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Islamic Centre for Development of Trade

CAPACITY ASSESSMENT OF CARGO SEAPORTS IN OIC ASIAN MEMBER COUNTRIES

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This report is the result of a collaborative effort led by the Islamic Development Bank (IsDB) and the Islamic Centre for Development of Trade (ICDT), undertaken with the objective of strengthening the capacity, performance, and strategic role of cargo seaports in OIC Asian Member Countries.

The study was carried out under the overall guidance of Dr. Issa Faye (Director General, Global Practice and Partnerships, IsDB), May Ali Babiker (Director, Cooperation and Capacity Development Department, IsDB) and Latifa El Bouabdellaoui (Director General, ICDT). The core team members included Dr. Mamoudou Sall from ICDT, along with Kadir Basboga, Atiq Ahmad, Sameh Hussein, Nazar Diab, Mohammed Bukhari, Helena Diffo, and Aminuddin Mat Ariff from IsDB. Valuable feedback was provided by Houssem Eddine Bedoui, Mbianyor Bakia, and Parviz Rashidov from IsDB, whose insights greatly contributed to the refinement and quality of the report.

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Abbreviations

BCP	Border Crossing Point
CAGR	Compound Annual Growth Rate
COVID-19	Coronavirus disease
CPPI	Container Port Performance Index
FEU	Forty Equivalent Unit or 40-foot container
ICDT	Islamic Centre for Development of Trade
ILO	International Labor Organisation
IMO	International Maritime Organisation
IsDB	Islamic Development Bank
Km	kilometer
LPI	Logistics Performance Indicators
LSCI	Liner Shipping Connectivity Index
MEPC	Marine Environment Protection Committee
OIC	Organisation of Islamic Cooperation
PRC	People's Republic of China
TEU	Twenty Equivalent Unit or 20-foot container
TITR	Trans-Caspian International Transport Route
TMTM	Russian acronym for TITR
UNCTAD	United Nations Conference on Trade and Development
WB	World Bank
WIF	WageIndicator Foundation
Y-o-Y	Year on Year

In this report, "$" and "US $" refers to US dollars.

Foreword

The growing complexity of global supply chains and the accelerating pace of international trade have placed unprecedented demands on seaports, particularly in developing economies. For the Organization of Islamic Cooperation (OIC) Asian Member Countries, spanning critical geostrategic corridors and serving as gateways to some of the world's fastest growing markets, seaports are far more than logistical assets. They are foundational pillars of economic development, engines of industrial transformation, and enablers of deeper regional integration.

Against this backdrop, the Islamic Development Bank (IsDB) and the Islamic Centre for Development of Trade (ICDT) are pleased to present the Capacity Assessment of Cargo Seaports in OIC Asian Member Countries. This joint effort forms part of our shared commitment to strengthening trade facilitation, enhancing cross-border connectivity, and supporting Member Countries in modernizing critical trade infrastructure. The study provides an evidence based diagnosis of national logistics environments and port level capabilities, while identifying opportunities for impactful capacity development and targeted knowledge exchange.

The findings reveal not only the diversity of challenges faced by ports in the region, but also the immense potential they hold. From rising container traffic and demographic expansion to evolving maritime routes and the growing demand for digitalization, the opportunities for harnessing ports as engines of growth have never been greater. Yet, unlocking this potential requires addressing persistent gaps in logistics performance, modern infrastructure, skilled labor, and environmental sustainability. It also requires strong partnerships and coordinated action across institutions, sectors, and borders.

This report responds to that imperative. It offers a robust methodology for assessing port capacity, draws on global and regional benchmarks, and provides solid inputs to recommendations aimed at strengthening institutional capabilities, operational efficiency, and maritime connectivity. Most importantly, it emphasizes cooperation between ports, Member Countries, and development institutions, recognizing that shared challenges can be transformed into shared opportunities through collective action.

We extend our sincere appreciation to the national authorities, port operators, and technical experts who contributed to this study. As we move forward, IsDB and ICDT reaffirm their dedication to supporting Member Countries in implementing the study's recommendations and in advancing port modernization agendas. Strengthening maritime infrastructure is not only an economic priority, but also a strategic investment in resilience, competitiveness, and inclusive development for the entire OIC region.

We trust that this report will serve as a valuable resource for policymakers, port authorities, development partners, and all stakeholders committed to enhancing the performance and future readiness of cargo seaports across OIC Asian Member Countries and beyond.

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Executive Summary

Maritime transport moves more than 80% of global crossborder trade, making seaports indispensable nodes in international supply chains and critical enablers of economic development across the Organization of Islamic Cooperation (OIC) Asian region.

Recognizing the strategic importance of modernizing port systems to enhance trade competitiveness, the Islamic Development Bank (IsDB) and the Islamic Centre for Development of Trade (ICDT) commissioned this Capacity Assessment of Cargo Seaports in OIC Asian Member Countries.

This report presents detailed country- and portlevel assessments across the 15 OIC Asian countries, of which nine possess maritime borders: Azerbaijan, Bangladesh, Indonesia, Iran, Kazakhstan, Maldives, Pakistan, Türkiye, and Turkmenistan. It aims to systematically diagnose key infrastructure, operational, and institutional constraints, thereby providing an analytical foundation for targeted interventions to strengthen port performance and enhance regional trade integration.

Methodology and Analytical Framework

The study adopts a two-step analytical approach as follows:

- Country-Level Analysis: Applying a "country filter" using six dimensions, 16 subfactors, and 83 indicators, the study identifies countries most in need of portfocused capacity development. The dimensions cover economic performance, trade and logistics, enabling business environment, workforce competitiveness, Environmental, Social, and Governance (ESG) performance, and strategic positioning. Countries are evaluated based on both developmental needs and potential impact of port improvements.
- Port-Level Analysis: From the shortlisted countries, major seaports are assessed using a "port filter" comprising five dimensions, 10 subfactors, and 19 indicators. These include economic and demographic characteristics of port cities, container trade performance, supply chain efficiency, business environment, ESG conditions, and strategic relevance. This analysis identifies priority ports for in-depth assessment in subsequent phases following the completion of this report.

Key Findings

The multidimensional analysis reveals significant disparities in economic development, trade intensity, logistics performance, investment climate, labor productivity, and environmental sustainability across OIC Asian Member Countries. These findings are purely analytical in nature, based on available data, and should not be interpreted as judgments on individual countries.

Bangladesh, Indonesia, Türkiye, Kazakhstan, and Pakistan frequently emerge as priority countries based on cumulative scores across the six dimensions. Many countries display strong strategic importance due to their hinterland linkages and gateway roles (e.g., Azerbaijan for Central Asia, Bangladesh for Northeast India, Türkiye for

the Europe Asia corridor). Weaknesses persist in maritime performance, logistics quality, technology and innovation, and environmental sustainability, signaling areas where targeted port interventions can generate high regional impact.

The port-level filter highlights ports that are operationally significant but face constraints that impede growth, efficiency, and competitiveness. Several ports exhibit rapid cargo growth but insufficient capacity expansion, leading to congestion and operational inefficiencies. Container-handling performance, berth productivity, and supply chain reliability vary widely, with many ports scoring low on terminal productivity and liner shipping connectivity.

Infrastructure gaps, particularly in deep-water access, hinterland connectivity, digital systems, and modern cargo-handling equipment, emerge as common constraints. Ports in countries with strong urban growth (e.g., Jakarta, Chittagong, Karachi) face rising demand pressures that outpace investment.

Impact of 2026 Maritime Disruptions in the Middle East Region

The 2026 maritime disruptions in the Middle East region and the resulting impact on maritime traffic through the Strait of Hormuz exposed the vulnerability of global trade networks to geopolitical shocks. Sharp declines in vessel movements through the Strait led to higher freight rates, fuel costs, insurance premiums, and supply chain uncertainty, while also disrupting energy, fertilizer, and commodity flows. The impacts varied across OIC member countries and ports, with import-dependent economies facing increased logistics and energy costs, while some locations benefited from shifting trade routes. The crisis underscores the need for resilient, digitalized, and well-connected ports, stronger contingency planning, and enhanced regional cooperation to safeguard trade continuity and supply chain resilience.

Strategic Recommendations

The study recommends five strategic priorities to strengthen the capacity, competitiveness, and resilience of cargo seaports in OIC Asian Member Countries. First, ports should accelerate digitalization and trade facilitation through Port Community Systems, automated processes, and customs modernization. Second, targeted investments are needed to address infrastructure and capacity constraints, including terminal expansion, equipment upgrades, and improved hinterland connectivity. Third, ports should strengthen resilience and supply chain continuity through risk management frameworks, business continuity planning, and contingency measures for geopolitical and operational disruptions. Fourth, Member Countries should advance green and sustainable port development through energy-efficient infrastructure, renewable energy adoption, and environmental management initiatives. Fifth, greater emphasis should be placed on human capital development and institutional strengthening, supported by knowledge exchange and technical cooperation among OIC ports. Implementation follows a phased approach: short-term (1–2 years) digitalization and capacity development, medium-term (3–5 years) modernization and partnerships, and long-term (5+ years) expansion, resilience, smart-port development, and decarbonization.

The assessment suggests that strengthening port capacity in OIC Asian Member Countries is essential for boosting trade competitiveness, enabling integration into global production networks, and supporting sustained economic development. By systematically identifying weaknesses, prioritizing highimpact interventions, and leveraging intraOIC cooperation, the study sets the foundation for transforming the performance and resilience of seaports across the region. These insights are intended to guide policymakers in designing coordinated, forward-looking strategies to enhance port performance, resilience, and regional trade integration across the OIC.

01

Overview of Methodology

1.1 Background

In the contemporary world, more than 80% of crossborder trade is transported by sea, making seaports a critical interface in global supply chains and a central hub for multimodal transport as cargo moves between maritime and landbased networks. As the OIC Asian region experiences rising trade volumes, demographic expansion, and deeper integration into global markets, the efficiency, resilience, and competitiveness of its seaports have become increasingly vital. Yet many ports in the region face persistent challenges, including aging infrastructure, limited digitalization, operational bottlenecks, and growing climaterelated vulnerabilities.

Addressing these constraints is essential not only for enhancing port performance, but also for strengthening regional connectivity, supporting economic diversification, and advancing sustained development across OIC Member Countries. The significant diversity in port capacities, governance structures, and operational standards across the region further underscores the need for a structured, evidencebased assessment to guide targeted interventions.

While several ports have made notable progress in adopting international best practices, others continue to struggle with institutional capacity gaps, regulatory inconsistencies, financing limitations, and human capital constraints. By undertaking a comprehensive, multidimensional capacity assessment, this study aims to provide a comparative baseline that can inform strategic investment decisions, enhance regional collaboration, and support the design of bankable, wellsequenced capacity development and investment initiatives.

1.2 Framework and Methodology

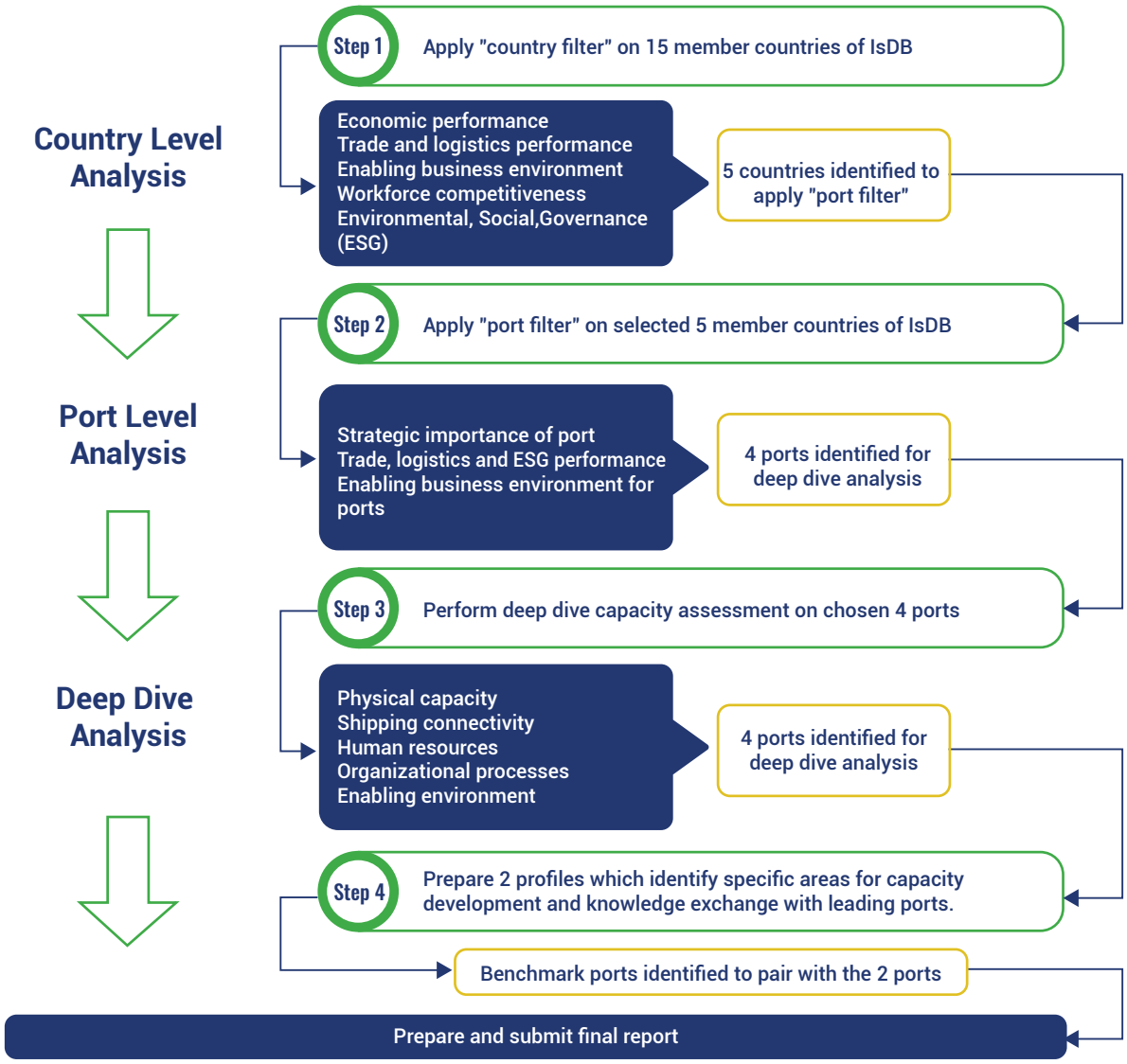
The methodology and analytical framework for the study are presented in Figure 1. The approach aims to inform the identification of capacity development needs, focusing on specific areas of knowledge exchange with leading ports.

The methodology adopts a country and port-level approach, focusing on the specific characteristics of individual port communities and their internal and external stakeholders. The country level analysis considers six dimensions which comprise 16 sub-factors and 83 indicators. The port level analysis considers five dimensions and 19 indicators that pertain to the port industry.

Analyses at both the country and port levels are based on secondary research, drawing on data from publicly available sources. A subsequent study, beyond the scope of this report, will undertake in-depth port-level assessments using a combination of secondary data and, where feasible, primary research collected through interviews and surveys of selected ports. In the subsequent phase, the assessment will develop detailed port profiles to identify targeted capacity development priorities and facilitate structured knowledge exchange through pairing with benchmark ports.

Selection of indicators and the accompanying data is an important aspect of the study. The study takes reference to six attributes when determining the choice of indicators used. These attributes are relevancy, authoritativeness, objectivity, recency, comprehensiveness, and parsimony. The study uses indicators that are relevant to the context of the study which deals with the port and shipping

Figure 1: Methodology and analytical framework for the study



Source: Yap, W.Y., and Ee, K.K.

industry. Key indicators also include those that are related to economic performance, trade and logistics activities, and manufacturing.

The indicators used in this study are drawn from authoritative and credible sources. Objectivity is ensured by prioritizing reliable, factbased datasets and minimizing reliance on subjective inputs. Recency is maintained by using the most uptodate data available, ideally from 2023. The principle of comprehensiveness guides the selection of datasets that cover all, or as many as possible, of the 15 OIC Asian Member Countries. Parsimony emphasizes simplicity, favoring indicators that are easy to interpret and avoiding unnecessary duplication across subfactors and dimensions. All indicators within a given dimension are assigned equal weight; for example, five indicators in a dimension would each receive a weight of 20%. As this stage of the study serves as a broad diagnostic filter rather than an investment prioritization tool, equal weighting provides a fair, consistent, and objective basis for comparison. More refined weighting and prioritization will naturally occur in the deepdive stage, where country- and portspecific conditions can be incorporated more comprehensively.

02

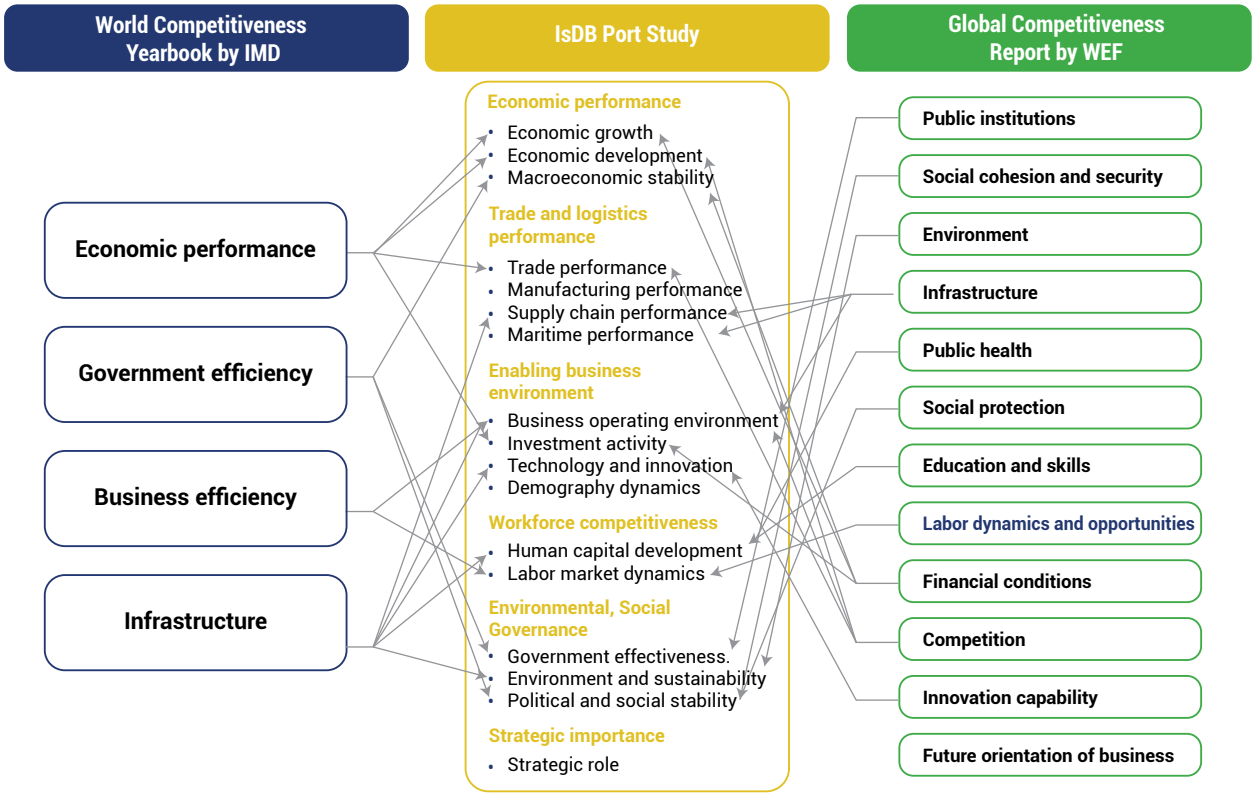
Dimensions and Indicators

2.1 Overview

With reference to Figure 2, the first step of the analytical framework takes place at the country level. At the country level of analysis, we apply a "country filter" which considers six dimensions, 16 sub-factors and 83 indicators. The aim is to shortlist five countries where more detailed analyses at the port level can be conducted. For the six dimensions applied at the country level, these are economic performance, trade and logistics performance, enabling business environment, workforce competitiveness, environmental, social and governance (ESG) aspects, and strategic importance.

The dimensions considered for the study take reference to the methodology used by the International Institute for Management Development (IMD)[1] and the World Economic Forum (WEF)[2] in their regular appraisal of various economies and countries across the world. The *World Competitiveness Yearbook*, which is published by IMD, and the *Global Competitiveness Report*, which is published by WEF, serve as important benchmarks where many countries and economies take reference to in developing greater competitiveness. The IMD considers four dimensions (termed as "factors") in their evaluation of country competitiveness whereas the WEF measures global competitiveness based on twelve dimensions (termed as "pillars"). For this study, these dimensions have been adapted to the context of the port industry.

Figure 2: Methodology for the Country Level Analysis



Source: Yap, W.Y., and Ee, K.K..

