



SUSTAINABLE PORT DEVELOPMENT AND IMPROVING PORT PRODUCTIVITY IN ESCAP MEMBER COUNTRIES

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This report has been issued without formal editing.

Summary

From an economic and environmental point of view, sustainable port development is a very important issue not only for the government as port management agencies but also for port authorities and terminal operators. It is important to harmonize the roles and functions of individual ports with Sustainable Development Goals (SDGs) as ports have a direct impact on international and domestic freight transportation as well as local and national economic and social development. Since ports emit not only carbon dioxide but also various air pollutants through cargo handling equipment, related facilities and berthing vessels, the introduction and diffusion of environment friendly policies in ports are becoming urgent policy agendas.

In this context, the project have focused to fostering progress toward achievement of SDGs 9.1 (Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all) and 9.4 (By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities)

In this regard, ESCAP's Transport Division is mandated to implement the Regional Action Programme for Sustainable Transport Connectivity in Asia and the Pacific, phase I (2017-2021); Commission resolution 73/3 on Advancing integrated and seamless connectivity for sustainable development in Asia and the Pacific; and Commission resolution 71/6 on Maritime transport connectivity for sustainable development.

In accomplishing this mandate, the Division conducted a study project that included organization of "Capacity Building Workshop on sustainable port development and improving port productivity among ESCAP member countries". The overarching objective of the project is to assist member countries to promote sustainable port development and improve port productivity.

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Chapter 1. Introduction

1.1 Background

Port development and productivity play a crucial role in economic development and regional connectivity in Asia and the Pacific. Over the recent years, the rates of economic and trade growth in the Asia-Pacific region have shown to be higher than the world average and this situation is expected to continue, although to a lesser degree. The rate of growth of the maritime and port traffic, which is driven by global economic growth and international trade, is likely to decline slightly due to the global economic downturn and difficult trade relations, but the growth trend is expected to be maintained.

The shortage of ports' capacity directly hinders international trade, prompting Governments to seek to “unlock” the capacity constraints in and around ports. In many cases, the port territory (seabed and land) is owned by Government, which, in principle, should enable greater facilitation of trade and policy implementation, bringing wider economic benefits at the local, national or regional level. This theory is challenged by fiscal reality. Increasingly competing calls on the public budget mean that Governments do not have the financial resources to spend, or the inclination to commit available funds, to unlock port capacity constraints and to improve efficiency.

Unlocking capacity constraints and improving efficiency at ports can be achieved through various techniques, enhancing port capacity and associated inland logistics (through infrastructure enhancement or development) and increasing the efficiency of marine and inland operations (through infrastructure enhancement and service innovation). Competition between ports (and between terminals within ports) also drives efficiency. Competition in the shipping industry has an impact on port development with the shipping industry exerting pressure on ports to invest in order to accommodate increasingly larger vessels.

Because ports are valuable assets, and the port capacity, in itself, is valuable, there is a strong interest from the private sector to invest in their development, as demonstrated by the development of trans-shipment ports around the world (including the world's largest ports in Singapore). New ports and new port infrastructure are being increasingly developed with the involvement of the private sector, comprising some of the world's most known companies. This brings also a wider dissemination of global best practices, leading to increased quality of service, improved efficiency of operations and improvement in the allocation of public spending¹.

1.2 Objective of the report

In Asia and the Pacific, port capacity is under the daily pressure of growing commercial demand, making enhancing that capacity a crucial part of the port's development strategy. Often, this can

¹ Accessible from: <https://www.ashurst.com/en/news-and-insights/insights/ir1-port-developments-in-asiapac/>

lead to an accumulation of projects. However, these numerous projects are sometimes carried out without adequate long-term vision, which, in turn, limits their impact and benefits. By a way of example, it is already acknowledged that building new ports next to each other is no longer a valid option for financial, land-use related and environmental reasons. The concept of “Integrated Intermodal Transport” has been increasingly considered around the world as a way to address capacity constraint issues in ports. Other ports enhancements, such as transshipment operations, have also shown potential for enhancing efficiency and smooth operation of container transport.

