe. Experts estimate the cost of freight transport between the ROK and the PRC, the Russian Federation and other countries in the Eurasian region could be cut as much as four times with new rail systems. Transporting goods via train is much more efficient and time-saving than by freight ship. Na Hee-





sung, a senior researcher at the Korea Railroad Research Institute, estimated in a research paper published by the Korea Development Institute in 2014 that 20 to 30 million tons of freight per year could be carried along the Gyeongui Line, which would run from Gaesong to Pyongyang to Sinuiju. For the Donghae Line, he estimated approximately 10 to 20 million tons of freight could be transported per year by 2030 (JIN-KYU, 2018).

8.4 Shipping Routes - Sea of Japan / Pacific Ocean

The transportation of cargoes between North Asian countries and ports of Vladivostok and Vostochny are important for the CAREC corridor study because of the Russian port's connectivity with the Trans-Siberian railways. The shipping density map shows the majority of shipping movements are between Japan, the PRC, and the ROK to/from Nakhodka Bay ports. The concentration of effort slightly favors the port of Vostochny for shipping volumes. It is important to note that the concentration of shipping effort between Vostochny and the ROK and Japan ports is related to coal exports from the Russian Federation. In 2017, Japan imported 18.3 million tonnes and Korea 29.2 million tonnes of Russian coal (Elagina, 2020).

There are frequent scheduled container shipping services from the PRC and the ROK to both Vladivostok and Vostochny. There appears to be little of cross-over between the ports as most main shipping lines alternate between schedule direct calls in the Russian Federation. The typical container ship size operating on scheduled services to Nakhodka Bay Russian ports is 20-25,000 DWT, this being much smaller than vessels operated on intercontinental services.

Shipping connections to key ports in the region is included in Table 43.



Source: e-Atlas Shipping Density Mapping, 2020.

Route / Operators	Ports of Call	Frequency
Maersk Line	Shanghai, Ningbo, Busan, Vladivostok, Shanghai	7 days
	Singapore-Ho Chi Minh City-Da Nang-Hong Kong, China-Shanghai- Ningbo-Busan-Vostochniy	10 days
Hyundai Merchant Marine	Shanghai-Ningbo-Busan-Vladivostok- Vostochniy-Busan-Shanghai	7 days
FESCO	Vladivostok-Vostochniy-Shekou (Chiwan) -Yantian-Xiamen-Ningbo Zhoushan)-Shanghai -Vladivostok- Vostochniy	10 days
	Vladivostok-Vostochniy-Pusan- Qingdao-Shanghai-Ningbo (Zhoushan) -Pusan-Vladivostok-	10 days
	Vostochniy	10 days
	Vostochny-Vladivostok-Sendai- Yokohama- Shimizu-Nagoya-Kobe- Toyamashinko-Busan-	12 days
	Vostochniy-Magadan-Vostochniy	
Heilongjiang Land-sea Channel	Vostochny-Taicang-Vostochny	14 days
SASCO Line	Ningbo-Vostochniy-Vladivostok	14 days
SINOKOR Line	Vostochniy-Busan-Vostochniy.	7 days
	Vostochny-Busan-Ulsan-Kwangyang- Hong-Kong, China-Haiphong- Ningbo-Shanghai-Busan-Vostochny	14 days
CMA-CGM	Shekou-Yantian-Xiamen-Ningbo- Shanghai-Vladivostok-Vostochny- Shekou	12 days
	Vladivostok-Vostochny-Pusan- Qingdao-Shanghai-Ningbo-Pusan- Vladivostok	12 days

Table 43: Nakhodka Bay Sample Direct Shipping Connections

Source: Findaport.com, World Port Source, Lloyds List Maritime and Port Authorities.

Ports and Logistics Scoping Study in CAREC Countries Volume II: Ports and Shipping

CAREC countries rely upon open-sea ports of third-party countries outside of their borders as conduits for their exports and imports. These open-sea ports are located mostly in non-CAREC countries and act as international oceanic trade nodes to connect CAREC freight moving on cross border railways, highways, inland sea shipping, and on river and canal barges. This scoping study analyses seaports and multimodal corridors serving CAREC landlocked countries. Volume II includes a detailed description of main ports and shipping routes serving CAREC corridors.

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The Central Asia Regional Economic Cooperation (CAREC) Program is a partnership of 11 member countries and development partners working together to promote development through cooperation, leading to accelerated economic growth and poverty reduction. It is guided by the overarching vision of "Good Neighbors, Good Partners, and Good Prospects." CAREC countries include Afghanistan, Azerbaijan, the People's Republic of China, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan.

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