The study emphasizes those aspects that are related to the port industry. This results in three key differences between our approach compared to the IMD or WEF. Firstly, separate dimensions are created for economic performance and trade and logistics performance in view of their importance to the port industry. Most of these aspects are combined under the category of economic performance by IMD and competition by WEF. Secondly, the aspects of basic infrastructure, technological infrastructure, scientific infrastructure, education, and health and environment, have been reorganized and included in the sub-factors of supply chain-related infrastructure, technology and innovation, human capital development, environment and sustainability. The IMD

1 IMD (2024). IMD World Competitiveness Yearbook 2024. Available online at: https://www.imd.org/wp-content/uploads/2024/06/WCY_Bookletv1_2024-1.pdf

2 World Economic Forum (n.d.). The Global Competitiveness Index (GCI) 5.0. Available online at: https://www.weforum.org/about/the-global-competitiveness-index-gci-5-0/#:~:text=Accounting%20for%20a%20broader%20set,Japan%20and%20France%20taking%20the

has lumped these aspects in the dimension named "infrastructure" whereas these aspects carry distinctive impacts as seen by the categorization used by WEF.

Thirdly, the study included three new sub-factors that are seen as important for the port industry. The sub-factor of manufacturing performance is included in the dimension of trade and logistics performance given its close relation with manufacturing activities. The sub-factor of demography dynamics, which considers population growth and level of urbanization, has also been included in the dimension of enabling business environment. These aspects are seen to result in conducive or regressive operating conditions for businesses. The study also includes the sub-factor named "strategic role" of a country to assess its potential economic impact, trade impact, and market reach. It is appropriate to consider these aspects in terms of their strategic value and importance from the perspective of a country.

2.2 Country Level Sub-factors

1. Economic Performance

The dimension of economic performance comprises of three sub-factors which are economic growth, economic development, and macroeconomic stability. For the purpose of this study, ideal attributes are broadly high level of economic growth, low level of economic development, and exhibit macroeconomic stability. With reference to **Table 1**, the sub-factors, their indicators and associated measurements and sources of data are presented. The sub-factor of economic growth considers the size of the economy as well as its growth performance from the nominal and real perspectives. These are also assessed at the per capita income level. The preference will be for countries that exhibit comparatively high levels of growth but with low per capita incomes. Improvements made to the port sector can thus help

Table 1: Sub-factors and indicators for the economic performance dimension*

Indicator	Measurement	Source
Sub-factor: Economic growth		
Size of economy	GDP (nominal, billion US$)	WB
Nominal economic growth	GDP growth (nominal, CAGR %, 2018-2023)	WB
Real economic growth	Real GDP growth rate (CAGR %, 2018-2023)	WB
Per capita income nominal growth	GDP per capita (nominal US$ CAGR %, 2018-2023)	WB
Per capita income real growth	GDP per capita (PPP, constant 2021 international $, CAGR %, 2018-2023)	WB
Sub-factor: Economic development		
Per capita income	GNI per capita (current US$)	WB
Quality of life	Quality of life index	Numbeo[3]
Level of development	Human Development Index	UNDP[4]
Access to water supply	People using safely managed drinking water services (% of population)	WB
Access to sanitation facilities	People using at least basic sanitation services (% of population)	WB
Sub-factor: Macroeconomic stability		
Current account balance	Current account balance (% of GDP)	WB
Government budget balance	Government budget balance (% of GDP)	IMF
Size of government debt	General government gross debt (% of GDP)	IMF
Inflation	Consumer price inflation (%)	IMF
Country credit rating	Sovereign rating for countries	Various[5]

Source: Yap, W.Y., and Ee, K.K.. * WB denotes The World Bank[7]; IMF denotes International Monetary Fund[7].

3 Numbeo (2024). Quality of Life Index by Country 2023. Available online at: https://www.numbeo.com/quality-of-life/rankings_by_country.jsp?title=2023
4 United Nations Development Program (n.d.). Human Development Index (HDI). Available online at: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI
5 Sources include sovereign ratings given by Fitch, Moody's, and S&P.
6 Indicators from The World Bank are extracted from the World Development Indicators DataBank. Available online at: https://databank.worldbank.org/source/world-development-indicators
7 Indicators from the IMF are extracted from the World Economic Outlook Database. Available online at: https://www.imf.org/en/Publications/WEO/weo-database/2024/October

to raise income levels in the country. The sub-factor of economic development considers the developmental aspect of a country, accounting for gross national income per capita[8], quality of life, level of development, access to water supply, and access to sanitation facilities. These attributes are commonly used to measure the level of economic development and standard of living of a country. Preference will be for countries that perform comparatively poorly for these indicators. As such, the role of the port will be to expedite the pace of economic development in the country.

The sub-factor macroeconomic stability uses the indicators of current account balance, government budget balance, size of government debt, inflation, and country credit rating in its assessment. The use of these indicators is drawn from the experiences of managing the Asian Financial Crisis of 1997[9], Global Financial Crisis of 2007-2008[10], and the European Sovereign Debt Crisis of 2012[11]. Following from these experiences, preference will be for countries that operate a positive current account balance, have comparatively low inflation, and have comparatively high levels of country credit rating issued by rating agencies that include S&P, Moody's and Fitch. Preference is also to have countries with government budget deficits at less than 3% of GDP, and size of government gross debt at less than 60% of GDP[12]. These indicators were seen to be fundamental in determining the macroeconomic stability of a country. The data for sub-factors of this dimension is drawn largely from The World Bank (WB). Other sources include the United Nations Development Program (UNDP) and International Monetary Fund (IMF).

The dimension of trade and logistics performance comprises four sub-factors which are trade performance, manufacturing performance, supply chain performance, and maritime performance (see **Table 2**). For the purpose of this study, ideal attributes are broadly high dependence on trade and manufacturing, strong showing in supply chain performance, and weak showing in maritime performance, particularly for container throughput growth and shipping connectivity. The sub-factor of trade performance accounts for the indicators of merchandise trade value and growth, trade dependency, trade competitiveness, and trade openness. The preference will be for countries that exhibit comparatively high trade dependency and trade openness but with low trade competitiveness. Given that more than 80% of world trade by volume and 70% by value is transported by sea[13], the role of ports will be of great importance in facilitating trade as well as benefitting from the cargo and ship traffic that it brings. The second sub-factor of manufacturing performance accounts for dependence on manufacturing, size of the manufacturing sector, dependence on manufacturing trade, manufacturing trade performance, and competitiveness in manufacturing. Performance of manufacturing is an important consideration given its close relation to the container trade (Bernhofen et al., 2016[14]; Yap, 2019[15]). Preference will be given to countries with comparatively high dependence on manufacturing.

> THE SUB-FACTOR OF ECONOMIC DEVELOPMENT CONSIDERS THE DEVELOPMENTAL ASPECT OF A COUNTRY, ACCOUNTING FOR GROSS NATIONAL INCOME PER CAPITA, QUALITY OF LIFE, LEVEL OF DEVELOPMENT, ACCESS TO WATER SUPPLY, AND ACCESS TO SANITATION FACILITIES.

8 Note that this indicator is used by The World Bank and various organizations to classify countries according to different income levels (see https://blogs.worldbank.org/en/opendata/new-world-bank-country-classifications-income-level-2022-2023). GNI refers to income attributable to the nationals of a country whereas GDP refers to economic output that takes place within a country.

9 Carson, M., and Clark, J. (2013). "Asian Financial Crisis: July 1997-December 1998". Federal Reserve Bank of New York. Available online at: https://www.federalreservehistory.org/essays/asian-financial-crisis

10 Weinberg J. (2013). "The Great Recession and Its Aftermath". Federal Reserve Bank of Richmond. Available online at: https://www.federalreservehistory.org/essays/great-recession-and-its-aftermath

11 Kräussl, R., Lehnert, T., and Stefanova, D. (2017). "The European sovereign debt crisis: What have we learned?" CFS Working Paper Series, No. 567, Goethe University Frankfurt, Center for Financial Studies (CFS), Frankfurt a. M. https://hdl.handle.net/10419/149623

12 The guidelines for budget deficit and government debt take reference to those issued by the European Council in advising member countries to maintain government debt and spending at sustainable levels (see https://www.consilium.europa.eu/en/policies/excessive-deficit-procedure/#:~:text=To%20limit%20government%20deficit%20and,to%20a%20member%20state's%20GDP.&text=All%20member%20states%20must%20avoid%20exceeding%20these%20reference%20values.).

13 Bingham, C., Mikkelsen, I.T. (2023). "Understanding Maritime Decarbonization's Impacts on Trade Costs to Unlock a Just Transition". UNCTAD Transport and Trade Facilitation Newsletter, No. 98. Available online at: https://unctad.org/news/transport-newsletter-article-no-107-understanding-maritime-decarbonization

14 Bernhofen, D.M., El-Sahli, Z., and Kneller, R. (2016). "Estimating the effects of the container revolution on world trade". Journal of International Economics, Vol. 98, pp. 36-50. https://doi.org/10.1016/j.jinteco.2015.09.001

15 Yap, W.Y. (2019). "Container trade and shipping connectivity of Vietnam: implications of Comprehensive and Progressive Agreement for Trans-Pacific Partnership and 21st Century Maritime Silk Road". International Journal of Shipping and Transport Logistics, Vol. 11, No. 1, pp. 94-116. https://doi.org/10.1504/IJSTL.2019.096873

2. Trade and Logistics

Table 2: Sub-factors and indicators for the trade and logistics performance dimension*

Indicator	Measurement	Source
Sub-factor: Trade performance		
Merchandise trade growth	Merchandise trade growth (CAGR %, 2018-2023)	WB
Size of merchandise trade	Merchandise trade (billion US$)	WB
Trade dependency	Merchandise trade (% of GDP)	WB
Trade competitiveness	Merchandise trade balance (% of GDP)	WB
Trade openness	Tariff rate, applied, simple mean, all products (%)	WB
Sub-factor: Manufacturing performance		
Dependence on manufacturing sector	Manufacturing, value added (% of GDP)	WB
Size of manufacturing sector	Manufacturing, value added (billion US$)	WB
Dependence on manufacturing trade	Manufacturing exports and imports (% of GDP)	WB
Manufacturing trade performance	Value of manufacturing trade growth (CAGR %, 2018-2023)	WB
Manufacturing competitiveness	Manufacturing trade balance (% of GDP)	WB
Sub-factor: Supply chain performance		
Customs clearance	Efficiency of customs clearance process (1=low to 5=high)	WB
Trade and transport-related infrastructure	Quality of trade and transport-related infrastructure (1=low to 5=high)	WB
Ease of organizing shipments at competitive prices	Ease of arranging competitively priced shipments (1=low to 5=high)	WB
Quality of logistics services	Competence and quality of logistics services (1=low to 5=high)	WB
Track and trace capability	Ability to track and trace consignments (1=low to 5=high)	WB
Reliability and timeliness	Frequency with which shipments reach consignee within scheduled or expected time (1=low to 5=high)	WB
Sub-factor: Maritime performance		
Size of container trade	Container port throughput (million TEUs)	WB
Container throughput growth	Container port throughput (CAGR %, 2018-2023)	WB
Shipping connectivity	Liner shipping connectivity index	WB
Containership fleet	Containerships ('000 DWT)	UNCTAD[16]
Hub status of ports	Container transshipment incidence (%)	Various

Source: Yap, W.Y., and Ee, K.K.. * WB denotes The World Bank.

As for supply chain performance, the study draws on the findings from the Logistics Performance Index (LPI)[17] where the results are also reported by The World Bank. The LPI is the most authoritative source of information for assessing supply chain performance across countries. It covers the whole range of supply chain-related performances from customs clearance to logistics infrastructure to quality of logistics services. The index is computed using information from international logistics operators and includes data on container tracking and maritime shipping. Preference will be on countries that score comparatively better for these indicators as they are likely to be better positioned to capitalize on any improvements that are made to the port industry. As for maritime performance, the sub-factor comprises the indicators of container trade volume and growth, shipping connectivity, national containership fleet and hub status of ports. These indicators are related directly to the performance of the country in the containerized trade sector. The data for sub-factors of this dimension is drawn almost entirely from The World Bank. Data for containership fleet is drawn from UNCTAD while data for container transshipment incidence is extracted from various sources that include port websites. Preference will be on countries that exhibit comparatively low levels of shipping connectivity and container volume growth.

16 United Nations Conference on Trade and Development (UNCTAD) (n.d.). Maritime profile. Available online at: https://unctadstat.unctad.org/CountryProfile/MaritimeProfile/en-GB/004/index.html

17 The World Bank (n.d.). Logistics Performance Index (LPI). Available online at: https://lpi.worldbank.org/about

3. Enabling Business Environment

Table 3: Sub-factors and indicators for the enabling business environment dimension*

Indicator	Measurement	Source
Sub-factor: Business operating environment		
Company tax	Profit tax (% of commercial profits)	WB
Business integrity environment	% of firms experiencing at least one bribe payment request	WB
Access to lending	Domestic credit to private sector (% of GDP)	WB
Electricity supply reliability	Firms experiencing electrical outages (% of firms)	WB
Mobile network infrastructure	Mobile cellular subscriptions (per 100 people)	WB
Sub-factor: Investment activity		
Attraction of FDI	FDI net inflows (CAGR %, 2018-2023)	WB
Dependence on FDI	FDI net inflows (% of GDP)	WB
Long-term investment footprint	FDI stock per capita (US$)	WB
Dependence on investment	Total investment (% of GDP)	IMF
Foreign aid received	Net official development assistance and official aid received per capita (current US$)	WB
Sub-factor: Technology and innovation		
R&D spending	Expenditure on R&D (billion US$)	WB
Commitment to innovation	R&D expenditure (% of GDP)	WB
Research talent pool	Researchers in R&D (per million people)	WB
Innovative capacity (basic research)	Scientific and technical journal articles per 100,000 population	WB
Innovative capacity (applied research)	Patent applications per 100,000 population	WB
Sub-factor: Demography dynamics		
Urban population size	Urban population (million people)	WB
Urban population growth	Urban population (CAGR %, 2018-2023)	WB
Urbanization level	Urban population (% of total population)	WB
Net migration rate	Net migration (annual average %, 2018-2023)	WB

Source: Yap, W.Y., and Ee, K.K.. * WB denotes The World Bank; IMF denotes International Monetary Fund.

The dimension of enabling business environment comprises sub-factors that relate directly or affect the environment for business operations. For the purpose of this study, ideal attributes are broadly good business operating environment, low investment activity and attraction to foreign direct investments, strong showing for technology and innovation, and high level of urbanization. With reference to **Table 3**, the sub-factors considered are those of business operating environment, investment activity, technology and innovation, and demography dynamics. The sub-factor of business operating environment includes indicators that reflect challenges and concerns of businesses. These are issues related to taxes, business integrity environment, access to lending, reliability of electricity supply, and mobile network infrastructure. Preference will be for countries that possess comparatively good business operating environments such as having reliable electricity supply. These are seen as preconditions required for businesses to capitalize on improvements to trade flows because of better port capabilities. The exception is access to lending where preference will be for countries that perform relatively poorly for this indicator.

The sub-factor for investment considers the aspects of attractiveness to and dependence on foreign direct investment (FDI), stock of FDI in the country, and size of investment. The preference will be for countries that have comparatively high levels of dependence on FDI and investment but have low investment stock and FDI inflows. The sub-factor also considers foreign aid received by the country. Technically foreign aid is not considered as an investment in the conventional commercial sense as it does not seek direct returns. However, foreign aid for developing countries can often be an investment in the form of infrastructure improvements. In this context, the study considers foreign aid as an investment activity. Preference will be given to countries that perform relatively poorly for this indicator.

The sub-factor of technology and innovation is crucial for enabling businesses to compete and grow through technological progress and innovative capacity. Indicators considered are spending on research and development, research talent pool, and activities for basic and applied research. This sub-factor is especially important for countries that have ambitions to move up the manufacturing value chain. There will also be significant spillovers to the port sector which is becoming increasingly technology intensive (Kon et al., 2021[18]). The preference will be for countries that perform comparatively better for the indicators as they are likely to be in a better position to utilize and capitalize any technological improvements that can be made to the port. The last sub-factor for this dimension considers the impact of net migration, and urbanization developments in the country. These aspects are categorized as "demography dynamics". These factors have important implications for ports, especially where urban characteristics are highly influential for port-cities (Ducruet et al., 2020[19]). As such, the preference will be for countries that have comparatively higher levels of urbanization. Population growth is also viewed as an important determinant of port traffic particularly when combined with urbanization (Yap and Lam, 2013[20]). The preference will be for countries that have comparatively large urban populations. The data for indicators of this dimension is drawn from The World Bank and International Monetary Fund.

18 Kon, W.K., Abdul Rahman, N.S.F., Md Hanafiah, R., and Abdul Hamid, S. (2021). "The global trends of automated container terminal: a systematic literature review". Maritime Business Review, Vo. 6, No. 3, pp. 206-233. https://doi.org/10.1108/MABR-03-2020-0016

19 Ducruet, C., Itoh, H., and Berli, J. (2020). "Urban gravity in the global container shipping network". Journal of Transport Geography, Vol, 85, pp. 102729. https://doi.org/10.1016/j.jtrangeo.2020.102729

20 Yap, W.Y., and Lam, J.S.L. (2013). "80 million-twenty-foot-equivalent-unit container port? Sustainability issues in port and coastal development". Ocean and Coastal Management, Vol. 71, pp. 13-25. https://doi.org/10.1016/j.ocecoaman.2012.10.011

4. Workforce Competitiveness

Table 4: Sub-factors and indicators for the workforce competitiveness dimension*

Indicator	Measurement	Source
Sub-factor: Human capital development		
Investment on healthcare	Current health expenditure per capita (CAGR %, 2016-2021)	WB
Literacy rate	Literacy rate, adult total (% of people ages 15 and above)	WB
Expenditure on education	Government expenditure on education (% of GDP)	WB
Educational level of workforce	Educational attainment, at least completed post-secondary, population 25+, total (%)	WB
Sub-factor: Labor market dynamics		
Labor productivity based on number of workers	Output per worker (GDP constant 2017 international $ at PPP) -- ILO modelled estimates	ILO
Labor productivity based on hours worked	Output per hour worked (GDP constant 2017 international $ at PPP) -- ILO modelled estimates	ILO
Labor force participation rate	Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)	WB
Cost of labor	Labor tax and contributions (% of commercial profits)	WB
Labor rights	Labor Rights Index	WIF

Source: Yap, W.Y., and Ee, K.K.. * WB denotes The World Bank; ILO denotes International Labor Organization[21]; WIF denotes WageIndicator Foundation[22].

The dimension of workforce competitiveness comprises the sub-factors human capital development and labor market dynamics (see **Table 4**). For the purpose of this study, ideal attributes are broadly high level of human capital development and low level of labor productivity. The sub-factor of human capital development uses the indicators of investment in healthcare, literacy rate and expenditure on education. Expenditure on education is particularly important for aiding modernization efforts in the port industry where technological advancement through automation and digitalization are key (Kosiek et al., 2021)[23]. The sub-factor further uses the indicator educational level of workforce which is measured by those who attained post-secondary level of education, which is also a proxy for the capacity of the educational system in the country[24]. Preference will be given to countries that score comparatively better for these indicators as new port investments to raise its capability will require support from an indigenous well-trained pool of human capital.

As for labor market dynamics, the sub-factor considers the aspects of labor productivity from the perspective of output per worker and output per hour worked. The sub-factor also considers the labor force participation rate, cost of labor, and labor rights of the country. The preference will be for countries that exhibit comparatively low levels of labor productivity but have high labor force participation rates. Preference will also be given to countries that have comparatively better labor rights. Data for this dimension can be obtained from The World Bank and International Labor Organization. Data for labor rights index is sourced from WageIndicator Foundation.

> THE SUB-FACTOR OF HUMAN CAPITAL DEVELOPMENT USES THE INDICATORS OF INVESTMENT IN HEALTHCARE, LITERACY RATE AND EXPENDITURE ON EDUCATION.

21 ILO (n.d.). Statistics on labor productivity. Available online at: https://ilostat.ilo.org/topics/labour-productivity/#

22 WageIndicator Foundation (n.d.). Labor Rights Index 2024 – Full Test. Available online at: https://labourrightsindex.org/2024/2024-the-index-in-text-explanation/labour-rights-index-2024-full-text

23 Kosiek, J., Kaizer, A., Salomon, A., and Sacharko, A. (2021). "Analysis of modern port technologies based on literature review". TransNav: International Journal on Marine Navigation and Safety of Sea Transportation, Vol. 15, No. 3, pp. 6670674. https://doi.org/10.12716/1001.15.03.22

24 The World Bank (n.d.). Metadata Glossary. Available online at: https://databank.worldbank.org/metadataglossary/gender-statistics/series/SE.SEC.CUAT.PO.FE.ZS

5. Environmental, Social and Governance

Table 5: Sub-factors and indicators for the environmental, social and governance dimension*

Indicator	Measurement	Source
Sub-factor: Government effectiveness		
Government effectiveness	Government Effectiveness: Estimate	WB
Citizen engagement	Voice and Accountability: Estimate	WB
Regulatory quality	Regulatory Quality: Estimate	WB
Rule of law	Rule of Law: Estimate	WB
Strength of governance systems	Control of Corruption: Estimate	WB
Sub-factor: Environment and sustainability performance		
Renewable energy consumption	Renewable energy consumption (% of total final energy consumption)	WB
GHG emissions	Total greenhouse gas emissions (tons of CO2 equivalent per capita)	WB
Exposure to PM2.5	PM2.5 air pollution, mean annual exposure (micrograms per cubic meter)	WB
Waste recovery	Environmental Protection Index waste recovery rate score 2024	WPR
Recycling	Environmental Protection Index recycling score 2022	WPR
Sub-factor: Social and political environment		
Unemployment level	Unemployment, total (% of total labor force) (modeled ILO estimate)	WB
Level of income inequality	Gini coefficient	WB
Political environment	Political Stability and Absence of Violence/Terrorism: Estimate	WB
Incidence of poverty	Poverty rate (%)	WPR
Fragility	Fragile state index	TheGlobalEconomy.com

Source: Yap, W.Y., and Ee, K.K.. * WB denotes The World Bank; WPR denotes World Population Review[25]. # Data from TheGlobalEconomy.com[26].