Although Asian countries have been historically exposed to port development and maritime trade as a driver of their economic growth, the status of port development is still fragmented and largely different across the region. This is largely due to different level of economic development, financial resources, technical capacity and a lack of effective implementation. Some Asian ports, display high level of technological and operational development and ports in the region, placing them among global leaders in port performance, but this is far from being true for most of the ports in the region. The unevenness of port development ultimately reduces the benefit of the regional port system. To unlock its full potential, tangible outputs, proper governance, enforcement and implementation strategies must be put in place. There is a general recognition among governments and private sector in the region that any procurement structure should be structured in a way that ensures that the port capacity and its value are optimized. Regional cooperation and coordination are key in this respect, as they allow to maximize interoperability and tailor solutions to the local conditions. According to UNCTAD, ports should adopt sustainable growth strategies to protect ports from climate change as well as strengthening greener and more sustainable ports. However, the transition to a greener and more sustainable port requires not only procurement of large-scale investment resources, but also technical support for developing countries and various measures to strengthen their capabilities.²

Against this background, this report aims to provide key information and policy guidelines on improving port productivity and enhancing cooperation between public agencies and the private sector including shipping lines and shippers. The report also highlights the link between the roles and functions of ports and the implementation of the Sustainable Development Goals (SDGs), due to the port’s direct impact on international and domestic trade as well as on local economic, environmental and social development.

² UNCTAD, Review of Maritime Transport 2019.

Chapter 2. Status and Challenges on Sustainable Port Development and Productivity Improvement

2.1 Port Development and Productivity: current situation

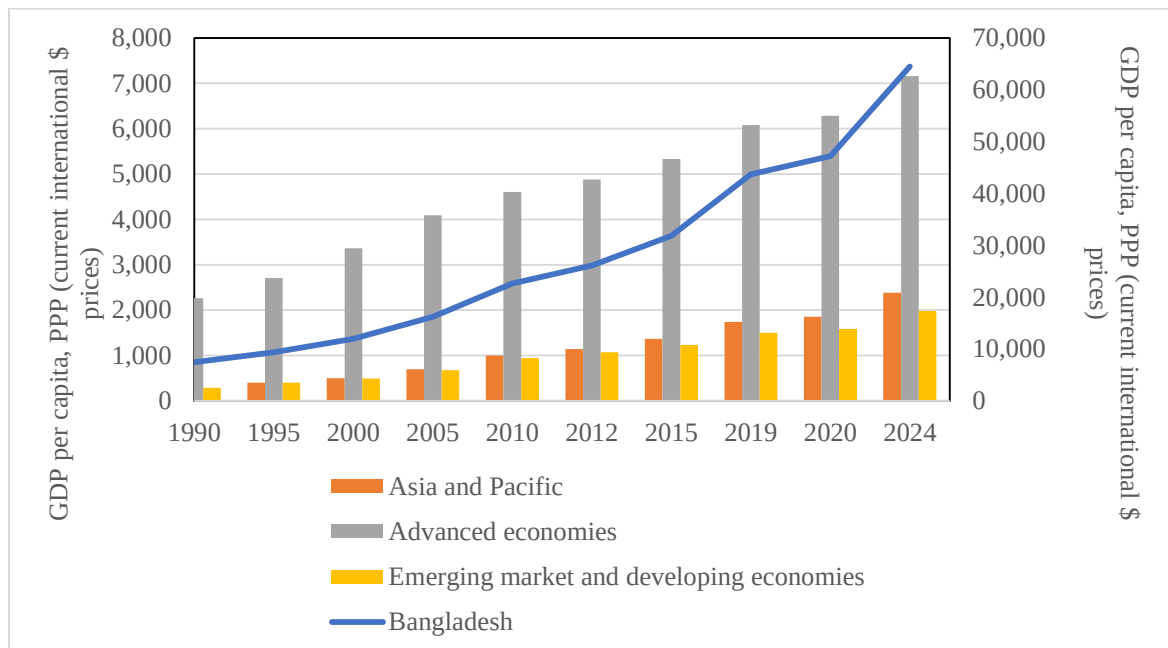
Current chapter offers “as is” analysis of the port development and productivity in selected UNESCAP member States. For each included country, it offers a) a general overview, b) national port development policies, c) examples of national good practices and d) challenges for further port development and productivity enhancement.

2.1.1 Bangladesh

1) Overview

Bangladesh is the 42nd largest market-based economy in nominal term in the world and 31st largest by purchasing power parity. It is classified among the next eleven emerging market middle income economies and is considered to be a frontier market. Over the past few years, Bangladeshi economy has been growing rapidly and it continues to grow at an impressive rate. According to the IMF, Bangladesh remained the second fastest growing major economy from 2016 to 2018, with a rate of 7.0 percent.

Figure 2.1.1.a. Bangladesh GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: IMF Data Mapper, accessed on April 2019.

Footnote: GDP per capita, PPP, current international \$: in this report, we adopted GDP per capita, PPP, current international dollar as an economic measurement from IMF to make

comparative balance among the 11 selected countries, in order to measure purchasing power parity (PPP) rate of GDP per capita, which based on international dollar.

Geographically, Bangladesh is suited in the north-west part of the Bay of Bengal and it is a densely populated nation. Its vast sea area is 1.5 times larger than the land area. Around 36,000 sq.km or 25 percent of the country's total landmass are located near the coastal area,. There are more than 200 rivers in the country covering 22,155 sq.km or almost 11 percent of total land area. Therefore, maritime sector is a core of the Bangladesh economic activities, and its seaports are highly important for the South Asia region due to this geographical location on a connecting route for the neighboring nations.

In 2017- 2018, goods worth 51.53 billion US dollars were imported in Bangladesh while goods worth 36.66 US dollars were exported. The import and export trade have increased by 24.36 percent in the last five years.

Figure 2.1.1.b. Bangladesh maritime world share for 2017



Source: UNCTAD stat (<http://unctadstat.unctad.org>), accessed in April 2019.

The sustained economic growth has significantly increased the demand for energy, transport and urbanization in Bangladesh. However, this growth together with insufficient planning and investment has resulted in increasingly severe infrastructure bottlenecks. To achieve its aspiration of becoming upper-middle income country, the country needs to implement structural reforms, expand investments in human capital, improve domestic revenue mobilization, increase female labor force participation, and raise productivity through increased global value chain integration. Improving infrastructure as well as the business climate would also allow new productive sectors to develop and would generate jobs.

2) National port development policies

There is, currently, no national master plan in Bangladesh dealing specifically with sustainable port development. However, Bangladesh Government is working on its Seventh Plan to set investment priorities in a way to gets best results from limited resources in the country.

While there has been improvement in Chittagong Port container handling efficiency, further efforts are needed to increase efficiency in line with good international practices. To this end, during the Seventh Plan, according to the current policies, priority would be given to:

- a. Reducing port induce-trailer truck traffic by developing wider international rail and river connectivity;
- b. Enhancing already saturated container storage port yard facilities by developing existing dilapidated 2.3km general cargo berthing facilities at Kanrnaphuli into a modern gateway-terminal of international standard that can play a key role in boosting the nation's trade and commerce and regional connectivity
- c. Developing the Chittagong Port as "Climate resilient" against sea level rise and land subsidence potential
- d. Maintaining and improving the navigability of the channel through capital dredging and regular maintenance dredging
- e. Increasing container handling capacity through expansion of terminal/yard facilities. Acquisition of modern container handling equipment and procurement of harbor crafts and vessels to ensure improved operating system
- f. Setting up ICDs/CFS by the Public/Private sector at all potential cargo distribution centres across the country to decongest the port
- g. Involving private sector in port management and port development infrastructure on BOO/BOT/PPP model for which a clear, reliable and transparent policy guideline is to be approved by the Government
- h. Improving institutional capacity in training, planning, safety and environmental management control in the port

Payra Port

The first phase of the green field port development comprises capital dredging works, which will be carried out by Belgium's Jan de Nul under a PPP framework agreement, and the creation of two new port terminals. The port, which is scheduled to be operational by 2022, will also have strong rail, road and waterway links to capital, Dhaka. It will be as essential link in the Bangladesh-China-India-Myanmar Economic Corridor and as such will have a great impact on the economic development of Bangladesh.

Matarbari Port

The 1200 MW Matarbari Ultra Super Critical Coal-fired power Plant project funded by the Government of Japan contains the important component: the deep sea port for the coal import, which will provide the opportunity for generation companies planning to develop the coal-fired power plants to procure the international coal at a relatively cheaper price compared to the individual purchased coal from foreign countries. The Government also taking steps to strengthen the land ports to facilitate trade with neighbors. This will be an important priority for the Seventh Plan.

3) Example of national good practices: Chittagong Port

The port of Chittagong is the busiest seaport on the coastline of the Bay of Bengal, and the second busiest in the overall region of countries dependent on the Bay of Bengal. According to

Lloyd's, it ranked as the 71st busiest port in the world in 2017³ located in the Bangladesh port city Chittagong and on the banks of the Karnaphuli River, the port of Chittagong handles 90 percent of Bangladesh's trade, and has been used by India, Nepal and Bhutan for trans-shipment.