The environmental, social and governance dimension comprises the sub-factors of government effectiveness, environment and sustainability performance, and political and social environment (see **Table 5**). Preference will be given to countries which exhibit comparatively better levels of government effectiveness as the presence of these conditions is likely to see improvements in the port sector work better.

The sub-factor of environment and sustainability performance considers indicators that measure renewable energy consumption, greenhouse gas emissions, air pollution caused by PM2.5, waste recovery and recycling. The preference will be for countries that perform comparatively poorly for these indicators, which although may not be reflective for the entire country, may still indicate potential areas for assistance for the port sector. As for political and social environment, the indicators considered are level of unemployment, vulnerability of the country to conflict, level of income inequality, and incidence of poverty. High scores received for these indicators may indicate the country being relatively more susceptible to social and political instability. Data for the indicators in this dimension are obtained mostly from The World Bank and World Population Review. Data for fragile state index is obtained from TheGlobalEconomy.com.

25 World Population Review (2024). Categories. Available online at: https://worldpopulationreview.com/

26 TheGlobalEconomy.com (2024). Fragile state index – Country rankings. Available online at: https://www.theglobaleconomy.com/rankings/fragile_state_index/

6. Strategic Importance

Table 6: Sub-factor and indicators for the strategic importance dimension*

Indicator	Measurement	Source
Sub-factor: Strategic role		
Potential market reach	Gateway of trade (merchandise trade, billion US$)	Derived from WB
Potential economic impact	Economic hinterland (GDP, billion US$)	
Potential social impact	Population hinterland (million people)	
Potential trade impact	Number of Free Trade Agreements	ADB

Source: Source: Yap, W.Y., and Ee, K.K.. * WB denotes The World Bank; ADB denotes Asian Development Bank[27].

The dimension for strategic importance considers the strategic role of the country with respect to its market reach, economic impact, social impact, and trade impact. These impacts account for the wider regional hinterland that can be served by the country. For example, Azerbaijan serves as an important gateway to trade for Central Asia and has corresponding effects on the economy, population and markets of this region. Bangladesh also plays a similar role for the northeast region of India. The same can be said for Pakistan which serves as a gateway for Afghanistan. For the purpose of this study, ideal attributes are those that exhibit comparatively high scores for the indicators in view of the bigger potential impact the port is likely to have for the wider geographical region. The data is derived from The World Bank using the indicators of merchandise trade, nominal GDP and population values. For potential impact on trade, the study considers the number of free trade agreements which the country has, and the data is extracted from ADB.

THE DIMENSION FOR STRATEGIC IMPORTANCE CONSIDERS THE STRATEGIC ROLE OF THE COUNTRY WITH RESPECT TO ITS MARKET REACH, ECONOMIC IMPACT, SOCIAL IMPACT, AND TRADE IMPACT. THESE IMPACTS ACCOUNT FOR THE WIDER REGIONAL HINTERLAND THAT CAN BE SERVED BY THE COUNTRY. FOR EXAMPLE, AZERBAIJAN SERVES AS AN IMPORTANT GATEWAY TO TRADE FOR CENTRAL ASIA AND HAS CORRESPONDING EFFECTS ON THE ECONOMY, POPULATION AND MARKETS OF THIS REGION.

2.3 Port Level Sub-factors

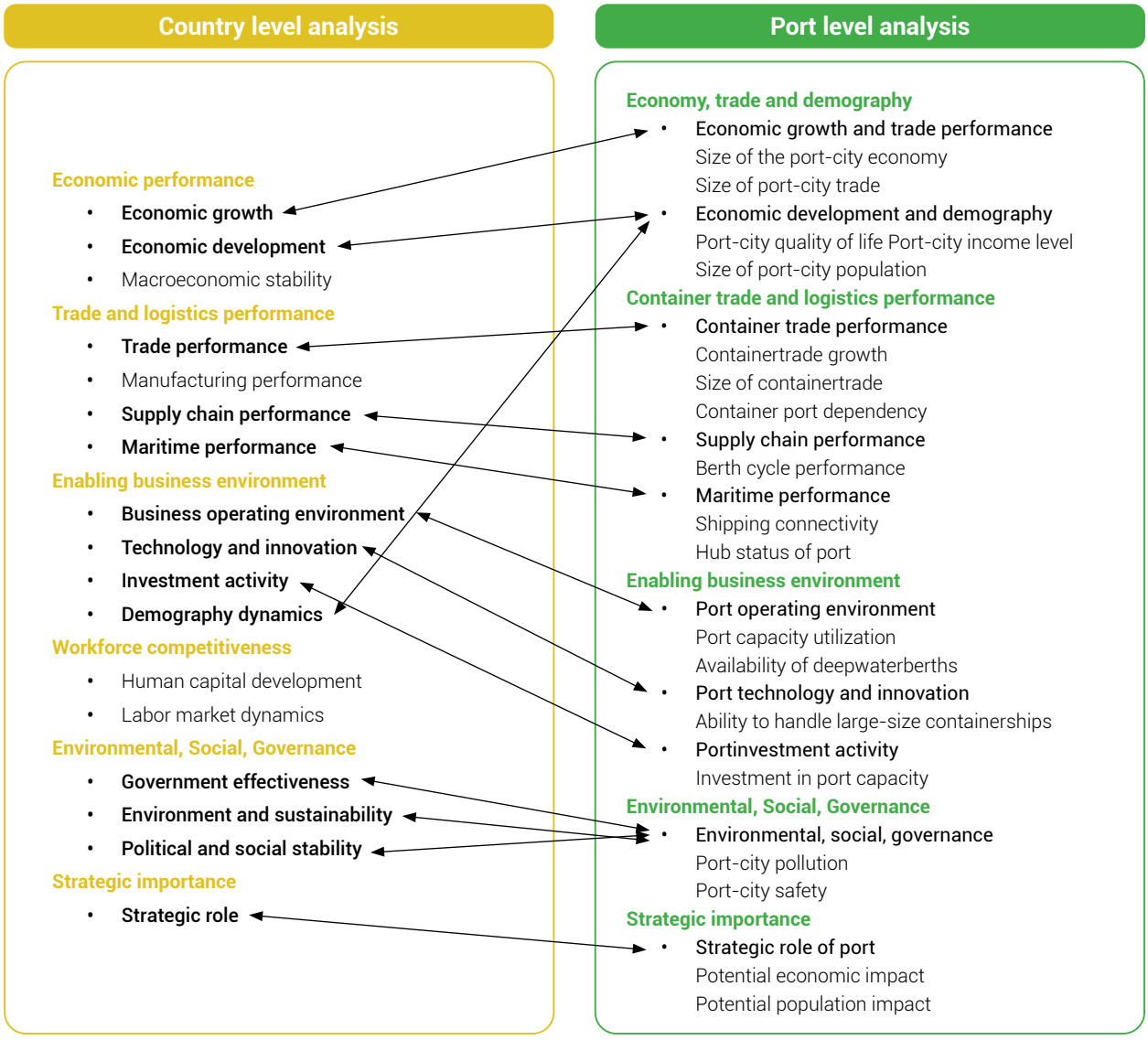
The second step of the study takes place at the port level. At the port level of analysis, the methodology and analytical framework applies a "port filter" to ports of the shortlisted member countries of the OIC. The aim is to identify about four ports to conduct deep dive analysis. The study will make the assessment using five dimensions, 10 sub-factors and 19 indicators. These are economic, trade and demographic performance, container trade and logistics performance, enabling business environment, environmental, social and governance, and strategic

27 Asian Development Bank (n.d.). "Free Trade Agreements". Asia Regional Integration Center. Available online at: https://aric.adb.org/fta-country

importance. For this study, ideal attributes the ports should possess are broadly high level of economic and trade performance but low level of economic development, poor container trade and logistics performance, poor enabling business environment, and high strategic importance among other considerations.

Mapping the country level analysis and port level analysis with an indicative list of dimensions, sub-factors and indicators is presented in **Figure 3**. The figure shows that the five dimensions can be largely captured by data at the port or port-city level. With reference to the dimension of economy, trade and demography, the study considers the sub-factors of economic growth and trade performance and economic development and demography. Indicators for economic growth and trade account for the size of the port-city economy and trade value while those for economic development and demography consider the quality of life, income level, and population size of the port-city. The assessment is conducted using port-cities as reference given that ports are symbiotically related to the cities where they are located. Furthermore, the role of the port-city is increasingly recognized as an important entity in the context of economic growth and development (Cong et al., 2020[28]). Preference will be given to port-cities that score comparatively better for the economic growth and trade performance sub-factor as improvements to the port are likely to generate greater multiplier impact on the economy. However, preference will be given to those that score relatively poorly for the aspect of economic development. Preference will also be given to port-cities that possess large population sizes.

Figure 3: Mapping between country level and port level analysis



Source: Yap, W.Y., and Ee, K.K..

28 Cong, L., Zhang, D., Wang, M., Xu, H., and Li, L. (2020). "The role of ports in the economic development of port cities: Panel evidence from PRC". Transport Policy, Vol. 90, pp. 13-21. https://doi.org/10.1016/j.tranpol.2020.02.003

The dimension of trade and logistics performance at the port level comprises of the sub-factors container trade performance of the port, supply chain performance, and maritime performance. Trade performance is largely based on indicators that measure container throughput of the port and share of national container throughput accounted by the port-city (Ha and Yang, 2017[29]; Parola et al., 2017[30]). Preference will be given to ports that account for a sizeable share of the national container trade but see relatively low levels of growth in container throughput. Supply chain performance of the port is represented by activities that pertain to container terminal operations. The study considers the berth cycle performance which represents container-handling performance and container terminal productivity (Mouhsene et al., 2021[31]; Yap and Ho, 2023[32]). The preference will be for ports that perform comparatively poorly for this aspect. As for maritime performance of ports, the sub-factor will be based on indicators that capture the vessel aspects and hub status of ports (Schøyen et al., 2018[33]; Yap and Loh, 2019[34]). Vessel-related indicator being port liner shipping connectivity while hub status will be measured by transshipment traffic handled by the port. Preference will be given to ports that perform comparatively poorly for shipping connectivity but are significant container hubs.

Turning to the dimension of enabling business environment, the emphasis is on the port as an enabler for businesses in the country and the wider hinterland geographical region which the port may serve. The dimension comprises of the sub-factors business operating environment of the port, investment activity by the port, and technology and innovation of the port. The sub-factor of business operating environment of the port comprises the indicators of port capacity utilization and availability of deepwater berths. These are essential components that capture the operating environment of the port (Kaliszewski et al., 2020[35]). As for investment activity by the port, the sub-factor considers container-handling capacity that has been introduced in recent years. This aspect indicates the readiness of the port with respect to catering for future cargo growth and expansion in port-related traffic. As for the sub-factor of technology and innovation of the port, assessment will be conducted from the perspective of its ability to handle large-size containerships which are increasingly being deployed in container trades. The last indicator serves as a proxy for innovation as handling larger size vessels and accompanying greater cargo volumes require innovations in port technology and operations. The preference will be for ports that perform relatively poorly for the indicators of the three sub-factors.

The environmental, social and governance dimension comprises of the indicators port-city pollution and port-city safety. The two indicators are meant to reflect the effectiveness and efficiency of handling environmental, social and governance issues related to the port-city. Preference will be for ports that score relatively well for safety but comparatively poorly for the pollution indicator. The dimension of strategic importance examines the role of the port in serving as a gateway for container flows and the potential economic and social impacts that can be generated. Given that the analysis is conducted at the port level, the focus of this dimension and sub-factor shall be on the port-city. The role of port-cities is increasingly recognized in being able to significantly influence nature and dynamics of trade flows (Monios et al., 2018[36]). As such, the strategic perspective of container ports should be considered in the evaluation. Preference will be given to ports that exhibit comparatively high scores for the indicators in view of the larger impact from potential improvements the port is likely to have for the region.

Note that the main source of data will be information available from publications and websites of individual ports. The aim is for the analysis to reflect performances that pertain to individual ports. Analysis at the port level did not include the dimension of workforce competitiveness as this aspect will be covered in depth in the deep dive analysis. The analysis at the port level also did not include the sub-factors macroeconomic stability and manufacturing competitiveness as reliable and representative data for these aspects are not available at the port level across the selected countries.

29 Ha, M.H., and Yang, Z. (2017). "Comparative analysis of port performance indicators: independency and interdependency". Transportation Research Part A: Policy and Practice, Vol. 103, pp. 264–278. https://doi.org/10.1016/j. tra.2017.06.013

30 Parola, F., Risitano, M., Ferretti, M., and Panetti, E. (2017). "The drivers of port competitiveness: a critical review". Transport Reviews, Vol. 37, No. 1, pp. 116–138. https://doi.org/10.1080/01441647.2016.1231232

31 Mouhsene, F., Doualoui, K., Mabrouki, C., Alami, E. (2021). "Reducing inconsistency in performance analysis for container terminals". International Journal of Supply and Operations Management, Vol. 8, No. 3, pp. 328-346. https://doi.org.10.22034/IJSOM.2021.3.6

32 Yap, W.Y., and Ho, J. (2023). "Port strategy and performance: empirical evidence from major container ports and implications for role of data analytics". Maritime Policy and Management, Vol. 50, No. 5., pp. 608-628. https://doi.org/10.1080/03088839.2021.2017040

33 Schøyen, H., Bjorbæk, C.T., Steger-Jensen, K., Bouhmala, N., Burki, U., Jensen, T.E., and Berg, Ø. (2018). "Measuring the contribution of logistics service delivery performance outcomes and deep-sea container liner connectivity on port efficiency". Research in Transportation Business and Management, Vol. 28, pp. 66-76. https://doi.org/10.1016/j.rtbm.2018.03.002

34 Yap, W.Y., and Loh, H.S. (2019). "Next generation mega container ports: implications of traffic composition on sea space demand". Maritime Policy and Management, Vol. 50, No. 5., pp. 608-628. https://doi.org/10.1080/03088839.2019.1620359

35 Kaliszewski, A., Kozłowski, A., Dąbrowski, J., and Klimek, H. (2020). "Key factors of container port competitiveness: A global shipping lines perspective". Marine Policy, Vol. 117, pp. 103896. https://doi.org/10.1016/j.marpol.2020.103896

36 Monios, J., Bergqvist, R., and Waxenius, J. (2018). "Port-centric cities: the role of freight distribution in defining the port-city relationship". Journal of Transport Geography, Vol. 66, pp. 53-64. https://doi.org/10.1016/j.jtrangeo.2017.11.012

2.3 Port Deep Dive

As a follow-up to this study, the next stage will involve conducting deep dive analysis for priority ports that have been identified using the "country filter" and "port filter". With reference to "Step 3" in **Figure 1**, the analysis shall focus on capacity assessment which considers the five dimensions of physical capacity, shipping connectivity, human resources, organizational processes and enabling environment. A preliminary list of 38 sub-factors and 65 indicators pertaining to each dimension is shown in **Table 7**. The list is drawn up based on the works of Ha and Yang (2017[37]), Parola et al. (2017[38]), Kaliszewski et al. (2020[39]), Yap (2020[40]) and Yap and Ho (2023[41]).

The dimension of physical infrastructure comprises 6 sub-factors and 12 indicators. The sub-factors include container-handling capacity, vessel-handling capacity, port equipment and infrastructure, supporting services for containers, maritime access, and hinterland access. These aspects are considered vital components of the physical infrastructure of the port. The second dimension is concerned with human resources for the port. The dimension also comprises 6 sub-factors and 12 indicators. The sub-factors cover the areas of port employment, remuneration to labor, labor productivity, quality of the labor force, employee satisfaction, and rights of labor. These areas highlight the multifaceted nature of human resource environment in the port industry.

37 Ha, M.H., and Yang, Z. (2017). "Comparative analysis of port performance indicators: independency and interdependency". Transportation Research Part A: Policy and Practice, Vol. 103, pp. 264–278. https://doi.org/10.1016/j. tra.2017.06.013

38 Parola, F., Risitano, M., Ferretti, M., and Panetti, E. (2017). "The drivers of port competitiveness: a critical review". Transport Reviews, Vol. 37, No. 1, pp. 116–138. https://doi.org/10.1080/01441647.2016.1231232

39 Kaliszewski, A., Kozłowski, A., Dąbrowski, J., and Klimek, H. (2020). "Key factors of container port competitiveness: A global shipping lines perspective". Marine Policy, Vol. 117, pp. 103896. https://doi.org/10.1016/j.marpol.2020.103896

40 Yap, W.Y. (2020). Business and Economics of Port Management: An Insider's Perspective, Routledge, London, 508 pages. https://doi.org/10.4324/9780429439926

41 Yap, W.Y., and Ho, J. (2023). "Port strategy and performance: empirical evidence from major container ports and implications for role of data analytics". Maritime Policy and Management, Vol. 50, No. 5., pp. 608-628. https://doi.org/10.1080/03088839.2021.2017040

Table 7: Dimensions, sub-factors and indicators for the port deep dive analysis

Sub-factor	Indicator
Dimension: Physical infrastructure	
Container-handling capacity	Design container-handling capacity
	Planned investment in port capacity
Vessel-handling capacity	Container berth length
	Maximum draft alongside
Port equipment and infrastructure	Number of container-handling ship-to-shore cranes
	Area of container terminal
	Equipment for container yard handling
Supporting services for containers	Container repair facilities
Maritime access	Time for vessels to travel from anchorage to berth
	Port deepening projects
Hinterland access	Quality of hinterland transport infrastructure
	Land transport improvement projects
Dimension: Human resources	
Port employment	Number of port employees
	Port employees as percentage of city's employment
	Port employees who are permanent staff
	Number of workers doing container operations
	Number of workers doing container operations who are permanent staff
Remuneration to labor	Annual salary, wage and compensation to port employees
Labor productivity	TEUs handled per port employee
Quality of labor force	Educational level of port workforce
	Training hours per port employee
Employee satisfaction	Employee absenteeism rate
	Employee turnover rate
Labor rights	Percentage of port employees who are unionized
Dimension: Organizational processes	
Container throughput performance	Container throughput (TEUs, number, tons, value)
Container terminal productivity	Container-handling capacity utilization
	Level of containerization
Container terminal efficiency	Container dwell time (days)
Berth cycle efficiency	Turnaround time for containership
Congestion level	Percentage of vessels berthed on arrival
	Average vessel time in anchorage
Loading/discharge cycle efficiency	Container loading and unloading performance

Sub-factor	Indicator
Yard cycle efficiency	Throughput per m2 of container terminal space
Gate cycle efficiency	Waiting time for trucks or other modes of hinterland transportation
Terminal operating system	Terminal operating system in use
Port cargo-handling system	Container-handling system in use
Port tariff	Port tariff for cargo
	Port tariff for vessels
	Port tariff for hinterland transportation (truck/train)
	Total port charges faced by port users
Safety violations	Number of safety violations
Security violations	Number of security violations
Environmental, Social and Governance activity	Environment and sustainability projects
	Renewable energy consumption
	Greenhouse gas emissions
	PM2.5 air pollution
	Water productivity
Community engagement	Community engagement projects
Dimension: Enabling environment	
Efficiency of customs operations	Efficiency of customs clearance process
	Distribution of green, yellow and red channels
Technology, innovation and trade facilitation	Availability of port ICT systems and connected to National Single Window system
Reliability of utility supply	Reliability of power supply (% of downtime)
	Reliability of internet network (% of downtime)
	Reliability of water supply (% of downtime)
Quality of maritime services	Maritime services available (e.g., bunkering)
Quality of logistics services	Quality of logistics service providers
Dimension: Maritime connectivity	
Port connectivity	Number of ports connected to
Shipping connectivity	Number of shipping lines calling at the port
	Number of shipping services calling at the port
Vessel traffic performance	Number of containerships calling at the port
	Average size of containerships calling at the port
Hub status	Transshipment incidence and volume
Ability to handle large-size vessels	Largest size containership calling at the port
Port competition and competitiveness	Ports that are viewed as competitors
	Ports that are viewed as ideal benchmarks

Source: Yap, W.Y., and Ee, K.K..

The third dimension is concerned with the aspect of organizational processes. These are aspects considered to be internal to the port. There are 15 sub-factors and 24 indicators proposed. They cover the areas of container throughput performance, container terminal productivity and efficiency, berth, ship-to-shore crane, yard and gate operations, port congestion, information communication technology systems employed, port tariff, incidents of violation to port safety and security, environmental, social and governance activities, and community engagement. The focus of this dimension will be on key processes involved with the handling of cargo through the port, as well as its environmental footprint.