The privatization of port operations, seen around the world and experienced here, has succeeded in increasing efficiency and productivity of ship operation and cargo handling. Globalization, deregulation, logistics integration and containerization have forced a reshape of the port industry internationally, leading it to redefine its functional role in the supply chain for the sake of creating customer value, and ensuring survival and growth. This wave of change has also impacted all sectors of Bangladesh in general, particularly the maritime sector. Consequently, cargo handling through Chittagong Port has not only rapidly increased but cargo type has also diversified. Foreign trade accounts for approximately 38% of GDP. The average maritime dependency factor of the country is about 33% in the last five years.

The private sector is playing an increasingly active role in the economic life of the country, while the public sector concentrates more on the physical and social infrastructure. 75 percent of total investment in the national economy comes from the private sector. To encourage the private sector and create an investment friendly environment, the government has produced the Bangladesh Private Sector Infrastructure Guidelines (BPSIG) to foster private sector participation in the development of infrastructure in the country.

Figure 2.1.1.c. Chittagong Port Performance 2016-2017

Performance Type	Year 2016 - 2017	
Vessels Calls	3,092	2016 - 2017 FY
Container traffic (TEU's)	2,419,482	2016 - 2017 FY
Total Cargo Handling (mt)	73,174,044	2016 - 2017 FY
Total Annual Capacity of the Port	41,000,000	2016 - 2017 FY

Source: Chittagong Port Authority (CPA), 2019

Figure 2.1.1.d. Chittagong Port capacity 2016-2017

Capacity Type	Bulk (mt/year)	Container (TEU's/year)	Conventional (mt/year)
Export activity of the Port	-	1,207,608	6,395,923
Import activity of the port	-	1,211,874	17,084,610

³ Accessible from: <http://www.dhakatribune.com/bangladesh/2016/10/08/chittagong-port-ranks-76th-lloyds-register/>

Source: Chittagong Port Authority (CPA), 2019

Figure 2.1.1.e. Chittagong Port berthing specifications

Port Specifications	Nb	Bulk Min (m)	Bulk Max (m)	Conventional Min (m)	Conventional Max (m)
Berths	31	2.2 m	186 m	2.2 m	190 m
Anchorage	No limitations	8.5 m	11,5 m	8.5 m	11.5 m
Draught at anchor	n/a	8.5 m	11,5 m	8.5 m	11.5m
Draught at Berth	n/a	8.55 m	9,2 m	8.55 m	9.2 m
Length Over All	n/a	No limitations	186 m	No limitations	186 m
Beam (maximum)	n/a	No limitations	No limitations provided length is 186 m	No limitations	No limitations provided length is 186 m

Source: Chittagong Port Authority (CPA), 2019

Figure 2.1.1.f. Chittagong Port handling equipment

Appliance	Quantity	Capacity (Ton)
Mobile Crane	41	10–50
Forklift Truck	10	10–20
Forklift Truck	111	3–5
Low Mast Forklift	45	2.5–5
Tractors	9	25
Trailers – Light	22	6
Trailers – Heavy	5	25

Source: Chittagong Port Authority (CPA), 2019

4) Challenges for further port development and productivity enhancement

While the income growth, human development and vulnerability reduction efforts to date have been extraordinary, Bangladesh faces daunting challenges with about 24 million people still living below the poverty line. The country is at an important juncture, when with the right policies and timely action, it can move up within the middle-income bracket. The World Bank has identified job creation as the country's top development priority. Bangladesh needs to create more and better jobs to manage the problems related to rising youth unemployment and informal nature of the jobs. To do so, Bangladesh will need to remove the barriers to higher investment posed by low access to reliable and affordable power, poor transportation infrastructure, limited availability of serviced land, uncertain and complex business regulation, among others.

Challenges related to rapid urbanization and climate change needs to get addressed through long-term planning.

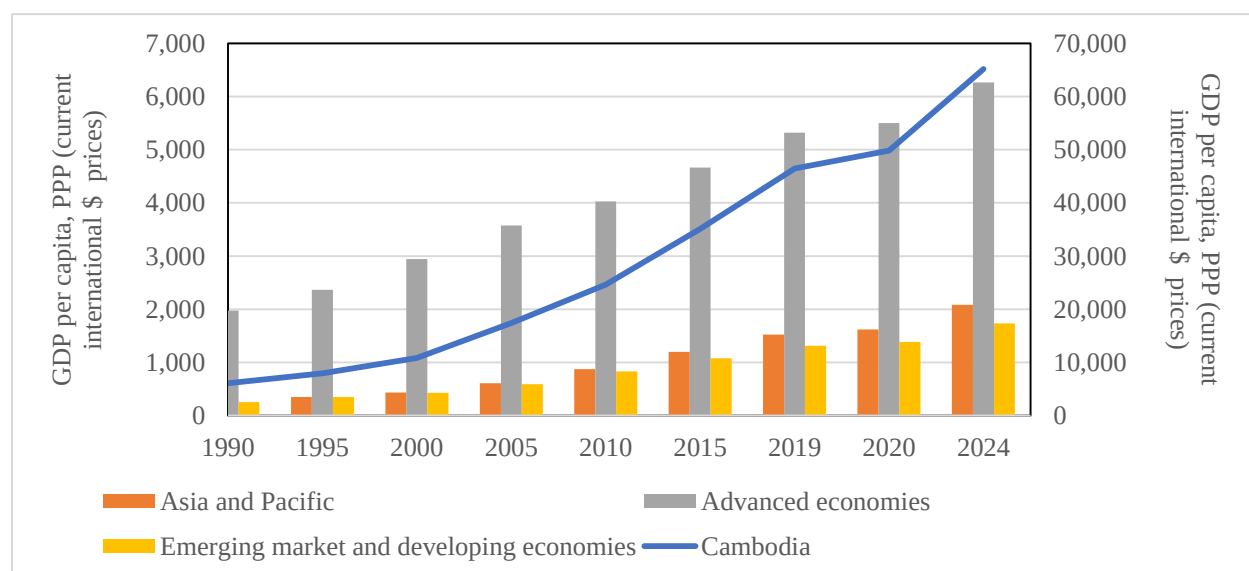
Chittagong Port is the major seaport of Bangladesh. It provides a major gateway for the country's trade with the outside world. During the year 2012-2013 Chittagong Port handled over 43.37 million metric tons of cargo including 1.47 million TEUs containerized cargo, which is around 92 percent of total maritime trade of Bangladesh. The GDP growth of Bangladesh economy is around 6-7 percent while the container traffic growth of Chittagong Port is about 14 percent which is double of GDP rate. Thus, Chittagong Port's contribution to the national economy is remarkable. To meet the challenges of globalization and liberalization of world trade and economy, Chittagong Port has undertaken many ambitious projects to enhance its capacity, improve efficiency and quality of services and also to develop adequate facilities to turn itself into a world class regional port.

2.1.2 Cambodia

1) Overview

Cambodia's economy has sustained an average growth rate of 7.7 percent between 1995 to 2018, making it among the fastest-growing economies in the world. In 2018, the GDP PPP per capita has reached 4,335 dollars, IMF predicted that the GDP PPP per capita will reach 6,516 dollars (Figure 2.1.2a). Cambodia major exports comprise of articles of apparel, accessories, knit or crochet printed books. The majority of exports are destined to the United States and Hong Kong, China.

Figure 2.1.2.a. Cambodia GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: IMF Data Mapper, accessed on April 2019

Cambodia located in the southwestern part of the Indochina peninsula and the land area is 181,035 km², bordering Thailand, Lao PDR, Viet Nam, the Gulf of Thailand. The south and south-west of the country constitute a 443 km long coast at the Gulf of Thailand. The Central Plain lies central of the land and great river system, Tonle Sap, the Bassac River and Mekong River system flows north to south in the midst of Central Plain. The other parts of the land are highlands which are densely forested and sparsely populated.

IMF investigations warned that Cambodia was now subject to higher risks than before that could affect economic growth-including the potential loss of the EU's Everything But Arms (EBA) scheme, a spillover effect of China-US trade war and the UK's decision to leave the EU. Prime Minister Hun Sen in late March announced large-scale economic reforms, outlining a 17-point strategy to stimulate economic growth that he said could save the private sector up to 400 million US dollars per year. The strategy included a number of key money-saving initiatives for private business-including reducing cost associated with shipping, port services fees and electricity, as well as railway operation management reforms. He said the reforms will allow Cambodia's exports to remain competitive-even if the EU removes the Kingdom's access to EBA scheme.⁴

2) National port development policies

Cambodia does not currently have a comprehensive national master plan on sustainable port development. However, port development in Cambodia is historically strongly linked with help from ODA loans of Japanese International Cooperation Agency (JICA). The agency has been a traditional sponsor of port development in the country since the post-conflict reconstruction of Cambodia.