With regards to the dimension of enabling environment, it is proposed to use 8 indicators that are organized into the 5 sub-factors of customs operations, technology, innovation and trade facilitation, reliability of utility supply, quality of maritime services, and quality of logistics services. The dimension will consider aspects that are external to the port. For the fifth dimension which is concerned with maritime connectivity, it is proposed to include 9 indicators that are organized into 5 sub-factors. These are port connectivity, shipping connectivity, vessel traffic performance, hub status of the port, ability to handle large containerships, and the issue of port competition and competitiveness.

While the list attempts to be comprehensive, primary data collection is required which will involve direct engagements with the selected four ports. They will be reviewed, revised and refined, depending on the willingness of the port in sharing such data. The survey and interview exercise will also identify key challenges and concerns faced by the ports with respect to the five dimensions and priority areas for improvements. The engagements will also point out the types of assistance which the ports are looking to receive with a view to improving their performance in those areas.

In the next step of this analytical study, it is proposed to select two of the ports to develop brief profiles which identify specific areas for capacity development and knowledge exchange with leading ports. The leading ports in the OIC will be selected with reference to the bilateral container shipping connectivity profile of the shortlisted two ports.

As the assessment enters the deep-dive stage, ESS will be fully integrated into the initiative, and at a strategic level through the development of a Strategic Environmental and Social Assessment (SESA) for all the beneficiary countries. The SESA will be driven by strategic planning (options analysis, cost-benefit analysis, strategic site selection, and initial design). While conducting deep dive analysis for priority ports, the following ESS instruments will be considered:

- Environmental and Social Impact Assessment (ESIA)
- Environmental and Social Management Plan (ESMP)
- Stakeholder Engagement Plan (SEP)
- Resettlement Action Plan (RAP)
- Hazardous Waste Management Plan (WMP)
- Dredging Management Plan (DMP); and
- Biodiversity Management and Action Plan (BAP).

03

Country Level Analysis

3.1 Objective

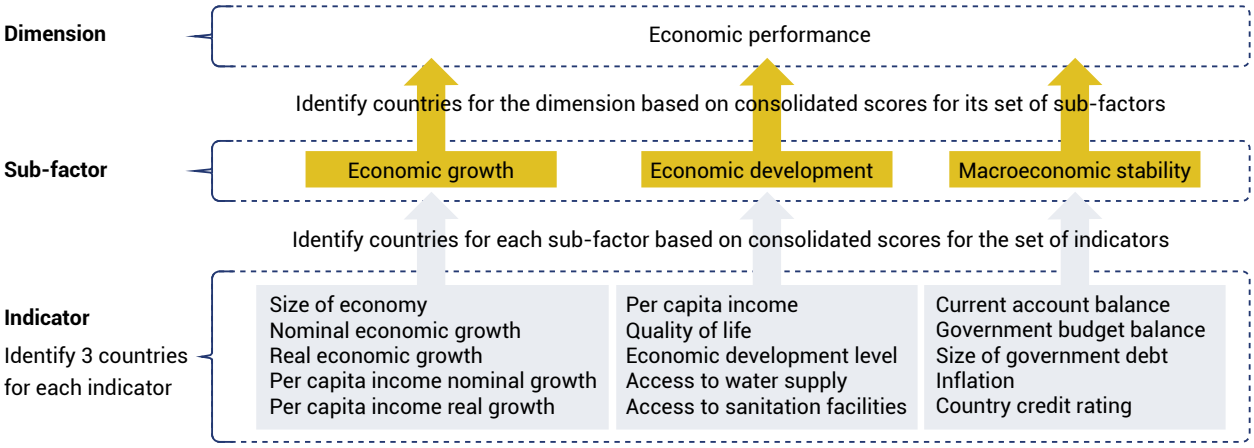
The study applied a "country filter" as the first step of the analysis with the objective of shortlisting five countries where more detailed investigations at the port level can be conducted (see Figure 2). The country filter considers six dimensions, 16 sub-factors and 83 indicators. As mentioned above, the dimensions take reference to the methodology used by the International Institute for Management Development (IMD) and the World Economic Forum (WEF) in their regular appraisal of various economies and countries across the world.

3.2 Note on the Approach to Country Selection

Of the fifteen OIC countries selected, the country level filter considers the nine countries of **Azerbaijan, Bangladesh, Indonesia, Iran, Kazakhstan, Maldives, Pakistan, Türkiye and Turkmenistan**, as these have maritime borders. The land-locked countries of Afghanistan, Kyrgyzstan, Tajikistan and Uzbekistan were not included as they neither possess maritime borders nor seaports. Given the developmental focus of the study and key objective which is to identify potential candidates in countries where knowledge sharing and technical cooperation can be used to improve the capacity and performance of their ports, the country filter analysis did not include Malaysia and Brunei Darussalam. The reason for not including Malaysia is that their main container ports of Port Klang and Tanjung Pelepas are already ranked among the best performing container ports in the world. The reason for not including Brunei Darussalam is that the country has already reached high-income country status as classified by the United Nations, whereas the other countries in this study are classified as low- or middle-income countries[42]. The dimensions applied at the country level are economic performance, trade and logistics performance, enabling business environment, workforce competitiveness, environmental, social and governance aspects, and strategic importance. Selection from the list of countries is illustrated in Figure 4 using the example for the dimension of economic performance. The filtering process begins at the level of indicators. The filtering process will identify high and low performing countries for each indicator, depending on the pre-set criteria mentioned in the methodology. The choice of three countries is based on the total sample size of nine countries put through the country filtering process. These selected countries for each indicator will be given a score of "1". The scores will be consolidated for each sub-factor to identify the top-scoring countries. The list of countries will depend on the number of countries which received identical scores. The aim is to differentiate those countries with higher scores from the others that received lower scores.

As the next step, these countries which received higher scores will be given a score of "1" for each sub-factor. The results at the sub-factor level will also be consolidated at the dimension level with the top-scoring countries identified for each dimension. Equal weightage is given to each indicator within a sub-factor. Hence, sub-factor which has five indicators will see them assigned a weightage of 20% each. Equal weightage is also assigned to each sub-factor within a dimension. Specifically, a dimension which has four sub-factors will see them assigned a weightage of 25% each. Results will be consolidated for the six dimensions to identify the five top-scoring countries where port-level filters will be applied. The countries will be ranked in the order of scores obtained for dimensions, followed by sub-factors, and lastly by indicators.

Figure 4: Approach to country selection for each dimension



Source: Yap, W.Y., and Ee, K.K.

42 United Nations (2014). "Country classification", United Nations. Available online at: https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf

The scoring approach in this study uses a binary system where a score of "1" indicates that a country or port performs relatively strongly (or meets the defined criteria) for a given indicator or sub-factor, while a score of "0" indicates relatively weaker performance. Rather than measuring absolute performance, the system highlights comparative positioning across countries. These binary scores are then aggregated progressively, from indicators to sub-factors, and from sub-factors to dimensions, to identify those countries and ports that consistently appear as higher-priority cases. Ultimately, a higher total score does not necessarily mean better performance overall; instead, it signals a stronger case for prioritization in terms of potential impact of interventions, development needs, and opportunities for capacity enhancement.

It is important to note that indicators highlighted in red (indicating relatively weaker performance) may still contribute to a score of "1" in certain cases. This is because the scoring framework prioritizes countries where gaps indicate a higher need and potential for impactful interventions. In such cases, weaker performance signals areas where capacity development in the port sector can generate significant improvements, and is therefore considered an important criterion for prioritization.

3.3 Economic Performance

There are six dimensions considered for the country level analysis. The first dimension pertains to economic performance and comprises the three sub-factors of economic growth, economic development, and macroeconomic stability, with a total of 15 indicators. We begin with the sub-factor of economic growth. With reference to Table 1, the countries Azerbaijan, Bangladesh, Kazakhstan, Pakistan, Türkiye and Turkmenistan had more indicators highlighted compared to the other countries. As such, these six countries received a score of "1" (shown by "✓") for the sub-factor. The sub-factor of economic development showed that the countries of Bangladesh, Indonesia, Iran and Pakistan had more indicators highlighted compared to the others. These four countries also received a score of "1" for the sub-factor. The same method is applied to the results for the sub-factor of macroeconomic stability where the countries of Azerbaijan, Bangladesh, Indonesia, Kazakhstan and Turkmenistan had more of the indicators highlighted. These five countries also received a score of "1" for the sub-factor.

Table 8: Detailed results for the dimension of economic performance

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Economic growth		✓	✓			✓		✓	✓	✓
	Score	2	2	1	1	2	1	2	2	2
Size of economy	GDP (nominal, bln US$)	72	437	1371	402	261	7	338	1108	60
Nominal economic growth	GDP growth (nominal, CAGR %, 2018-2023)	9.0	6.4	5.6	4.0	7.8	4.1	-1.0	7.3	8.0
Real economic growth	Real GDP growth rate (CAGR %, 2018-2023)	1.9	6.2	3.4	2.7	2.9	3.3	2.5	4.8	6.2
Per capita income nominal growth	GDP per capita (nominal US$ CAGR %, 2018-2023)	8.6	5.2	4.8	3.2	6.0	2.8	-2.8	6.3	6.5
Per capita income real growth	GDP per capita (PPP, constant 2021 international $, CAGR %, 2018-2023)	1.5	5.1	2.6	1.9	1.1	2.0	0.6	3.8	-
Economic development			✓	✓	✓			✓		
	Score	0	5	4	2	0	0	4	0	0
Per capita income	GNI per capita, Atlas method (current US$ '000)	6.7	2.9	4.9	4.7	10.9	11.0	1.5	11.7	7.1
Quality of life	Quality of life index	110	69	95	78	98	-	104	124	-
Economic development level	Human Development Index	0.76	0.67	0.71	0.78	0.80	0.76	0.54	0.86	0.74
Access to water supply	People using safely managed drinking water services (% of population)	71.6	59.1	30.3	94.2	89.3	-	50.6	-	94.9

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Access to sanitation facilities	People using at least basic sanitation services (% of population)	96.1	59.3	88.2	90.4	97.9	99.7	70.5	99.2	99.8
Macroeconomic stability		✓	✓	✓		✓				✓
	Score	4	3	4	2	3	1	0	1	3
Current account balance	Current account balance (% of GDP)^	11.5	1.0	-0.1	2.8	-3.3	-21	-0.1	-4.1	7.0
Government budget balance	Government budget balance (% of GDP)*	6.0	-4.6	-1.6	-2.8	-1.5	-11	-7.7	-5.3	2.5
Size of government debt	General government gross debt (% of GDP)**	17.3	39.3	39.6	36.9	22.8	120	77.3	29.3	5.8
Inflation	Consumer price inflation (%)	13.9	9.0	3.7	40.7	14.6	2.6	29.2	53.9	11.2
Country credit rating	Fitch, S&P or Moody's country credit rating#	BBB-	B+	BBB	B+	BBB	CC	CCC+	BB-	B+

Source: Consultants, using data including from The World Bank[43] and IMF[44]. ^ Positive; * Above -3%; ** Below 60%; # Investment grade; cells shaded in yellow indicate relatively better performing countries; cells shaded in pink indicate relatively low performing countries. ✓ indicates the country receiving a score of "1" for the sub-factor.

Results for the three sub-factors are consolidated by country and ranked in the order of sub-factor and indicator (see Table 2). Bangladesh which was identified for all the three sub-factors received a score of "3". The countries of Indonesia, Azerbaijan, Pakistan, Kazakhstan and Turkmenistan which had two of the three sub-factors identified were given a score of "2". These six countries which have comparatively more sub-factors highlighted than the other three countries consequently received a score of "1" for the economic performance dimension.

Table 9: Country ranking by tabulated scores for the economic performance dimension*

Rank	Country	Number of sub-factors highlighted	Sub-factor			Score for indicators
			Economic growth	Economic development	Macroeconomic stability	
1	**Bangladesh**	3	**2**	**5**	**3**	10
2	**Indonesia**	2	1	**4**	**4**	9
3	**Azerbaijan**	2	**2**	0	**4**	6
3	**Pakistan**	2	**2**	**4**	0	6
5	**Kazakhstan**	2	**2**	0	**3**	5
5	**Turkmenistan**	2	**2**	0	**3**	5
7	Iran	1	1	**2**	2	5
8	**Türkiye**	1	**2**	0	1	3
9	Maldives	1	1	0	1	2

Source: Consultants. * For each of the three sub-factors, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

43 Indicators from The World Bank are extracted from the World Development Indicators DataBank. Available online at: https://databank.worldbank.org/source/world-development-indicators

44 Indicators from the IMF are extracted from the World Economic Outlook Database. Available online at: https://www.imf.org/en/Publications/WEO/weo-database/2024/October

3.4 Trade and Logistics

The second dimension pertains to trade and logistics performance and comprises the four sub-factors of trade performance, manufacturing performance, supply chain performance and maritime performance. The four sub-factors comprise a total of 21 indicators. With reference to Table 3, the countries Azerbaijan, Indonesia, Kazakhstan, Maldives and Türkiye had more indicators highlighted compared to the other countries for the sub-factor of trade performance. As such, these five countries received a score of "1" for the sub-factor. The sub-factor of manufacturing performance showed that the countries of Bangladesh, Indonesia, Iran and Türkiye had more indicators highlighted compared to the others. As such, these four countries also received a score of "1" for the sub-factor. The same method is applied to the results for the sub-factor of supply chain performance where the countries of Indonesia, Kazakhstan, Maldives and Türkiye had more of the indicators highlighted. These four countries also received a score of "1" for the sub-factor. The remaining sub-factor of maritime performance showed that Indonesia, Iran, Pakistan and Türkiye had more of the indicators highlighted. These four countries also received a score of "1" for the sub-factor.

Table 10: Results for the dimension of trade and logistics performance

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Trade performance		✓		✓		✓	✓		✓	
		3	0	3	1	2	2	0	3	1
Merchandise trade growth	Merchandise trade growth (CAGR %, 2018-2023)	16.8	10.0	10.2	1.9	11.8	7.9	5.1	8.9	6.8
Size of merchandise trade	Merchandise trade (bln US$)	51	123	481	156	139	4	79	618	13
Trade dependency	Merchandise trade (% of GDP)	70.7	28.0	35.1	39.0	53.2	59.4	23.3	55.7	22.4
Trade competitiveness	Merchandise trade balance (% of GDP)	-6.5	-1.1	-0.3	-1.2	-1.8	-71	-1.4	-0.4	-7.9
Trade openness	Tariff rate, applied, simple mean, all products (%)	9.3	12.6	6.0	15.2	4.5	10.4	11.7	4.4	-
Manufacturing performance			✓	✓	✓				✓	
		0	5	2	2	1	1	1	3	0
Dependence on manufacturing sector	Manufacturing, value added (% of GDP)	5.8	22.3	18.7	20.0	12.3	2.0	13.6	19.4	-
Size of manufacturing sector	Manufacturing, value added (bln $)	4.2	97.7	256	80.3	32.1	0.1	45.9	215	-
Dependence on manufacturing trade	Manufacturing exports and imports (% of GDP)	18.0	29.6	20.7	15.6	25.1	28.3	12.2	35.7	-
Manufacturing trade performance	Value of manufactures trade growth (CAGR %, 2018-2023)	9.5	10.2	9.6	4.1	14.8	1.1	-3.4	7.4	-
Manufacturing competitiveness	Manufactures trade balance (% of GDP)	-14	2.2	-1.8	-0.6	-14	-28	-0.3	-1.9	-

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Supply chain performance (1=low to 5=high)				✓		✓	✓		✓	
		2	1	6	0	3	3	0	6	0
Customs clearance	Efficiency of customs clearance process	2.6	2.3	2.8	2.2	2.6	2.4	2.1	3.0	2.4
Trade and transport-related infrastructure	Quality of trade and transport-related infrastructure	2.7	2.3	2.9	2.4	2.5	2.7	2.2	3.4	2.2
Ease of organizing shipments at competitive prices	Ease of arranging competitively priced shipments	2.6	2.6	3.0	2.4	2.6	2.7	2.6	3.4	2.3
Quality of logistics services	Competence and quality of logistics services	2.1	2.7	2.9	2.1	2.7	2.3	2.6	3.5	2.3
Track and trace capability	Ability to track and trace consignments	2.1	2.4	3.0	2.4	2.8	2.6	2.3	3.5	2.6
Reliability and timeliness	Frequency with which shipments reach consignee within scheduled or expected time	2.6	3.0	3.3	2.7	2.9	3.3	2.7	3.6	2.7
Maritime performance				✓	✓			✓	✓	
		1	0	4	2	1	0	3	3	0
Size of container trade	Container port throughput (million TEUs)	0.04	3.2	12.4	1.6	0.04	0.11	3.4	12.4	0.02
Container throughput growth	Container port throughput (CAGR %, 2018-2023)	14.1	4.4	0.5	-8.8	9.1	5.2	0.6	4.3	21.0
Shipping connectivity	Liner shipping connectivity index	1.9	14.7	32.7	31.1	1.5	7.3	34.1	61.5	1.7
Container ship fleet	Containerships ('000 DWT)	0.0	151	2076	1620	0.02	0.00	0.00	930	0.00
Hub status of ports	Container transshipment incidence (%)	0.0	0.0	12.0	0.0	0.0	0.0	2.0	10.0	0.0

Source: Consultants, using data including from The World Bank[45] and IMF[46]. Cells shaded in yellow indicate relatively better performing countries; cells shaded in pink indicate relatively low performing countries.

45 Indicators from The World Bank are extracted from the World Development Indicators DataBank. Available online at: https://databank.worldbank.org/source/world-development-indicators

46 Indicators from the IMF are extracted from the World Economic Outlook Database. Available online at: https://www.imf.org/en/Publications/WEO/weo-database/2024/October

Results for the four sub-factors in this dimension are consolidated by country and ranked in the order of sub-factor and indicator (see Table 4). Indonesia and Türkiye which are identified for all the four sub-factors received a score of "4". The countries of Kazakhstan, Maldives and Iran which had two of the four sub-factors identified were given a score of "2". These five countries which have comparatively more sub-factors highlighted than the other four countries consequently received a score of "1" for the trade and logistics performance dimension.

Table 11: Country ranking by tabulated scores for the trade and logistics dimension*

Rank	Country	Number of sub-factors highlighted	Sub-factor				Score for indicators
			Trade performance	Manufacturing performance	Supply chain performance	Maritime performance	
1	Indonesia	4	**3**	**2**	**6**	**4**	15
1	Türkiye	4	**3**	**3**	**6**	**3**	15
3	Kazakhstan	2	**2**	1	**3**	1	7
4	Maldives	2	**2**	1	**3**	0	6
5	Iran	2	1	**2**	0	**2**	5
6	Azerbaijan	1	**3**	0	2	1	6
6	Bangladesh	1	0	**5**	1	0	6
8	Pakistan	1	0	1	0	**3**	4
9	Turkmenistan	0	1	0	0	0	2

Source: Consultants. * For each of the four sub-factors, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

3.5 Enabling Business Environment

The third dimension concerns the performance for an enabling business environment and comprises the four sub-factors of business operating environment, investment activity, technology and innovation and demography dynamics. The four sub-factors comprise a total of 19 indicators. With reference to Table 5, the countries Azerbaijan, Indonesia, Iran, Kazakhstan, Maldives, Pakistan and Türkiye had more indicators highlighted compared to the other countries for the sub-factor of business operating environment. As such, these seven countries received a score of "1" for the sub-factor. The sub-factor of investment activity showed that the countries of Bangladesh, Indonesia, Iran and Turkmenistan had more indicators highlighted compared to the others. As such, these four countries also received a score of "1" for the sub-factor. By the same method, the results for the sub-factor of technology and innovation showed the countries of Indonesia, Iran, Kazakhstan and Türkiye to have more indicators highlighted. These four countries also received a score of "1" for the sub-factor. The remaining sub-factor of demography dynamics showed that Bangladesh, Indonesia, Pakistan and Türkiye had more of the indicators highlighted. These four countries also received a score of "1" for the sub-factor.

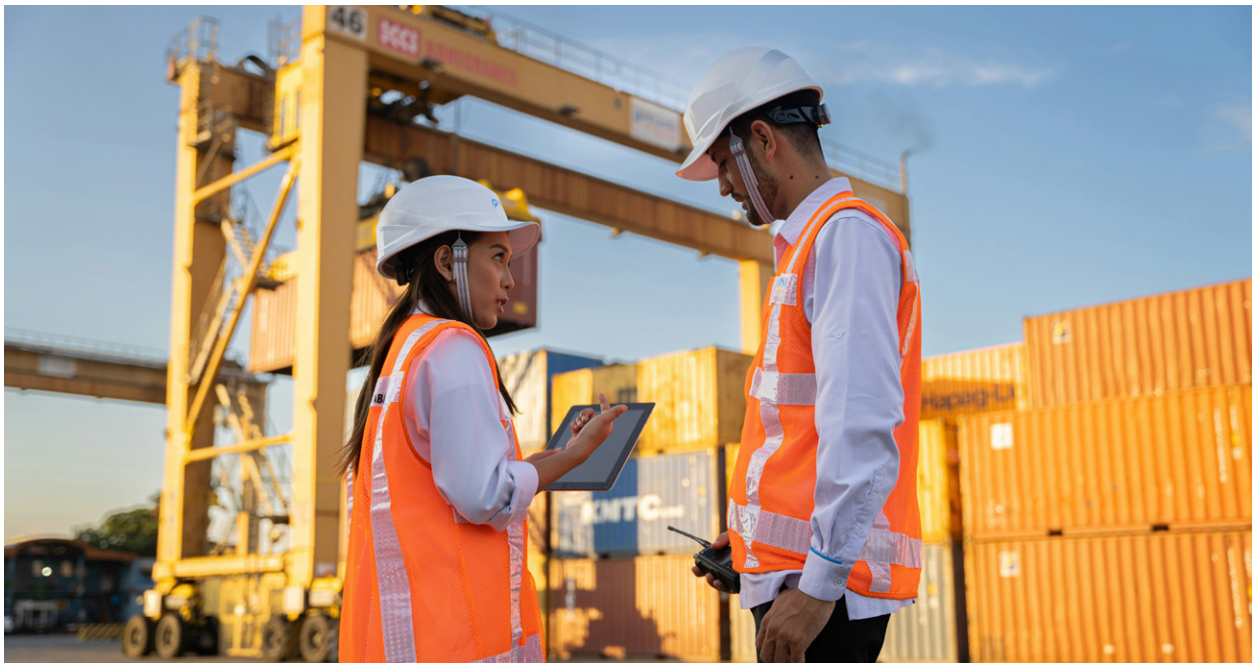


Table 12: Results for the dimension of enabling business environment

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Business operating environment		✓		✓	✓	✓	✓	✓	✓	
		4	0	1	1	5	2	1	1	0
Company tax	Profit tax (% of commercial profits)	12.7	31.1	18.1	18.4	16.4	13.1	17.8	20.0	-
Bribery and corruption incidence	Bribery incidence (% of firms experiencing at least one bribe payment request)	12.1	23.0	20.3	-	11.6	-	15.9	1.4	-
Access to lending	Domestic credit to private sector (% of GDP)	23.2	37.6	36.0	60.3	26.1	35.9	12.0	50.3	-
Electricity supply reliability	Firms experiencing electrical outages (% of firms)	27.6	71.4	22.5	-	17.1	-	50.7	28.5	-
Mobile network infrastructure	Mobile cellular subscriptions (per 100 people)	105	105	115	165	130	137	82	106	99
Investment activity			✓	✓	✓					✓
		1	3	3	4	0	1	1	0	2
Attraction of FDI	FDI, net inflows (CAGR %, 2018-2023)	-29	-11	3.2	-9.7	72	5.8	0.9	-3.1	-3.0
Dependence on FDI	Foreign direct investment, net inflows (% of GDP)	0.3	0.3	1.6	0.4	2.0	11.5	0.5	1.0	2.3
Long-term investment footprint	Foreign direct investment stock per capita ($)	3238	119	1029	707	7899	14355	119	1835	6586
Dependence on investment	Total investment (% of GDP)	18.3	30.9	30.5	40.6	29.6	20.0	14.1	30.0	-
Foreign aid received	Net official development assistance and official aid received per capita (current US$)	4.7	30.3	2.4	3.3	3.8	227	7.8	9.4	2.3
Technology and innovation				✓	✓	✓			✓	
		1	0	2	5	2	0	0	5	0
R&D spending	Expenditure on R&D (bln US$)	0.11	-	3.85	3.17	0.31	-	0.56	15.6	-
Commitment to innovation	Research and development expenditure (% of GDP)	0.15	-	0.28	0.79	0.12	-	0.16	1.40	-
Research talent pool	Researchers in R&D (per mln people)	1691	-	400	1597	682	-	415	2000	-
Innovative capacity (basic research)	Scientific and technical journal articles per 100,000 population	9.8	2.8	11.7	64.8	14.9	4.5	7.1	50.0	0.1
Innovative capacity (applied research)	Patent applications per 100,000 population	1.3	0.3	3.2	12.1	4.5	-	0.4	9.9	-

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Demography dynamics			✓	✓				✓	✓	
		0	3	2	1	0	0	3	2	1
Urban population size	Urban population (mln people)	5.8	70.0	163	68.9	11.6	0.2	91.5	66.1	3.5
Urban population growth	Urban population (CAGR %, 2018-2023)	1.0	3.1	1.9	1.4	2.0	2.3	2.6	1.6	2.4
Urbanization level	Urban population (% of total population)	57.6	40.5	58.6	77.3	58.2	42.0	38.0	77.5	54.0
Net migration rate	Net migration (annual average %, 2018-2023)	0.0	-0.2	-0.0	-0.1	-0.1	0.1	-0.3	-0.3	-0.1

Source: Consultants, using data including from The World Bank[47]. Cells shaded in yellow indicate relatively better performing countries; cells shaded in pink indicate relatively low performing countries.

Results for the four sub-factors in this dimension are consolidated by country and ranked in the order of sub-factor and indicator (see Table 6). Indonesia which has been identified for all the four sub-factors received a score of "4". Iran and Türkiye which had three of the sub-factors identified received a score of "3". The countries of Kazakhstan, Bangladesh and Pakistan which had two of the four sub-factors identified were given a score of "2". These six countries which have comparatively more sub-factors highlighted than the other three countries consequently received a score of "1" for the dimension of enabling business environment.

Table 13: Country ranking by tabulated scores for the enabling business environment dimension*

Rank	Country	Number of sub-factors highlighted	Sub-factor				Score for indicators
			Business operating environment	Investment activity	Technology and innovation	Demography dynamics	
1	Indonesia	4	**1**	**3**	**2**	**2**	8
2	Iran	3	**1**	**4**	**5**	1	11
3	Türkiye	3	**1**	0	**5**	**2**	8
4	Kazakhstan	2	**5**	0	**2**	0	7
5	Bangladesh	2	0	**3**	0	**3**	6
6	Pakistan	2	**1**	1	0	**3**	5
7	Azerbaijan	1	**4**	1	1	0	6
8	Maldives	1	**2**	1	0	0	3
8	Turkmenistan	1	0	**2**	0	1	3

Source: Consultants. * For each of the four sub-factors, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

47 Indicators from The World Bank are extracted from the World Development Indicators DataBank. Available online at: https://databank.worldbank.org/source/world-development-indicators

3.6 Workforce Competitiveness

The fourth dimension pertains to workforce competitiveness and comprises the two sub-factors of human capital development and labor market dynamics. The two sub-factors comprise a total of 9 indicators. With reference to Table 7, the countries Azerbaijan, Indonesia, Kazakhstan, Maldives and Turkmenistan had more indicators highlighted compared to the other countries for the sub-factor of human capital development. As such, these five countries received a score of "1" for the sub-factor. The sub-factor of labor market dynamics showed that the countries of Azerbaijan, Bangladesh, Indonesia, Kazakhstan and Pakistan had more indicators highlighted compared to the others. As such, these five countries also received a score of "1" for the sub-factor.

Table 14: Results for the dimension of workforce competitiveness

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Human capital development		✓		✓		✓	✓			✓
		2	1	2	1	3	2	0	1	3
Investment on healthcare	Current health expenditure per capita (CAGR %, 2016-2021)	0.8	8.6	6.5	-2.5	1.5	0.1	1.7	-2.4	4.4
Literacy rate*	Literacy rate, adult total (% of people ages 15 and above)	99.8	76.4	96.0	89.0	99.8	97.9	58.0	96.7	99.7
Expenditure on education	Government expenditure on education, total (% of GDP)	2.9	2.1	2.4	2.7	4.2	4.6	1.7	2.6	3.8
Educational level of workforce	Educational attainment, at least completed post-secondary, population 25+, total (%) (cumulative)	32.5	17.8	12.1	44.9	79.0	25.6	8.6	20.9	-
Labor market dynamics		✓	✓	✓		✓		✓		
		2	3	3	0	3	1	2	1	0
Labor productivity based on number of workers	Output per worker (GDP constant 2017 international $000 at PPP) -- ILO modelled estimates	29.5	15.8	26.3	53.0	59.4	48.3	16.6	91.9	46.8
Labor productivity based on hours worked	Output per hour worked (GDP constant 2017 international $ at PPP) -- ILO modelled estimates	16.5	6.6	13.5	23.1	30.1	20.5	6.9	40.4	22.1
Labor force participation rate	Labor force participation rate, total (% of total population ages 15+) (modeled ILO estimate)	70.2	58.2	67.6	42.6	68.5	63.8	52.7	53.4	48.1
Cost of labor	Labor tax and contributions (% of commercial profits)	25.4	0.0	11.6	25.9	10.1	7.9	15.0	19.7	-
Labor rights	Labor Rights Index	90.5	56.0	62.5	67.0	86.5	-	53.5	80.0	-

Source: Consultants, using data including from The World Bank[48]. * Above 95%. Cells shaded in yellow indicate relatively better performing countries; cells shaded in pink indicate relatively low performing countries.

48 Indicators from The World Bank are extracted from the World Development Indicators DataBank. Available online at: https://databank.worldbank.org/source/world-development-indicators

Results for the two sub-factors in this dimension are consolidated by country and ranked in the order of sub-factor and indicator (see Table 8). Kazakhstan, Indonesia and Azerbaijan which has been identified for both sub-factors received a score of "2". Given that there are only three countries which are ranked in the top positions, the selection is expanded to those countries which received a score of "1" at the sub-factor level as well. These countries are Bangladesh, Maldives, Turkmenistan and Pakistan. Altogether, these seven countries which have comparatively more sub-factors highlighted than the other countries consequently received a score of "1" for the workforce competitiveness dimension.

Table 15: Country ranking by tabulated scores for the workforce competitiveness dimension*

Rank	Country	Number of sub-factors highlighted	Sub-factor		Score for indicators
			Human capital development	Labor market dynamics	
1	Kazakhstan	2	**3**	**3**	6
2	Indonesia	2	**2**	**3**	5
3	Azerbaijan	2	**2**	**2**	4
4	Bangladesh	1	1	**3**	4
5	Maldives	1	**2**	1	3
5	Turkmenistan	1	**3**	0	3
7	Pakistan	1	0	**2**	2
8	Türkiye	0	1	1	2
9	Iran	0	1	0	1

Source: Consultants. * For each of the two sub-factors, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

3.7 Environmental, Social and Governance

The fifth dimension pertains to environmental, social and governance and comprises the three sub-factors of government effectiveness, environmental and sustainability performance and political and social environment. The three sub-factors comprise a total of 15 indicators. With reference to Table 9, the countries Azerbaijan, Indonesia, Kazakhstan and Maldives had more indicators highlighted compared to the five other countries for the sub-factor of government effectiveness. As such, these four countries received a score of "1" for the sub-factor. The sub-factor of environmental and sustainability performance showed that the countries of Azerbaijan, Bangladesh, Iran, Kazakhstan, Türkiye and Turkmenistan had more indicators highlighted compared to the others. As such, these six countries also received a score of "1" for the sub-factor. The same method is applied to the results for the sub-factor of political and social environment.

Table 16: Results for the dimension of environmental, social and governance

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Government effectiveness		✓		✓		✓	✓			
		2	1	5	0	4	3	0	1	0
Government effectiveness	Government Effectiveness: Estimate	0.0	-0.8	0.4	-0.9	0.1	-0.1	-0.6	-0.2	-1.2
Citizen engagement and participation	Voice and Accountability: Estimate	-1.4	-0.8	0.1	-1.5	-1.1	-0.2	-0.9	-0.9	-1.9
Regulatory quality	Regulatory Quality: Estimate	-0.1	-0.9	0.2	-1.6	0.0	-0.7	-0.9	-0.2	-2.1
Rule of law	Rule of Law: Estimate	-0.6	-0.6	-0.2	-1.0	-0.5	0.0	-0.7	-0.5	-1.5
Control of corruption	Control of Corruption: Estimate	-1.0	-1.1	-0.4	-1.1	-0.2	-0.4	-0.8	-0.5	-1.4
Environmental and sustainability performance		✓	✓		✓	✓		✓		✓
		2	2	1	3	2	1	2	0	2
Renewable energy consumption	Renewable energy consumption (% of total final energy consumption)	1.3	25.0	20.2	0.9	2.0	1.4	41.6	12.0	0.1
GHG emissions	Total greenhouse gas emissions (tons of CO2 equivalent per capita)	5.47	1.19	3.52	9.47	14.8	3.83	1.82	5.92	29.8
Exposure to PM2.5	PM2.5 air pollution, mean annual exposure (micrograms per cubic meter)	25.5	63.4	19.4	38.0	20.3	10.9	62.6	26.0	26.2
Waste recovery	EPI waste recovery rate score 2024	12.6	3.1	3.1	17.0	13.0	2.7	3.6	12.3	4.3
Recycling	EPI recycling score 2022	14.4	15.7	15.2	16.8	3.8	20.9	13.8	32.0	15.3
Political and social stability				✓		✓	✓			✓
		0	0	2	0	4	5	1	0	4
Unemployment level	Unemployment, total (% of total labor force) (modeled ILO estimate)	5.6	5.1	3.4	9.1	4.8	4.1	5.5	9.4	4.1
Vulnerability to potential collapse	Fragile state index	72.8	85.9	63.7	82.9	57.8	60.3	91.7	84.0	62.2
Level of income inequality	Gini coefficient	-	33.4	36.1	34.8	29.2	29.3	29.6	44.4	-
Political stability	Political Stability and Absence of Violence/ Terrorism: Estimate	-0.9	-1.1	-0.4	-1.6	-0.4	0.7	-1.9	-1.0	-0.1
Incidence of poverty	Poverty rate (%)	6.0	18.7	9.5	21.9	5.2	5.4	21.9	14.4	0.2

Source: Consultants, using data including from The World Bank[49]. Cells shaded in yellow indicate relatively better performing countries; cells shaded in pink indicate relatively low performing countries.

49 Indicators from The World Bank are extracted from the World Development Indicators DataBank. Available online at: https://databank.worldbank.org/source/world-development-indicators

Results for the three sub-factors are consolidated by country and ranked in the order of sub-factor and indicator (see Table 10). Kazakhstan which was identified for all the three sub-factors received a score of "3". The countries of Maldives, Indonesia, Turkmenistan, Azerbaijan and Pakistan which had two of the three sub-factors identified were given a score of "2". These six countries which have comparatively more sub-factors highlighted than the other three countries consequently received a score of "1" for the dimension of environmental, social and governance.

Table 17: Country ranking by tabulated scores for the environmental, social and governance dimension*

Rank	Country	Number of sub-factors highlighted	Sub-factor			Score for indicators
			Government effectiveness	Environmental and sustainability performance	Political and social stability	
1	Kazakhstan	3	**4**	**2**	**4**	10
2	Maldives	2	**3**	1	**5**	9
3	Indonesia	2	**5**	1	**2**	8
4	Turkmenistan	2	0	**2**	**4**	6
5	Azerbaijan	2	**2**	**2**	0	4
6	Pakistan	2	0	**2**	**1**	3
7	Bangladesh	1	1	**2**	0	3
7	Iran	1	0	**3**	0	3
9	Türkiye	0	1	0	0	1

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. * For each sub-factor, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

3.8 Strategic Importance

The sixth and last dimension for the country level analysis pertains to strategic importance and comprises the sub-factor of strategic role. The sub-factor comprises a total of four indicators. With reference to Table 11, the countries of Indonesia, Kazakhstan, Pakistan and Türkiye had more indicators highlighted compared to the five other countries for the sub-factor of strategic role. As such, these four countries received a score of "1" for the sub-factor.

Table 18: Results for the dimension of strategic importance

Sub-factors and indicators	Measures	Azerbaijan	Bangladesh	Indonesia	Iran	Kazakhstan	Maldives	Pakistan	Türkiye	Turkmenistan
Strategic role				✓		✓		✓	✓	
		0	0	4	0	3	0	2	3	0
Potential market reach	Gateway of trade for (bln $)	261	169	481	157	219	4	85	790	13
Potential economic impact	Economic hinterland (bln $)	485	582	1371	402	378	7	353	1390	60
Potential population impact	Population hinterland (mln people)	73	250	278	89	74	0.5	283	136	6.5
Potential trade impact	Number of Free Trade Agreements	12	15	45	1	31	4	35	23	6

Source: Consultants' estimates. Cells shaded in yellow indicate relatively better performing countries.

Results for the sub-factor are consolidated by country and ranked (see Table 12). The countries of Indonesia, Kazakhstan, Türkiye and Pakistan which was identified for the sub-factor of strategic role received a score of "1". As there is only one sub-factor for this dimension, the results obtained for the sub-factor level are directly translated to scores for the dimension. Hence, the four countries which are highlighted for the sub-factor consequently received a score of "1" for the dimension of strategic importance.

Table 19: Country ranking by tabulated scores for the strategic importance dimension*

Rank	Country	Number of sub-factors highlighted	Sub-factor	Score for indicators
			Strategic role	
1	Indonesia	1	**4**	4
2	Kazakhstan	1	**3**	3
2	Türkiye	1	**3**	3
4	Pakistan	1	**2**	2
5	Azerbaijan	0	0	0
5	Bangladesh	0	0	0
5	Iran	0	0	0
5	Maldives	0	0	0
5	Turkmenistan	0	0	0

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. * For each sub-factor, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

3.9 Consolidated Results for Country Level Analysis

Results obtained for the six dimensions are consolidated and presented in Table 20. As mentioned above, the countries are ranked in the order of scores obtained at the level of dimension, followed by sub-factor and lastly by indicators. The aim is to identify five countries where port level analysis will be applied. In the order of total scores received, the five countries shown in the table are **Indonesia, Kazakhstan, Pakistan, Türkiye and Bangladesh**.

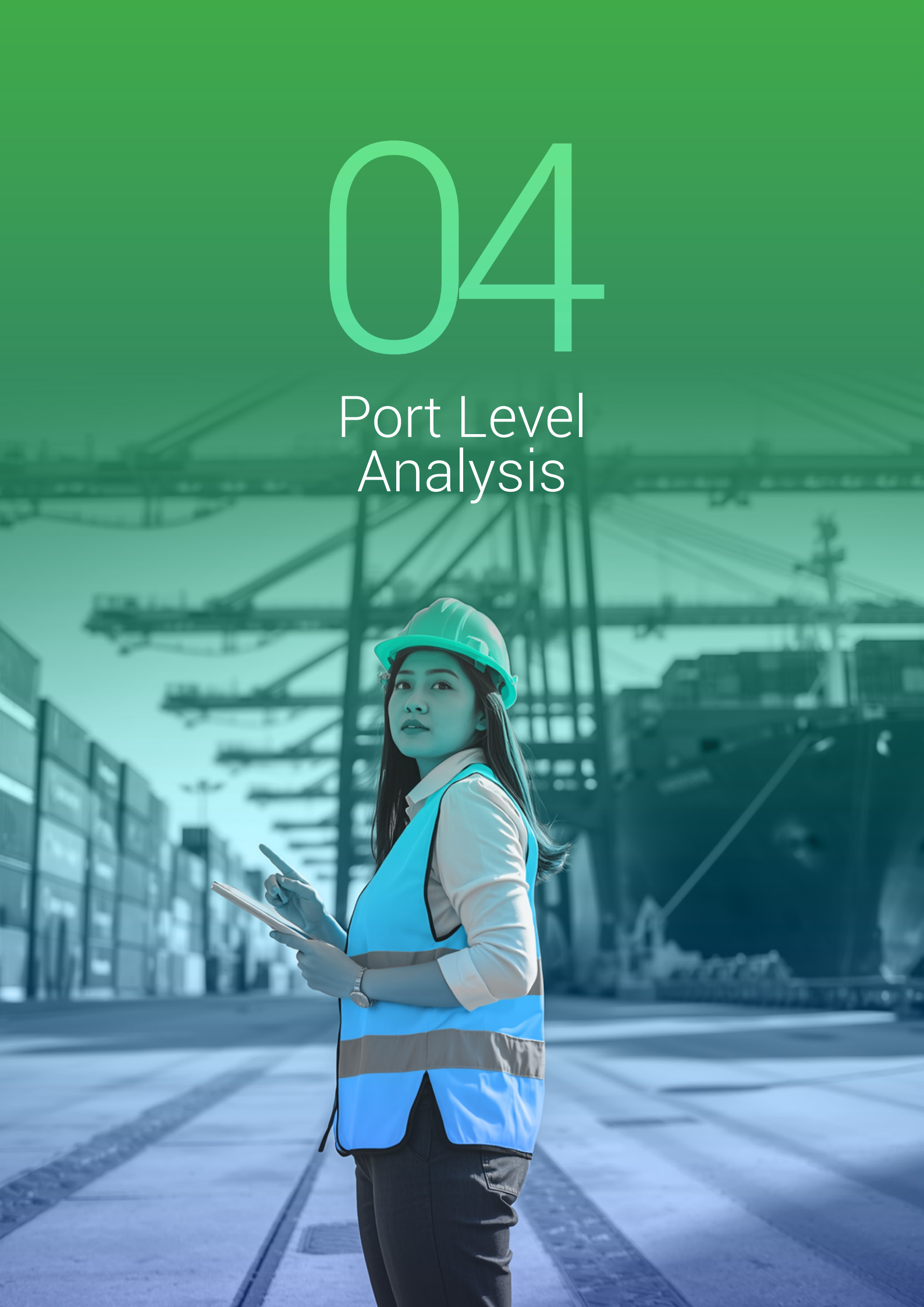
Table 20: Consolidated country ranking by tabulated scores for the six dimensions

Rank	Country	Number of dimensions highlighted	Number of sub-factors highlighted	Score for indicators
1	Indonesia	**6**	**15**	**49**
2	Kazakhstan	**6**	**12**	**38**
3	Pakistan	**5**	**9**	**22**
4	Türkiye	**3**	**9**	**32**
5	Bangladesh	**3**	**8**	**29**
6	Azerbaijan	3	8	26
7	Maldives	3	7	23
8	Turkmenistan	3	6	19
9	Iran	2	7	25

Source: Consultants.