JICA has identified priority projects and mid-term to long-term objectives to reach. Based on their report, priority should be given to the following projects:⁵

- Evaluation of present facilities, identification specify of existing issues
- Efficient Operation of New Container Terminal in Port of Sihanoukville
- Development of Port of Sihanoukville according to Long-term Plan
- Development of Port of Phnom Penh
- Appropriate Development and Use of Coastal Zone
- Efficient Port Management
- Natural and environmental conditions
- Securing Port Security
- Development of SEZ at the Port

Also, beside ODA Loan projects, JICA provided Technical Cooperation Program (TCP) and Grant Aid (GA) as follows:⁶

- The Study on Master Plan and Feasibility Study of the Sihanoukville Port (1996-1997),

⁴ Accessible from: <https://www.phnompenhpost.com/business/imf-economic-outlook-robust>

⁵ JICA, *The Study on the Master Plan for Maritime and Port Sectors in Cambodia-Final Report*.

⁶ Accessible from: <http://www.pas.gov.kh/en/page/development-plan>

- The Study on Regional Development for the Phnom Penh and Sihanoukville Growth Corridor (2002-2003),
- The Study on Master Plan for Maritime and Port Sectors in Cambodia (2006-2007),
- The Project for the Improvement of Security and Equipment in Main International Port in the Kingdom of Cambodia (2008-2009) by using Grant Aid with the total of JPY927,000,000.
- The Project for Establishment of National Ports Policy and Administration Systems (2009-2011)
- The Project for the Study on Strengthening Competitiveness and Development of Sihanoukville Port in the Kingdom of Cambodia (2011-2012), and
- The Project for Capacity Development on Container Terminal Management and Operation in Sihanoukville Port (2013-2016).

Recently, in February 2017, Cambodia's Ministry of Public Works and Transport has been designing and implementing new National Logistics Master Plan in order to chart out Cambodia's logistics direction for the next 5 years. "The services sector, which includes logistics, is the biggest contributor to Cambodia's GDP, accounting for 42.3 percent in 2015"⁷. This Master Plan will cover ports and waterways that account for a large amount of handled logistics in the country, in order to revitalize transportation and enhance travel of goods in the region.

3) Example of national good practices: Sihanoukville New Container Terminal Project

The growing export trade is accelerating port development in Cambodia and foreign investors are looking for potential opportunities as box volumes soars.⁸

Sihanoukville New Container Terminal Project

In August 2017, an agreement was signed between the Government of the Kingdom of Cambodia and JICA to provide Japanese ODA loan of up to 23.502 billion yen for the Sihanoukville Port New Container Terminal Development Project.⁹

JICA gave green light to \$209 million low-interest loan for the new container terminal in exchange for the purchase of a direct equity stake of 13.5 per cent. Construction is due to start in 2019, and when completed in 2023, it should raise port's capacity to around 450,000 TEU per year.¹⁰

JICA has been a longstanding sponsor of Sihanoukville port development through ODA loans to fund restoration and rehabilitation of the neglected port during Cambodia's conflicts. The Japanese aid-agency funded the Sihanoukville Port Multipurpose Terminal Development Project, a new bulk terminal for vessels of up to 50,000 DWT. Through this project, Cambodia's ability

⁷ Asia Weekly, June 19, 2017. <http://epaper.chinadailyasia.com/asia-weekly/article-12724.html>

⁸ Accessible from: <http://splash247.com/cambodia-speeds-up-port-developments-as-exports-soar/>

⁹ Accessible from: https://www.jica.go.jp/english/news/press/2017/170808_01.html

¹⁰ Accessible from: <https://www.maritime-executive.com/article/japan-invests-in-cambodias-deepwater-port#gs.1YfkUOo>

to participate in global trade has improved significantly, allowing GDP to grow at a consistent level of 7 percent a year, driven by strong garment industry and rising exportations.¹¹

Currently, Sihanoukville port handles around half a million TEU a year and is becoming capacity constraint with rising cargo trade. Thailand's seaports in Laem Chabang, Klong Yai and S.Kittawan handle a share of Cambodia's cargo but they enforce an added layer of customs checks on Cambodia's shippers. The Vietnamese port of Cai Mep also handles significant volumes of Cambodian goods.¹²

4) Challenges for further port development and productivity enhancement.

There are several challenges to improving transport connectivity from/to ports in Cambodia.

On infrastructure level, shortages and poor maintenance of road infrastructure leads to significant traffic congestion in some areas. Also, there is a need to enhance the overall network strategy to make it holistic as it seems that rail is sometimes competing with road network. Also, concerning big scale projects, such as ports, there is still a high reliance on external aid for further development. As for dry ports and hinterland connectivity, transport hubs are yet not effectively organized and there is a lack of integrated plan for multi-modal transport.

On operational level, there is a need for a better cooperation in streamlining customs processes, for higher expertise in transport management, for adoption of mutual agreed standards among neighboring countries and for a better development of ICT ecosystem in particular to implement and operate fully Single Window facilities.

At institutional level, government still needs to negotiate external aid in order to fund costly infrastructure projects. There is a need to involve more private sector and other stakeholders to mobilize necessary financial resources for further port development.

2.1.3 China

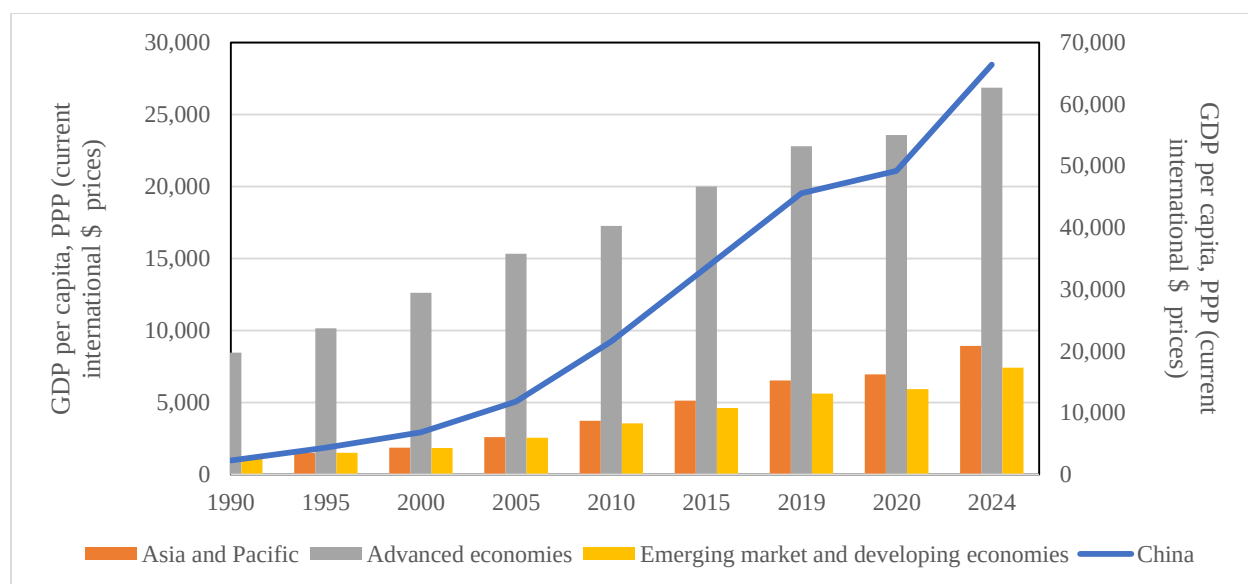
1) Overview

China with its fast-growing economy become the world's second largest economy by nominal GDP and the world's largest economy by purchasing power parity (PPP). Until 2015, China was the world's fastest-growing major economy, with growth rates averaging 7 percent over 30 years. Coming to 2018, official statistics placed real GDP growth at 6.6 percent with GDP PPP, per capita is 18,110 dollars (Figure 2.1.3.a).

¹¹ Ibid.

¹² Ibid.

Figure 2.1.3.a. China GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: IMF Data Mapper, accessed on April 2019

Electronics and machinery make up around 55 percent of total exports, garments account for 13 percent and construction material and equipment represent 7 percent. Sales to Asia represent over 40 percent of total shipments, while North America and Europe have an export share of 24 percent and 23 percent, respectively. Although exports to Africa and South America expanded rapidly, they only account for 8 percent of total shipments. The country's imports are mostly dominated by intermediate goods and a wide range of commodities, including oil, iron ore, copper and cereals. In order to supply factories and support China's rapid development. Supply of imports into China is mostly dominated by Asian countries, with a combined share of around 30 percent of total imports, Purchases from Europe and the US account for 12 percent and 8 percent, respectively. As a major buyer of commodities, imports from Africa, Australia, the Middle East and South America have increased strongly in the last decade to represent a combined share of around 50 percent.