04

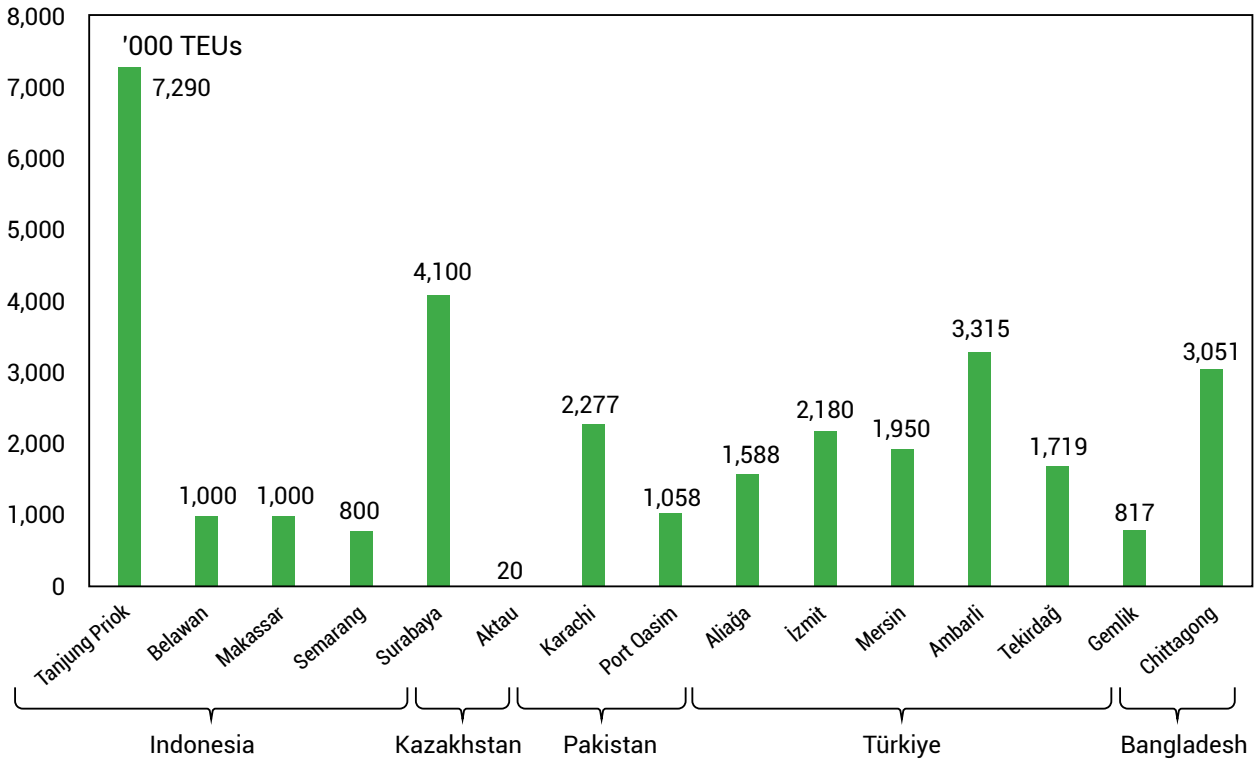
Port Level Analysis



4.1 Overview

The next step is to apply the port filter to identify about four ports to conduct deep dive analysis. The first step is to identify the major container ports for each of the five shortlisted countries. With reference to Figure 5, these are the ports of **Tanjung Priok, Belawan, Makassar, Semarang and Surabaya from Indonesia, Aktau from Kazakhstan, Karachi and Port Qasim from Pakistan, Aliağa, İzmit, Mersin, Ambarli, Tekirdağ and Gemlik from Türkiye, and Chittagong from Bangladesh**. Hence, the port filter will be conducted for 15 ports from these five countries.

Figure 5: Major container ports in the shortlisted OIC countries



Source: Consultants, using various information including respective port authority websites.

A similar approach is adopted by conducting filtering at the indicator, sub-factor and dimension levels for the port selection process. The study will make the assessment using five dimensions, 10 sub-factors and 19 indicators. The filtering process begins at the level of indicators. The filtering process will identify high and low performing ports for each indicator, depending on the pre-set criteria mentioned in the methodology. The condition is further set to have the three ports coming from different countries. This is to avoid the situation where the selection process is tilted to favor the ports of a particular country. The result should be the shortlisted four ports that come from different countries.

The dimensions considered are economic, trade and demography performance, container trade and logistics performance, enabling business environment, environmental, social and governance, and strategic importance. The choice of three ports is based on the total sample size of 15 ports. These selected ports for each indicator will be given a score of "1". The scores will be consolidated for each sub-factor to identify the top-scoring ports. The list of ports can be four to five, although the result will depend also on the number of ports that obtained similar scores. These ports will be given a score of "1" at the sub-factor level and the results will be consolidated at the dimension level with four to five top-scoring ports identified for each dimension. The result will also depend on the number of ports which received similar scores. Equal weightage is given to each indicator within a sub-factor. Hence, sub-factor which has two indicators will see them assigned a weightage of 50% each. Equal weightage is also assigned to each sub-factor within a dimension. Specifically, a dimension which has two sub-factors will see them assigned a weightage of 50% each. Results will be consolidated for the five dimensions to identify the four top-scoring ports where deep dive analysis will be conducted. The ports will also be ranked in the order of scores obtained for dimensions, followed by sub-factors, and lastly by indicators.

4.2 Economy, Trade and Demography

There are five dimensions considered for the port level analysis. The first dimension pertains to economy, trade and demography and comprises the two sub-factors of economic growth and trade performance, and economic development and demography. The dimension has a total of five indicators. We begin with the sub-factor of economic growth and trade performance. With reference to Table 21, the ports of Tanjung Priok, Karachi, Ambarli and Chittagong had more indicators highlighted compared to the other ports. As such, these two ports received a score of "1" for the sub-factor. The sub-factor of economic development and demography showed the ports of Tanjung Priok, Semarang, Karachi, Port Qasim, Mersin, Ambarli and Chittagong had more indicators highlighted compared to the others. As such, these seven ports also received a score of "1" for the sub-factor.

Table 21: Results for the dimension of economy, trade and demography

Sub-factor	Economic growth and trade performance		Economic development and demography		
Indicator	Size of port-city economy	Size of port-city trade	Port-city quality of life	Port-city income level	Size of port-city population
Measure	Port-city GDP (nominal, bln US$)	Port-city trade (nominal, bln US$)	Port-city quality of life index	Port-city GDP per capita (US$)	Port-city population (mln people)
Indonesia					
Tanjung Priok	323.0	192.3	87.0	10,420	31.0
Belawan	13.7	19.2	91.9	5,485	2.5
Makassar	17.1	4.8	102.3	5,879	2.9
Semarang	26.1	21.6	88.7	3,943	6.6
Surabaya	88.8	62.5	117.2	7,527	11.8
Kazakhstan					
Aktau	9.2	41.8	106.1	11,530	0.8
Pakistan					
Karachi	74.4	41.1	84.3	4,074	18.3
Port Qasim	10.2	35.5	84.3	5,001	2.0
Türkiye					
Aliağa	41.0	14.7	142.0	9,152	4.5
İzmit	26.3	108.9	106.3	12,484	2.1
Mersin	13.1	97.4	119.7	6,743	1.9
Ambarli	192.5	165.5	116.2	12,294	15.7
Tekirdağ	12.1	85.9	161.1	10,331	1.2
Gemlik	25.7	40.8	143.8	7,991	3.2
Bangladesh					
Chittagong	52.5	110.4	72.1	9,756	5.4

Source: Consultants, includes estimates and using data from various sources. Cells shaded in yellow indicate relatively better performing ports; cells shaded in pink indicate relatively low performing ports.

Results for the two sub-factors are consolidated by port and ranked in the order of sub-factor and indicator (see Table 22). The ports of Tanjung Priok, Karachi, Ambarli and Chittagong were identified for both the sub-factors and received a score of "2". These four ports which have comparatively more sub-factors highlighted than the other eleven ports consequently received a score of "1" for the dimension of economy, trade and demography.

Table 22: Port ranking by tabulated scores for the economy, trade and demography dimension

Rank	Port	Number of sub-factors highlighted	Sub-factor		Score for indicators
			Economic growth and trade performance	Economic development and demography	
1	Tanjung Priok	2	**2**	**2**	4
1	Karachi	2	**1**	**3**	4
3	Ambarli	2	**2**	**1**	3
4	Chittagong	2	**1**	**1**	2
5	Semarang	1	0	**1**	1
5	Port Qasim	1	0	**1**	1
5	Mersin	1	0	**1**	1
8	Belawan	0	0	0	0
8	Makassar	0	0	0	0
8	Surabaya	0	0	0	0
8	Aktau	0	0	0	0
8	Aliağa	0	0	0	0
8	İzmit	0	0	0	0
8	Tekirdağ	0	0	0	0
8	Gemlik	0	0	0	0

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. For each sub-factor, the **numbers shown in bold and highlighted** are for ports that had more indicators highlighted compared to the other ports.

4.3 Trade and Logistics

The second dimension pertains to container trade and logistics performance and comprises the three sub-factors of container trade performance, supply chain performance, and maritime performance. The three sub-factors comprise a total of six indicators. With reference to Table 23, the ports of Tanjung Priok, Port Qasim, Ambarli, Gemlik and Chittagong had more indicators highlighted compared to the ten other ports for the sub-factor of container trade performance. As such, these five ports received a score of "1" for the sub-factor. The sub-factor of supply chain performance showed that the ports of Aktau, Karachi, Mersin and Chittagong had more indicators highlighted compared to the others. As such, these four ports also received a score of "1" for the sub-factor. The same method is applied to the results for the sub-factor of maritime performance where the ports of Tanjung Priok, Makassar, Aktau, Karachi, Port Qasim and Tekirdağ had more of the indicators highlighted. These six ports also received a score of "1" for the sub-factor.

Table 23: Results for the dimension of container trade and logistics performance

Sub-factor	Container trade performance		Supply chain performance		Maritime performance	
Indicator	Container trade growth	Size of container trade	Container port dependency	Berth cycle performance	Shipping connectivity	Port liner shipping connectivity index
Measure	Container port throughput (CAGR %, 2018-2023)	Container port throughput (mln TEUs, 2023)	Share of port in country's container throughput (%)	Turnaround time for containership (ranking)	Hub status of port	Transshipment incidence (%)
Indonesia						
Tg. Priok	-1.3	7.3	58.9	23	484.8	15.0
Belawan	10.8	1.0	8.1	308	124.3	0.0
Makassar	10.8	1.0	8.1	186	103.8	0.0
Semarang	4.5	0.8	6.5	150	110.2	0.0
Surabaya	1.2	4.1	33.1	101	359.3	1.0
Kazakhstan						
Aktau	55.7	0.02	60.3	406	10.0	0.0
Pakistan						
Karachi	1.0	2.3	67.3	61	306.4	1.5
Port Qasim	0.1	1.1	31.3	146	166.7	0.0
Türkiye						
Aliağa	10.9	1.6	12.8	280	362.1	0.0
İzmit	6.4	2.2	17.6	276	254.8	0.0
Mersin	3.2	2.0	15.8	403	296.8	0.0
Ambarli	0.9	3.3	26.8	276	465.1	3.6
Tekirdağ	9.7	1.7	13.9	280	211.2	7.0
Gemlik	-0.9	0.8	6.6	33	285.1	0.0
Bangladesh						
Chittagong	1.0	3.1	95.3	334	214.0	0.0

Source: Consultants, includes estimates and using data from various sources. Cells shaded in yellow indicate relatively better performing ports; cells shaded in pink indicate relatively low performing ports.

Results for the three sub-factors are consolidated by port and ranked in the order of sub-factor and indicator (see Table 24). The port of Aktau was identified for all the three sub-factors and thereby received a score of "3". The ports of Tanjung Priok, Chittagong, Karachi and Port Qasim which had two of the three sub-factors identified were given a score of "2". These five ports which have comparatively more sub-factors highlighted than the other ten ports consequently received a score of "1" for the dimension of container trade and logistics.

Table 24: Port ranking by tabulated scores for the container trade and logistics dimension

Rank	Port	Number of sub-factors highlighted	Sub-factor			Score for indicators
			Container trade performance	Supply chain performance	Maritime performance	
1	**Aktau**	2	0	**2**	**1**	3
2	**Tanjung Priok**	2	**2**	0	**1**	3
2	**Chittagong**	2	**1**	**2**	0	3
4	**Karachi**	2	0	**1**	**1**	2
4	**Port Qasim**	2	**1**	0	**1**	2
6	Makassar	1	0	0	**1**	1
6	Mersin	1	0	**1**	0	1
6	Ambarli	1	**1**	0	0	1
6	Tekirdağ	1	0	0	**1**	1
6	Gemlik	1	**1**	0	0	1
11	Belawan	0	0	0	0	0
11	Semarang	0	0	0	0	0
11	Surabaya	0	0	0	0	0
11	Aliağa	0	0	0	0	0
11	İzmit	0	0	0	0	0

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. For each sub-factor, the **numbers shown in bold and highlighted** are for ports that had more indicators highlighted compared to the other ports.

4.4 Business Environment

The third dimension pertains to enabling business environment and comprises the three sub-factors of port operating environment, port investment activity, and port technology and innovation. The three sub-factors comprise a total of four indicators. With reference to Table 25, the ports of Belawan, Aktau, Mersin and Chittagong had more indicators highlighted compared to the eleven other ports for the sub-factor of port operating environment. As such, these four ports received a score of "1" for the sub-factor. The sub-factor of port investment activity showed that almost all of the ports were highlighted. The exception being Makassar, Karachi and Chittagong which had new container-handling capacity introduced in the past five years. As such, the twelve ports also received a score of "1" for the sub-factor. The same method is applied to the results for the sub-factor of port technology and innovation where the ports of Tanjung Priok, Aktau and Chittagong were highlighted. These three ports also received a score of "1" for the sub-factor.

Table 25: Results for the dimension of enabling business environment

Sub-factor	Port operating environment		Port investment activity	Port technology and innovation
Indicator	Port capacity utilization	Availability of deepwater berths	Investment in port capacity	Ability to handle large-size containerships
Measure	Container-handling capacity utilization (%)	Maximum draft alongside (meters)	New container-handling capacity introduced (mln TEUs, 2018-2023)	Increase in size of largest containership handled (%, 2018-2023)
Indonesia				
Tanjung Priok	125.7	16.0	0.0	-9.0
Belawan	142.9	10.0	0.0	-3.3
Makassar	40.0	16.0	1.5	-1.1
Semarang	100.0	12.0	0.0	2.0
Surabaya	63.1	13.0	0.0	5.3
Kazakhstan				
Aktau	28.5	4.8	0.0	0.0
Pakistan				
Karachi	49.0	16.0	3.1	7.7
Port Qasim	52.2	13.0	0.0	2.6
Türkiye				
Aliağa	48.9	21.5	0.0	0.3
İzmit	53.8	18.5	0.0	4.7
Mersin	75.0	15.8	0.0	0.3
Ambarli	71.1	17.0	0.0	4.7
Tekirdağ	68.8	18.0	0.0	4.7
Gemlik	40.8	18.0	0.0	4.7
Bangladesh				
Chittagong	101.7	10.5	0.5	0.8

Source: Consultants, includes estimates and using data from various sources. Cells shaded in yellow indicate relatively better performing ports; cells shaded in pink indicate relatively low performing ports.

Results for the three sub-factors are consolidated by port and ranked in the order of sub-factor and indicator (see Table 26). The port of Aktau was identified for all the three sub-factors and thereby received a score of "3". The ports of Belawan, Chittagong, Tanjung Priok and Mersin which had two of the three sub-factors identified were given a score of "2". These five ports which have comparatively more sub-factors highlighted than the other ten ports consequently received a score of "1" for the dimension of enabling business environment.

Table 26: Port ranking by tabulated scores for the enabling business environment dimension

Rank	Port	Number of sub-factors highlighted	Sub-factor			Score for indicators
			Port operating environment	Port investment activity	Port technology and innovation	
1	Aktau	3	**1**	**1**	**1**	3
2	Belawan	2	**2**	**1**	0	3
2	Chittagong	2	**2**	0	**1**	3
4	Tanjung Priok	2	0	**1**	**1**	2
4	Mersin	2	**1**	**1**	0	2
6	Semarang	1	0	**1**	0	1
6	Surabaya	1	0	**1**	0	1
6	Port Qasim	1	0	**1**	0	1
6	Aliağa	1	0	**1**	0	1
6	İzmit	1	0	**1**	0	1
6	Ambarli	1	0	**1**	0	1
6	Tekirdağ	1	0	**1**	0	1
6	Gemlik	1	0	**1**	0	1
14	Makassar	0	0	0	0	0
14	Karachi	0	0	0	0	0

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. For each sub-factor, the **numbers shown in bold and highlighted** are for ports that had more indicators highlighted compared to the other ports.

4.5 Environmental, Social and Governance

The fourth dimension pertains to environmental, social and governance performance and comprises only one sub-factor which has the same name. The sub-factor has a total of two indicators. With reference to Table 27, the ports of Belawan, Aktau, Mersin, Gemlik and Chittagong had more indicators highlighted compared to the ten other ports. As such, these five ports received a score of "1" for the sub-factor.

Table 27: Results for the dimension of environmental, social and governance performance

Sub-factor	Environmental, social and governance performance	
Indicator	Port-city pollution	Port-city safety
Measure	Port-city pollution index	Port-city safety index
Indonesia		
Tanjung Priok	85.13	47.32
Belawan	45.47	76.13
Makassar	55.00	49.01
Semarang	50.34	60.30
Surabaya	55.91	63.92
Kazakhstan		
Aktau	87.93	44.86
Pakistan		
Karachi	89.54	43.22
Port Qasim	89.54	43.22
Türkiye		
Aliağa	60.25	67.54
İzmit	74.26	57.79
Mersin	42.28	64.30
Ambarli	68.01	52.00
Tekirdağ	67.47	65.86
Gemlik	62.67	68.02
Bangladesh		
Chittagong	80.65	36.06

Source: Consultants, using data from Numbeo[50]. Cells shaded in yellow indicate relatively better performing ports; cells shaded in pink indicate relatively low performing ports.

50 Numbeo (2024). Quality of Life Index by Country 2023. Available online at: https://www.numbeo.com/quality-of-life/rankings_by_country.jsp?title=2023

Results for the sub-factor are consolidated by port and ranked (see Table 21). The ports of Belawan, Aktau Mersin, Gemlik and Chittagong were highlighted and thereby received a score of "1". As there is only one sub-factor for this dimension, the results obtained for the sub-factor level are directly translated to scores for the dimension. Hence, the five ports which are highlighted for the sub-factor consequently received a score of "1" for the dimension of environmental, social and governance performance.

Table 28: Port ranking by tabulated scores for the environmental, social and governance dimension

Rank	Country	Number of sub-factors highlighted	Sub-factor	Score for indicators
			Environmental, social and governance performance	
1	Belawan	1	**2**	2
2	Aktau	1	**1**	1
2	Mersin	1	**1**	1
2	Gemlik	1	**1**	1
2	Chittagong	1	**1**	1
6	Tanjung Priok	0	0	0
6	Makassar	0	0	0
6	Semarang	0	0	0
6	Surabaya	0	0	0
6	Karachi	0	0	0
6	Port Qasim	0	0	0
6	Aliağa	0	0	0
6	İzmit	0	0	0
6	Ambarli	0	0	0
6	Tekirdağ	0	0	0

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. * For each sub-factor, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

4.6 Strategic Importance

The fifth and last dimension pertains to strategic importance and comprises only one sub-factor. The sub-factor of strategic role has a total of two indicators. With reference to Table 29, the ports of Tanjung Priok, Karachi and Ambarli had more indicators highlighted compared to the twelve other ports. As such, these three ports received a score of "1" for the sub-factor.

Table 29: Results for the dimension of strategic importance

Sub-factor	Strategic role	
Indicator	Potential economic impact	Potential population impact
Measure	Port-city share of national GDP (%)	Port-city share of country's population (%)
Indonesia		
Tanjung Priok	23.6	11.2
Belawan	1.0	0.9
Makassar	1.2	1.0
Semarang	1.9	2.4
Surabaya	6.5	4.3
Kazakhstan		
Aktau	3.5	4.0
Pakistan		
Karachi	22.0	7.6
Port Qasim	3.0	0.8
Türkiye		
Aliağa	3.7	5.2
İzmit	2.4	2.5
Mersin	1.2	2.3
Ambarli	17.4	18.3
Tekirdağ	1.1	1.4
Gemlik	2.3	3.8
Bangladesh		
Chittagong	12.0	3.1

Source: Consultants, includes estimates and using data from various sources. Cells shaded in yellow indicate relatively better performing ports; cells shaded in pink indicate relatively low performing ports.

Results for the sub-factor are consolidated by country and ranked (see Table 30). The ports of Tanjung Priok, Karachi and Ambarli which were identified for the sub-factor of strategic role received a score of "1". As there is only one sub-factor for this dimension, the results obtained for the sub-factor level are also directly translated to scores for the dimension. Hence, the three countries which are highlighted for the sub-factor consequently received a score of "1" for the dimension of strategic importance.

Table 30: Port ranking by tabulated scores for the strategic importance dimension

Rank	Country	Number of sub-factors highlighted	Sub-factor	Score for indicators
			Strategic role	
1	Tanjung Priok	1	**2**	2
1	Karachi	1	**2**	2
1	Ambarli	1	**2**	2
4	Belawan	0	0	0
4	Makassar	0	0	0
4	Semarang	0	0	0
4	Surabaya	0	0	0
4	Aktau	0	0	0
4	Port Qasim	0	0	0
4	Aliağa	0	0	0
4	İzmit	0	0	0
4	Mersin	0	0	0
4	Tekirdağ	0	0	0
4	Gemlik	0	0	0
4	Chittagong	0	0	0

Source: Consultants. ✓ indicates the country receiving a score of "1" for the sub-factor. * For each sub-factor, the **numbers shown in bold and highlighted** are for countries that had more indicators highlighted compared to the other countries.

4.7 Consolidated Analysis

Results obtained for the five dimensions for the port level analysis are consolidated and presented in Table 31. As mentioned above, the ports are ranked in the order of scores obtained at the level of dimension, followed by sub-factor and lastly by indicators. The aim is to identify four ports where deep dive analysis for the selected ports will be applied. In the order of total scores received, the four ports are **Tanjung Priok from Indonesia, Chittagong from Bangladesh, Aktau from Kazakhstan, and Karachi from Pakistan**.

Table 31: Consolidated port ranking by tabulated scores for the five dimensions

Rank	Country	Number of dimensions highlighted	Number of sub-factors highlighted	Score for indicators
1	Tanjung Priok	**4**	**7**	**11**
2	Chittagong	**4**	**7**	**9**
3	Aktau	**3**	**7**	**7**
4	Karachi	**3**	**5**	**8**
5	Ambarli	2	5	7
6	Mersin	2	5	5
7	Belawan	2	3	5
8	Port Qasim	1	4	4
9	Gemlik	1	3	3
10	Semarang		2	2
10	Tekirdağ		2	2
12	Makassar		1	1
12	Surabaya		1	1
12	Aliağa		1	1
12	İzmit		1	1

Source: Consultants.

4.8 Note on Identification of Leading Ports for Benchmarking

The profile of container traffic for the shortlisted ports is reproduced in Table 32. Included in the table is information on the top bilateral shipping connectivity partner countries for each port. The information is extracted from the maritime profiles of the countries which the shortlisted ports belong to. The table further highlights those countries who are members of OIC. It is proposed that the ports which are used for benchmarking be selected from the country which has the closest bilateral shipping connectivity with the shortlisted port.

Table 32: Profile of shortlisted ports and potential OIC member country port for benchmarking*

Container port	Tanjung Priok (Indonesia)	Chittagong (Bangladesh)	Aktau (Kazakhstan)	Karachi (Pakistan)
Container throughput (TEUs)	7,290,000	3,050,000	23,000	2,280,000
Transshipment share (%)	15.0%	0	0	1.5%
Import/export share (%)	85.0%	100.0%	100.0%	98.5%
Top bilateral shipping connectivity partner countries**	Singapore **Malaysia** China Australia Japan Thailand South Korea **Saudi Arabia** Belgium	Singapore **Malaysia** Sri Lanka India Belgium **Saudi Arabia** **Jordan** **Maldives** **Yemen** Myanmar	**Azerbaijan** **Iran** **Turkmenistan** Russia	**UAE** Singapore India **Saudi Arabia** China **Malaysia** China Belgium Italy Germany
Potential leading OIC member port for benchmarking	Port Klang (MY) Tg. Pelepas (MY) Jeddah (SA) Jebel Ali (AE)^ Abu Dhabi (AE)^	Port Klang (MY) Tg. Pelepas (MY) Jeddah (SA) Jebel Ali (AE)^ Abu Dhabi (AE)^	Baku (AZ) Izmit (TR)+ Mersin (TR)+ Ambarli (TR)+ Tekirdağ (TR)+	Jebel Ali (AE) Abu Dhabi (AE) Jeddah (SA) Port Klang (MY) Tg. Pelepas (MY)

Source: Consultants, using information from various websites including UNCTAD (2024)[51]. * OIC member countries shown in bold. ** Bilateral connectivity shown for the country level. ^ The UAE as a major country by container throughput handled. + Türkiye as a key trading partner for Kazakhstan.

In this regard, the proposed OIC member country port to serve as potential benchmark for Tanjung Priok could be Port Klang from Malaysia as the first choice. Port Klang is ranked as the 11th busiest container port in the world52 and handles a mix of import/export and transshipment containers, serving as the national maritime gateway and transshipment load center for Malaysia. Port Klang is seen as a suitable benchmark given the similar role of Tanjung Priok as the national maritime gateway and transshipment center for Indonesia. Another potential candidate port to serve as benchmark for Tanjung Priok could be Jeddah from Saudi Arabia. Jeddah is a major port located in the Red Sea and is ranked 32nd globally for container volume.

For Chittagong in Bangladesh, the port similarly serves as the national maritime gateway for the country. As such, a potential OIC member country port which can serve as benchmark for Chittagong could also be Port Klang from Malaysia. Given that Saudi Arabia is also ranked among the top ten countries in terms of bilateral shipping connectivity for Bangladesh, Jeddah of Saudi Arabia could also be considered as a potential port for benchmarking.

Turning to Aktau of Kazakhstan, there is strong bilateral container shipping connectivity with Baku in Azerbaijan. Several vessels operate container shuttles that transport containerized cargo between these two ports. As both ports are located in the Caspian Sea, they are likely to face similar challenges. As such, Baku could serve as a potential benchmark for the port of Aktau.

As for Karachi, the UAE is ranked top for bilateral shipping connectivity. Data for container shipping services also shows strong connectivity between Karachi and the port of Jebel Ali. As such, a potential benchmark for Karachi could be Jebel Ali. Both ports share the same characteristics of being major maritime gateways for their respective countries. Furthermore, the port of Jebel Ali is a reputed port in the world, being ranked 9th globally for container traffic handled[53]. Taking reference to the bilateral shipping connectivity profile of Pakistan, other ports which can be considered to serve as benchmarks for Karachi could include Jeddah of Saudi Arabia, Port Klang of Malaysia, and Abu Dhabi of the UAE.

51 UNCTAD (2024). Maritime profile, Country Profiles, UNCTAD. Available online at: https://unctadstat.unctad.org/CountryProfile/MaritimeProfile/en-GB/004/index.html
52 Lloyd's List (2024). One Hundred Ports 2024, Lloyd's List. Available online at: https://www.lloydslist.com/one-hundred-container-ports-2024
53 Lloyd's List (2024). One Hundred Ports 2024, Lloyd's List. Available online at: https://www.lloydslist.com/one-hundred-container-ports-2024

05

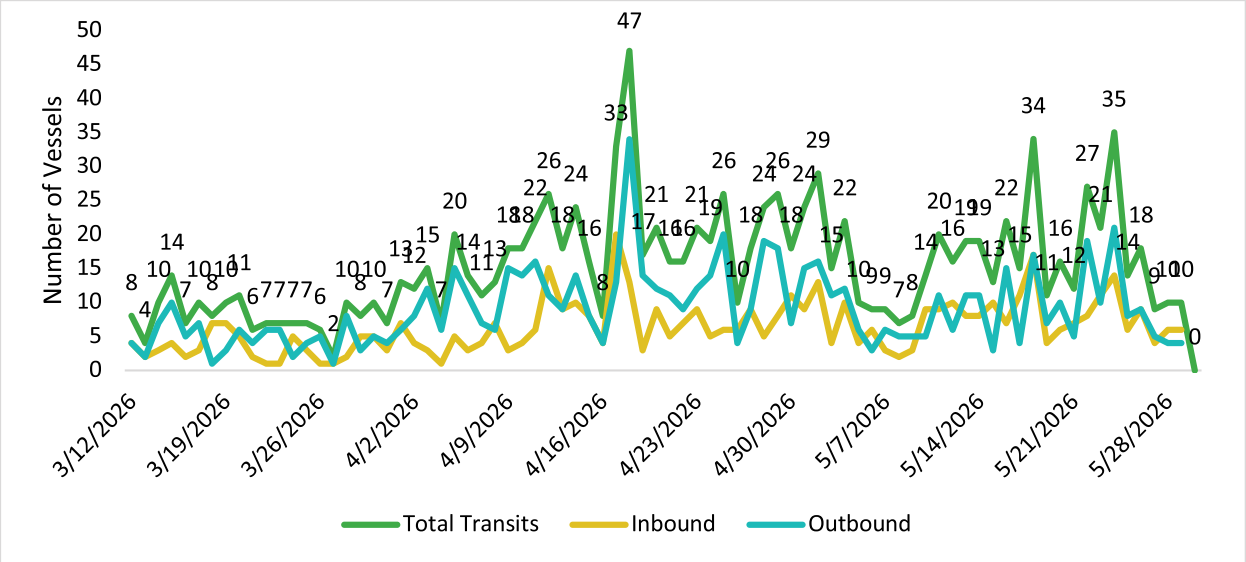
Impact of 2026 Maritime Disruptions

5.1 Overview

In February 2026, developments in the Middle East caused major disruption to maritime traffic through the Strait of Hormuz, one of the world's key shipping chokepoints. The Strait serves as a critical gateway connecting the oil- and gas-producing countries of the Gulf with international markets, particularly those in Asia. The conflict rapidly affected vessel movements, energy exports, and shipping operations, generating significant uncertainty across global trade and logistics networks.

The Strait of Hormuz is of exceptional importance to international maritime trade. Prior to the crisis, approximately one-quarter of global seaborne oil trade, nearly one-fifth of global liquefied natural gas (LNG) trade, and substantial volumes of chemicals, refined petroleum products, fertilizers and containerized cargo transited through the Strait. The passage is particularly important for Asian economies, which receive approximately 84% of crude oil and 83% of liquefied natural gas (LNG) shipments transported through the Strait. Following the disruption, vessel traffic through the Strait declined sharply. According to UN Trade and Development (UNCTAD)[54], average daily ship transits fell from approximately 141 vessels per day prior to the conflict to fewer than 10 vessels per day during the first week of March 2026, representing a decline of approximately 97 per cent. This trend is consistent with vessel traffic monitoring data collected for this study, which show that daily vessel movements through the Strait remained at exceptionally low levels during March 2026 before gradually recovering during April and May, albeit with considerable volatility.

Figure 6: Daily count of inbound and outbound ships at Strait of Hormuz



Source: ShipFinder.com

The disruption rapidly transmitted across global maritime and logistics systems. Shipping companies suspended or reduced services to affected areas, implemented emergency surcharges, and rerouted vessels through longer alternative routes. Freight rates, marine fuel prices, and insurance premiums increased significantly, while transit times became less predictable. At the same time, energy markets reacted strongly as concerns emerged regarding the continuity of oil and gas supplies from the region. Brent crude oil prices increased by approximately 27% within days of the conflict, while natural gas prices rose even more sharply.

For OIC member countries, the crisis has particular significance because many economies depend heavily on maritime trade routes that connect Asia, the Middle East, Africa and Europe. The impacts extend beyond energy markets to include higher shipping costs, increased logistics uncertainty, disruptions to fertilizer and commodity supply chains, and heightened pressure on port and transport infrastructure. The crisis therefore highlights the strategic importance of resilient seaport systems, efficient logistics operations, and effective contingency planning to maintain trade connectivity during periods of geopolitical disruption. While the duration and ultimate economic consequences of the crisis remain uncertain, the events of 2026 demonstrate the vulnerability of maritime transport and ports to disruptions at critical chokepoints.

54 United Nations Conference on Trade and Development (UNCTAD). (2026). "Strait of Hormuz Disruptions: Implications for Global Trade and Development". UNCTAD, Geneva. Available online at: https://unctad.org/publication/strait-hormuz-disruptions-implications-global-trade-and-development

5.2 Impacts on Maritime Transport and Port Operations

The disruption of maritime traffic through the Strait of Hormuz has had significant implications for global shipping networks and port operations. As one of the world's most critical maritime chokepoints, the Strait serves not only as a major corridor for energy exports but also as an important route for containerized cargo, chemicals, fertilizers, and other commodities moving between Asia, the Middle East, Africa, and Europe. The impacts relevant to this study included:

- ✓ Shipping costs increased substantially during the initial phase of the crisis. Freight rates were affected by higher fuel prices, additional security measures, and emergency surcharges imposed by shipping lines. At the same time, maritime insurance costs rose sharply as vessels operating in or near the zone became subject to significantly higher risk premiums. UNCTAD estimates indicate that insurance costs for a typical large vessel could increase by between 100 and 300 per cent, substantially raising the cost of maritime transport. Similarly, shipping lines introduced emergency conflict and fuel surcharges that further increased transport costs for cargo owners.

- ✓ The sharp decline in vessel traffic prompted shipping companies to modify service networks and adopt alternative routing strategies. Several operators reduced or suspended services to affected destinations, while others redirected cargo through alternative gateways outside the region. Essential cargoes such as food and medicine were prioritized to maintain critical supply chains.

- ✓ Longer shipping routes have also increased transit times and reduced schedule reliability. According to industry assessments[55], some Asia-Europe services were rerouted via the Cape of Good Hope, adding between 8 and 15 days to voyage durations. These changes reduced effective fleet capacity, increased vessel operating costs, and generated congestion risks at alternative ports and logistics hubs. For cargo owners and port operators, longer transit times translated into greater uncertainty in cargo arrival schedules and more complex planning requirements for terminal operations, storage facilities, and hinterland transport services.

- ✓ The crisis also affected bunker fuel markets, with direct implications for shipping operations. As a major share of global oil and marine fuel supplies originates from the region, concerns regarding supply disruptions led to significant increases in fuel prices. UNCTAD reported that low-sulphur and high-sulphur bunker fuel prices in Singapore increased by approximately 99 per cent and 100 per cent respectively between 27 February and 9 March 2026. In response, shipping operators adjusted fuel procurement strategies and introduced temporary bunker surcharges to offset higher operating costs.

For seaports, these developments have implications extending beyond vessel traffic volumes. Increased transport costs and longer transit times can reduce trade competitiveness and affect cargo throughput, particularly in import-dependent economies. Port operators may face greater variability in vessel arrivals, increased demand for storage capacity, and more complex cargo management requirements. Furthermore, disruptions to maritime connectivity can affect the reliability of supply chains that depend on regular shipping services, including those transporting food products, industrial inputs, fertilizers, and consumer goods.

The crisis therefore highlights the importance of resilience within port and logistics systems. Beyond physical infrastructure, resilience increasingly depends on operational flexibility, real-time information sharing, digital coordination systems, and effective contingency planning. Ports that are able to adapt quickly to changing shipping patterns, manage disruptions efficiently, and maintain service continuity are likely to be better positioned to withstand future geopolitical and supply-chain shocks. In this regard, the events of 2026 reinforce the growing importance of integrating resilience considerations into cargo seaport capacity development strategies across OIC Member Countries.

THE SHARP DECLINE IN VESSEL TRAFFIC PROMPTED SHIPPING COMPANIES TO MODIFY SERVICE NETWORKS AND ADOPT ALTERNATIVE ROUTING STRATEGIES. SEVERAL OPERATORS REDUCED OR SUSPENDED SERVICES TO AFFECTED DESTINATIONS, WHILE OTHERS REDIRECTED CARGO THROUGH ALTERNATIVE GATEWAYS OUTSIDE THE REGION. ESSENTIAL CARGOES SUCH AS FOOD AND MEDICINE WERE PRIORITIZED TO MAINTAIN CRITICAL SUPPLY CHAINS.

55 Oliver Wyman. (2026). Impact of the Middle East Conflict on Global Supply Chains. Available online at: https://www.oliverwyman.com/.

5.3 Implications for OIC Member Countries

The impacts of the 2026 disruption are not evenly distributed across OIC Member Countries. While all countries are affected to some extent through higher transport costs, disrupted maritime connectivity, and increased uncertainty in global trade, the magnitude and nature of the impacts vary considerably depending on their economic structure, trade patterns, energy dependence, and fiscal capacity.

A key distinction lies between net energy-importing and net energy-exporting economies. For many OIC Member Countries in South Asia, Southeast Asia, and Sub-Saharan Africa, higher oil and gas prices have increased import bills, widened trade deficits, and placed additional pressure on foreign exchange reserves. The International Monetary Fund (IMF)[56] notes that energy-importing economies are particularly exposed to the crisis, as higher fuel prices increase production costs, reduce purchasing power, and weaken external balances.

Countries such as **Bangladesh** and **Pakistan** are especially vulnerable because of their reliance on imported energy and their dependence on maritime trade for industrial production and economic growth. Higher fuel costs increase the cost of manufacturing, transportation, and port operations, while also contributing to inflationary pressures. For these economies, the crisis may reduce trade competitiveness and increase demand for more efficient logistics systems capable of mitigating rising transportation costs.

In contrast, some energy-exporting OIC member countries (e.g. Azerbaijan, Brunei Darussalam, Kazakhstan and Turkmenistan) may benefit from higher international oil and gas prices, provided that export flows remain operational. Higher commodity prices can strengthen fiscal revenues, improve trade balances, and support public investment. However, these benefits are not guaranteed. Countries whose exports depend on maritime routes affected by the conflict may face constraints in bringing products to market. Furthermore, prolonged geopolitical uncertainty can discourage investment and increase financing costs, limiting the longer-term gains associated with higher commodity prices.

Beyond energy markets, the crisis has significant implications for food security and agricultural supply chains across many OIC Member Countries. The Strait of Hormuz is an important route for global fertilizer trade, with approximately one-third of global seaborne fertilizer shipments transiting through the corridor. Disruptions to fertilizer supplies and rising transportation costs have contributed to higher input prices for agricultural production. UNCTAD identifies several developing countries that depend heavily on fertilizer imports originating from the region, including **Pakistan**, **Sudan**, **Somalia**, **Tanzania**, and **Mozambique**.

For many low- and middle-income OIC Member Countries, rising fertilizer costs may ultimately translate into higher food prices and increased pressure on household incomes. The IMF similarly warns that disruptions to fertilizer supply chains could exacerbate food insecurity, particularly in countries with limited fiscal resources and a high dependence on imported agricultural inputs. This creates an additional layer of vulnerability for countries already facing challenges related to inflation, debt servicing, and constrained public finances.

5.4 Implications for the Selected Cargo Seaports

The four cargo seaports prioritized in this study namely, **Tanjung Priok (Indonesia), Chittagong (Bangladesh), Karachi (Pakistan),** and **Aktau (Kazakhstan)** have different positions within regional and global trade networks. As a result, the 2026 maritime disruptions are likely to affect each port differently.

While all four ports face common challenges arising from higher shipping costs, longer transit times, and increased uncertainty in maritime logistics, the specific implications for port operations and future capacity development vary according to their economic context, cargo profile, and strategic role within transport systems.

Tanjung Priok Port, Indonesia

As Indonesia's principal international gateway and one of Southeast Asia's largest container ports, Tanjung Priok is heavily integrated into regional and global shipping networks. Although Indonesia is less directly exposed to the Strait of Hormuz than some South Asian economies, the port remains vulnerable to indirect effects arising from higher fuel costs, increased freight rates, and disruptions to shipping schedules.

The rerouting of vessels and increased operating costs experienced by shipping lines may reduce service efficiency and increase logistics costs for Indonesian importers and exporters. Industries dependent on imported energy, industrial inputs, and intermediate goods may face higher production costs, potentially affecting cargo volumes handled through the port. In addition, greater uncertainty in shipping schedules may place increased demands on terminal planning, container storage, and cargo tracking systems.

56 International Monetary Fund (IMF). (2026). "How the War in the Middle East Is Affecting Energy, Trade, and Finance". IMF Blog, 30 March 2026. Available online at: https://www.imf.org/en/Blogs/Articles/2026/03/30/how-the-war-in-the-middle-east-is-affecting-energy-trade-and-finance

The crisis reinforces the importance of ongoing efforts to improve operational efficiency, digitalization, and port community systems at Tanjung Priok. Enhanced real-time information exchange, vessel traffic management, and integrated logistics coordination can help mitigate the impact of external disruptions and strengthen the port's role as a resilient regional gateway.

Chittagong Port, Bangladesh

Among the four ports examined in this study, Chittagong is likely to be one of the most exposed to the economic consequences of the crisis. Bangladesh relies heavily on imported energy and imported industrial inputs to support its export-oriented manufacturing sector, particularly the ready-made garments industry. Higher energy prices, increased freight costs, and supply-chain disruptions therefore have direct implications for trade competitiveness and economic growth.

As the country's primary maritime gateway, Chittagong is experiencing increased pressure arising from shipping schedule disruptions, fluctuating cargo arrival patterns, and rising logistics costs. Delays in the delivery of raw materials and intermediate goods could create additional challenges for manufacturers that depend on predictable supply chains. Furthermore, increases in fertilizer and food import costs may contribute to broader economic pressures affecting domestic demand and trade flows.

For Chittagong, the crisis highlights the importance of improving port productivity, reducing vessel turnaround times, and strengthening coordination between port authorities, customs agencies, and logistics service providers. Investments in digitalization, cargo visibility systems, and streamlined clearance procedures would enhance the port's ability to manage disruptions and maintain efficient cargo flows during periods of external stress.

Karachi Port, Pakistan

Karachi Port faces challenges similar to those confronting Chittagong, although the potential impacts may be amplified by Pakistan's significant dependence on imported energy and its existing macroeconomic vulnerabilities.

Higher fuel and transportation costs are likely to increase import costs and place additional pressure on industries that depend on maritime trade. As a major gateway for both containerized and bulk cargo, Karachi plays a critical role in ensuring the continuity of national supply chains.

The crisis may also affect agricultural supply chains due to disruptions in fertilizer trade and rising commodity transportation costs. Given Pakistan's reliance on fertilizer imports originating from the region, prolonged disruptions could affect agricultural production and increase demand for efficient bulk cargo handling and storage facilities.

Aktau Port, Kazakhstan

The implications of the crisis for Aktau differ markedly from those for the other three ports. As Kazakhstan is a major exporter of hydrocarbons and commodities, higher global energy prices may create opportunities to strengthen export revenues and trade activity. While Kazakhstan is not directly dependent on maritime access through the Strait of Hormuz, disruptions to global energy markets may increase international demand for alternative energy suppliers and transport corridors.

At the same time, the crisis highlights the strategic importance of diversification and resilience in regional trade networks. As countries seek to reduce dependence on vulnerable maritime chokepoints, greater attention may be directed toward alternative Eurasian transport corridors and multimodal logistics routes, such as the Middle Corridor. This could enhance the strategic importance of Aktau as a gateway linking Central Asia with the Caspian region, the Caucasus, and broader international markets.

For Aktau, future capacity development priorities may therefore extend beyond operational efficiency to include strengthening multimodal connectivity, expanding cargo-handling capabilities, and improving integration with regional transport corridors. Such investments could position the port to capture emerging trade opportunities resulting from shifts in global logistics patterns.

Cross-Cutting Implications

Despite their differing circumstances, all four ports face a common challenge: the need to operate effectively in an increasingly uncertain and volatile global environment. The 2026 maritime disruptions demonstrate that external geopolitical events can rapidly affect maritime connectivity, shipping costs, cargo flows, and trade competitiveness. Consequently, port capacity development should increasingly incorporate resilience as a core objective alongside traditional goals such as throughput expansion and infrastructure modernization.

Across all four ports, priorities such as digitalization, real-time information sharing, operational flexibility, business continuity planning, and supply-chain coordination are likely to become more important. The crisis also underscores the value of international cooperation and knowledge exchange among OIC Member Countries, particularly in areas related to risk management, trade facilitation, and resilient port operations. These considerations provide important context for the strategic recommendations presented in the following chapter.

Table 33: Comparisons of the impacts on the four selected seaports

Selected Port	Exposure to the Crisis	Key Impacts	Implications for Capacity Development
Tanjung Priok (Indonesia)	**Moderate**	Higher fuel and freight costs; increased shipping schedule uncertainty; disruptions to imported industrial inputs and regional supply chains.	Strengthen digitalization, port community systems, cargo visibility, and operational efficiency to improve resilience against external disruptions.
Chittagong (Bangladesh)	**High**	Rising energy and logistics costs; disruptions to manufacturing supply chains; increased pressure on trade competitiveness and import-dependent industries.	Improve port productivity, reduce vessel turnaround times, strengthen customs and trade facilitation processes, and enhance supply-chain coordination.
Karachi (Pakistan)	**High**	Higher energy import costs; disruptions to fertilizer and commodity supply chains; increased logistics costs and macroeconomic pressures.	Enhance operational resilience, risk management capabilities, digital systems, and finding alternative land route to Central Asia.
Aktau (Kazakhstan)	**Moderate**	Beneficiary of higher energy prices and increased demand for alternative trade and transport corridors; exposure to broader logistics uncertainty remains limited.	Strengthen multimodal connectivity, expand cargo-handling capacity, and improve integration with the Middle Corridor to capture emerging trade opportunities.

06

Strategic Recommendations

The study demonstrates that cargo seaports in OIC Asian Member Countries play a critical role in facilitating trade, supporting economic development, and strengthening regional integration. However, significant disparities exist in infrastructure quality, operational efficiency, maritime connectivity, institutional capacity, and resilience to external shocks. Recent maritime disruptions have further highlighted the importance of resilient, digitally enabled, and well-connected port systems capable of adapting to rapidly changing trade conditions. In response, the Islamic Development Bank (IsDB) and the Islamic Centre for Development of Trade (ICDT) can play a catalytic role in supporting Member Countries through targeted investments, technical assistance, and regional cooperation initiatives. The following recommendations are proposed as practical areas for future engagement.

6.1 Strengthen Port Digitalization and Trade Facilitation

Digitalization represents one of the most effective interventions for improving port performance without requiring major physical infrastructure expansion. If ports in OIC Member Countries continue to rely on fragmented information systems, manual documentation processes, and limited real-time information sharing among stakeholders, the overall efficiency will be low. IsDB and ICDT can support the development and modernization of digital port ecosystems through:

- Implementation of Port Community Systems (PCS) to facilitate real-time information exchange among ports, customs authorities, shipping lines, terminal operators, freight forwarders, and logistics providers.
- Integration of port systems with National Single Window platforms to streamline customs clearance and border procedures.
- Adoption of digital cargo tracking, electronic documentation, and automated gate systems to reduce dwell times and improve cargo visibility.
- Capacity development programmes focused on digital transformation, cybersecurity, and data governance.

6.2 Address Critical Infrastructure and Capacity Constraints

Several ports assessed in this study face increasing demand pressures arising from population growth, trade expansion, and changing shipping patterns. In many cases, infrastructure development has not kept pace with cargo growth, resulting in congestion, operational bottlenecks, and reduced competitiveness. For example, the Port of Karachi is located in Karachi City, with the expanding city encroaching on the port's limits. This affects the access to ports, especially during morning and evening peak hours, affecting the first-mile and last-mile deliveries. IsDB and ICDT can prioritize support for strategic investments that address critical capacity constraints, including:

- Identify all seaports that face such issue and select the most urgent ones to begin a study that examines the cost-benefit of relocating the ports.
- Development of deep-water berths capable of accommodating larger vessels.
- Expansion of container terminal handling capacity.
- Modernization of cargo-handling equipment and terminal operating systems.
- Improvement of road, rail, and inland logistics connections between ports and their hinterlands.

Development of logistics zones and dry ports that extend the economic reach of maritime gateways.

6.3 Promote Port Resilience and Supply Chain Continuity

The recent disruptions demonstrate the vulnerability of global supply chains to geopolitical tensions and external shocks. Future capacity development efforts should therefore extend beyond efficiency considerations to incorporate resilience and business continuity. IsDB and ICDT can support ports in developing resilience strategies that include:

- Risk assessment frameworks for geopolitical, climate-related, operational, and cyber threats.
- Business continuity and emergency response planning.
- Diversification of shipping connections and trade corridors.
- Enhanced cooperation among customs authorities, border agencies, and logistics stakeholders during crisis situations.
- Development of contingency procedures for vessel rerouting and cargo diversion.

The adoption of International Ship and Port Facility Security (ISPS) is a good starting point. The ISPS Code is a comprehensive set of measures established by the International Maritime Organisation (IMO) to detect and deter security threats in international shipping.

6.4 Facilitate the Transition towards Green and Sustainable Ports

Environmental sustainability is becoming an increasingly important determinant of port competitiveness. International shipping lines, cargo owners, and investors are placing greater emphasis on environmental performance, emissions reduction, and climate resilience.

The assessment indicates that environmental and sustainability performance remains an area requiring further attention across many OIC Member Countries. Consequently, IsDB and ICDT can promote the development of green ports through:

- Investments in renewable energy systems and energy-efficient infrastructure.
- Electrification of port equipment and vehicles.
- Shore power facilities to reduce emissions from vessels at berth.
- Green port certification programmes and environmental management systems.
- Climate adaptation measures addressing sea-level rise, extreme weather events, and coastal vulnerability.

6.5 Strengthen Human Capital and Institutional Capacity

Infrastructure investments alone are insufficient to improve port performance if they are not accompanied by adequate human and institutional capabilities. It is imperative to develop the workforce, technical skills, managerial capacity, and organizational effectiveness in supporting modern port operations. ICDT and IsDB can therefore support:

- Port management and leadership development programmes.
- Technical training in terminal operations, digital technologies, environmental management, and logistics planning.
- Exchange programmes involving leading ports within and outside the OIC.
- Development of professional certification programmes for port and logistics personnel.
- Capacity development support for customs administrations and maritime regulatory agencies.

6.6 Phased Implementation

Given the diversity of development levels among OIC ports, a phased implementation approach is recommended.

Short-Term Priorities (1–2 Years)

- Port diagnostic studies and master planning.
- Digitalization initiatives and customs modernization.
- Capacity development and training programmes.
- Establishment of the OIC Port Knowledge Exchange Platform.

To lay the foundation for sustainable port development, IsDB and ICDT can prioritize four mutually reinforcing initiatives.

- First, **port diagnostic studies using the methodology** developed in this report can be undertaken to identify infrastructure bottlenecks, operational inefficiencies, institutional constraints, and future capacity requirements. Building on the assessment framework developed under this study, these diagnostics can inform long-term master plans that align port development with national trade strategies, logistics needs, and regional connectivity objectives.
- Second, **digitalization initiatives and customs modernization** can be accelerated to improve operational efficiency and trade facilitation. Priority

interventions include the implementation of Port Community Systems, digital cargo tracking, electronic documentation, automated gate management, and integration with National Single Window platforms. Customs modernization efforts should focus on risk-based inspections, streamlined clearance procedures, and enhanced inter-agency coordination to reduce cargo dwell times and logistics costs.

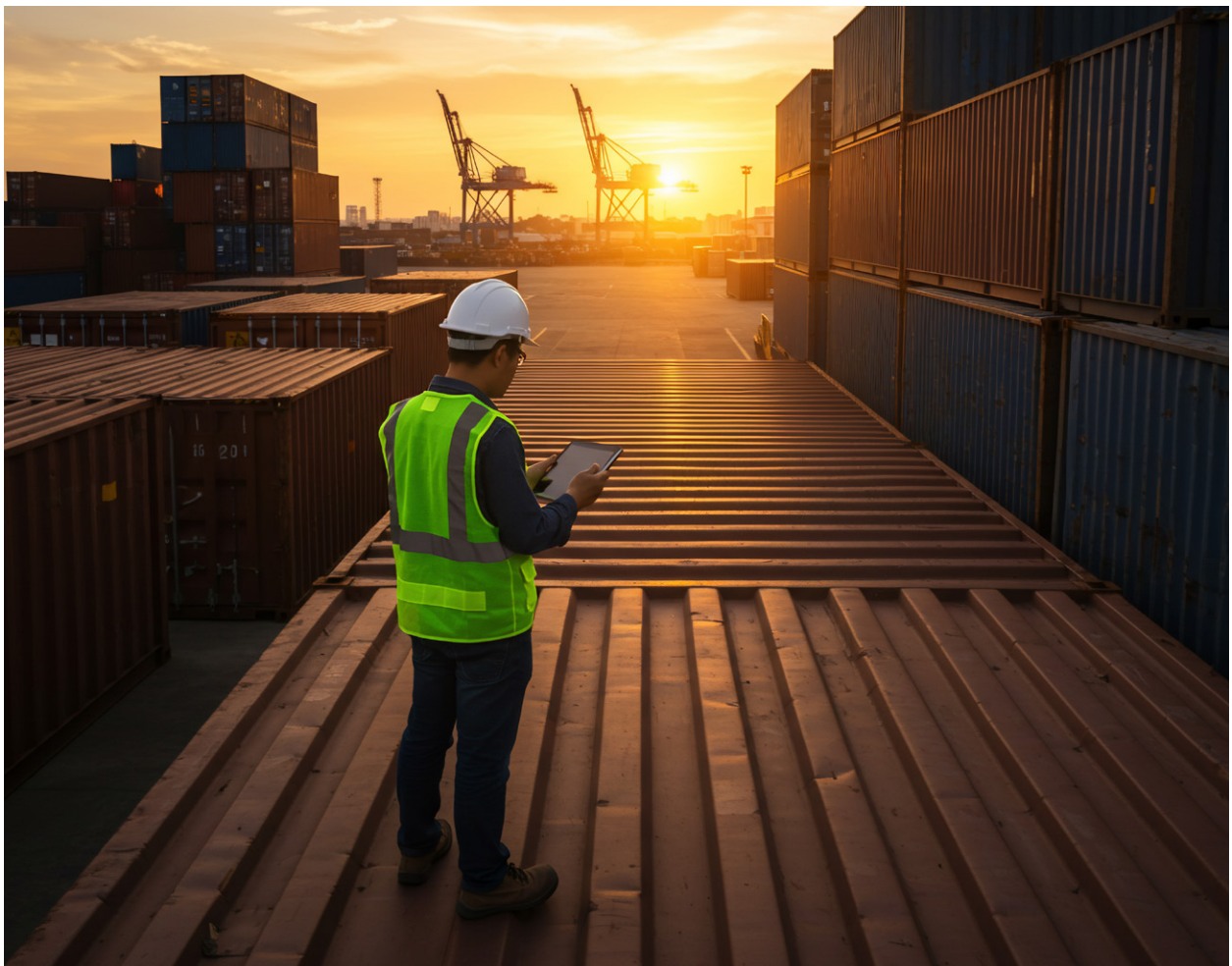
- Third, **capacity development and training programmes** can be developed to strengthen technical, managerial, and operational capabilities within port authorities, customs administrations, and logistics organizations. Training areas are suggested to include port management, digital transformation, terminal operations, maritime logistics, environmental sustainability, and crisis management. Study visits and peer-learning opportunities with leading ports should complement formal training activities.
- Finally, **an OIC Port Knowledge Exchange Platform** can be established to facilitate systematic cooperation among Member Countries. The platform could support benchmarking, dissemination of best practices, technical workshops, study visits, staff exchanges, and thematic working groups on digitalization, sustainability, trade facilitation, and resilience. Such a platform would institutionalize South-South cooperation and help accelerate the transfer of knowledge and expertise across OIC ports.

Medium-Term Priorities (3–5 Years)

- Infrastructure modernization and equipment upgrades.
- Port community systems and trade facilitation reforms.
- Green port pilot projects.
- Port partnership and technical cooperation programmes.

Following the actions in the short term (1-2 years), OIC Member Countries can then focus on strengthening port competitiveness through targeted infrastructure investments, deeper digital integration, environmental sustainability initiatives, and structured cooperation among ports.

- **Infrastructure modernization and equipment upgrades** can be prioritized to address operational bottlenecks and accommodate future cargo growth. Depending on the needs of individual ports, this may include berth expansion, channel deepening, modernization of container yards, procurement of ship-to-shore cranes and yard equipment, development of intermodal facilities, and improvements to road and rail connectivity. Investments should focus not only on increasing capacity but also on improving operational efficiency, vessel turnaround times, and service reliability.



- Building on earlier digitalization efforts, **Port Community Systems (PCS) and trade facilitation reforms** can be expanded and fully integrated across the port ecosystem. This includes connecting customs authorities, terminal operators, shipping lines, freight forwarders, and other stakeholders through interoperable digital platforms. Trade facilitation reforms need to focus on harmonizing procedures, reducing documentary requirements, enhancing risk-based inspections, and improving cross-border coordination. Such measures can significantly reduce transaction costs and improve supply chain predictability.
- **Green port pilot projects** can be introduced to support environmental sustainability and prepare ports for evolving international requirements. Potential initiatives include deployment of renewable energy, electrification of cargo-handling equipment, shore power facilities for vessels at berth, energy-efficient lighting systems, and environmental monitoring programmes. Pilot projects can serve as demonstration models that may later be scaled up across other OIC ports.
- Finally, **port partnership and technical cooperation programmes** can be formalized to facilitate long-term knowledge transfer and institutional development. Building on the findings of this study, partnerships can be established between ports at different stages of development, focusing on areas such as digitalization, terminal operations, customs modernization, maritime connectivity, sustainability, and resilience. Structured exchanges of technical personnel, joint training programmes, study visits, and collaborative pilot projects can help accelerate the adoption of best practices while strengthening cooperation among OIC Member Countries. Through such partnerships, successful experiences from more advanced ports can be systematically adapted and replicated across the region.

Long-Term Priorities (5+ Years)

- Large-scale port expansion projects.
- Maritime corridor development initiatives.
- Advanced automation and smart port solutions.
- Comprehensive climate resilience and decarbonization programmes.

Over the longer term, OIC Member Countries can pursue transformational initiatives that position their ports as globally competitive, technologically advanced, environmentally sustainable, and resilient gateways for international trade. These investments require substantial planning, financing, and institutional commitment, but are essential for supporting future trade growth and strengthening integration into global supply chains.

GREEN PORT PILOT PROJECTS CAN BE INTRODUCED TO SUPPORT ENVIRONMENTAL SUSTAINABILITY AND PREPARE PORTS FOR EVOLVING INTERNATIONAL REQUIREMENTS. POTENTIAL INITIATIVES INCLUDE DEPLOYMENT OF RENEWABLE ENERGY, ELECTRIFICATION OF CARGO-HANDLING EQUIPMENT, SHORE POWER FACILITIES FOR VESSELS AT BERTH, ENERGY-EFFICIENT LIGHTING SYSTEMS, AND ENVIRONMENTAL MONITORING PROGRAMMES.

- **Large-scale port expansion projects** can be undertaken where sustained cargo growth and strategic importance justify additional capacity. Such projects may include the development of new terminals, expansion of existing port complexes, construction of deep-water berths capable of accommodating larger vessels, and development of integrated logistics and industrial zones. Port expansion should be closely aligned with national economic development plans and regional trade strategies to maximize economic benefits and avoid excess capacity. Particular attention need to be given to strengthening hinterland connectivity through road, rail, and inland logistics networks to ensure that port investments translate into broader trade and economic gains. For example, the Ports of **Aktau**, **Kuryk**, **Baku** and **Turkmenbashi** at the Caspian Sea are expected to handle rising volume of containerized freight traffic driven by the rapidly increasing China-Europe container block trains. These ports would need significant expansion.
- **Maritime corridor development initiatives** can be pursued to enhance regional connectivity and reduce dependence on a limited number of trade routes and maritime chokepoints. The 2026 disruptions highlighted the vulnerability of global supply chains to geopolitical shocks and underscored the importance of diversified transport networks. IsDB and ICDT can support initiatives that strengthen strategic maritime and multimodal corridors linking OIC Member Countries, including connections between Central Asia, South Asia, Southeast Asia, the Middle East, and Africa. Enhanced corridor development can facilitate trade, improve market access, and increase supply chain resilience across the OIC region.

- As ports become increasingly technology-driven, **advanced automation and smart port solutions** emerge as a central component of long-term modernization strategies. These may include automated container handling systems, artificial intelligence-based terminal planning, digital twins for port operations, predictive maintenance systems, autonomous equipment, and advanced data analytics platforms. The adoption of smart port technologies can improve operational efficiency, optimize asset utilization, enhance safety, and support more informed decision-making. In parallel, investments in cybersecurity and digital infrastructure will be necessary to protect increasingly interconnected port systems from emerging risks.
- Finally, **comprehensive climate resilience and decarbonization programmes** can be integrated into all aspects of future port development. Ports face growing exposure to climate-related risks such as sea-level rise, coastal erosion, flooding, and extreme weather events, while international shipping is simultaneously under increasing pressure to reduce greenhouse gas emissions. Long-term initiatives need to include climate adaptation measures, resilient port infrastructure design, renewable energy integration, electrification of port operations, low-carbon logistics solutions, and support for alternative marine fuels. By embedding sustainability and resilience into future development plans, OIC ports can strengthen their competitiveness, meet evolving international standards, and contribute to global climate objectives while safeguarding long-term operational continuity.

6.7 Conclusion

This study represents a methodologically rigorous effort to assess the performance, competitiveness, and development needs of cargo seaports across OIC Asian Member Countries. Using a structured, multi layered analytical framework, the assessment progressed from a broad country level evaluation to a detailed port level comparison, ultimately identifying ports most suitable for targeted capacity development and knowledge exchange initiatives. The results contribute to a deeper understanding of the structural conditions that shape port performance in the region and offer a vision toward enhancing maritime connectivity, trade efficiency, and economic integration within the OIC.

This assessment provides the analytical clarity needed to guide future interventions and investments. By identifying where capacity gaps are greatest, and where opportunities for high impact improvement exist, the study lays the groundwork for targeted technical assistance, infrastructure development, policy reforms, and strategic partnerships. The forthcoming deep dive phase will therefore be crucial in translating analytical insights into implementable solutions that contribute to stronger, more connected, and more competitive port systems across the OIC region.

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