The coastal ports in China are enabled for the transportation of coal, containers, imported iron, and grain, roll-on-roll-off operation between mainland and islands, and deep-water access to the sea. In port construction, China has especially strengthened the container transport system, concentrating on the construction of a group of deep-water container wharves at Dalian, Tianjin, Shanghai, Ningbo, Xiamen and Shenzhen, and thus laying the foundations for China's container hubs. The coal transportation system has been further strengthened with the construction of number of coal transport wharves. In addition, wharves handling crude oil and iron ore imports have been reconstructed or expanded. At the end of 2010, China's coastal ports had over 5,453 berths of medium size or above, of which 1,554 berths can accommodate vessels of more than

10,000-tons; their overall handling capacity was 4,144.9 million tons and the container throughput capacity of China's coastal ports has reached 121.3 million TEUs in 2010.¹³

Figure 2.1.3.b. Major Chinese ports



Source: Bansarchina(<https://www.bansarchina.com/>)

2) National port development policies¹⁴

China has eight of the world's 50 busiest container ports. These ports serve as the engines of China's economic growth, but they also bring heavy pollution to the cities, where these ports are located.

In recent years, the Chinese government has taken several major steps to control shipping pollution.

The 12th Five Year Plan (2011-2015) and the 13th Five Year Plan (2016-2020) set national targets for reducing energy consumption and carbon dioxide emissions, as well as further recommendations for green transportation development.

¹³ L. Zhen, M.M Cerban, and F. Piniella, "The Development of China's Coastal Ports in the Era of Globalization", Journal of Maritime Research, Vol.X. No.2 (2013),

¹⁴ Access from: <https://www.lexology.com/gtdt/tool/workareas/report/ports-and-terminals/chapter/china>

Since the National People's Congress passed a number of amendments to China's Air Pollution Prevention and Control Law (Law on Air Pollution) in August 2015, the Ministry of Transport has taken various steps to tackle shipping emissions.

Shortly after the amended Law on Air Pollution, the Ministry of Transport published the Specialised Action Plan for Ship and Port Pollution Prevention and Control (2015-2020), a Five Year Plan that aims to reduce Sulphur and Nitrogen oxide emissions by up to 65 per cent in some of China's major ports. The action plan includes specific goals and timetables for:

- setting up emission control areas (ECAs) around key port regions;
- promotion of shore power use for ships at berth;
- replacement of container trucks with liquid natural gas (LNG) powered trucks;
- development of LNG bunkering stations; and
- research and development of LNG-powered vessels.

Following the Specialised Action Plan, a new regulation was implemented that designated the Pearl River Delta, Yangtze River Delta and Bohai-rim Water as domestic ECZs. From 1 January 2017, ships berthing at the key ports in ECZs must use fuel with Sulphur content not exceeding 0.5 per cent. This will gradually be increased to all ports within ECZs from 2018 and then all areas within ECAs from 2019.

The Ministry of Transport also published the Port Shore Power Plan on 20 July 2017, targeting the construction of 317 berths with shore power supply across all the major ports and specifying the number of such berths to be constructed at each port.

Further, the Green Port Development Proposal (2018-2020) Consultation Paper was published recently, where a Green Port Grading Pilot Scheme was introduced as an incentive for the major ports to commit to green port development. Port operators may apply for green port development to the provincial administration of transport. The criteria for the assessment of green ports are consistent with the goals set out in the Five-Year Plan and other relevant laws, including resource consumption, emissions and waste, remediation of the contaminated area and landscaping, green modes of transportation and environmental management.

3) Example of national good practices

In 2006, the Port of Shanghai became the world's third-largest container port when it achieved a container throughput of 21.71m TEU. In 2006 it handled 537 million tonnes of cargo, which was 21.1% higher than the previous year's figure. Total throughput for 2007, including 560 million tonnes of cargo, was over 26 million TEU. In 2008, the port handled 582 million tonnes of cargo and 28 million TEU, increases of 3.2% and 7%, respectively, over the previous year. In 2008, the port handled nearly 62,000 domestic and international ships. Cargo throughput registered by the port in 2009 was 590 million tonnes.

In 2010, Shanghai port overtook the Port of Singapore and became the world's busiest container port. Shanghai's port handled 29.05 million TEUs, whereas Singapore's was a half million TEU's behind. In 2016, Shanghai port set a historic record by handling over 37 million TEUs.

The Port of Shanghai is a critically important transport hub for the Yangtze River region and the most important gateway for foreign trade. It serves the Yangtze economically developed hinterland of Anhui, Jiangsu, Zhejiang and Henan provinces with its dense population, strong industrial base and developed agricultural sector.

Wusongkou, Waigaoqiao and Yangshan are the three main container port areas of the Port of Shanghai. The Wusongkou area is managed by Shanghai Container Terminals Company (SCT), a joint venture of Hutchison Port Holdings Limited (HPH) and SIPG. Zhanghuabang Terminal, Jungong Road Terminal and Baoshan Terminal are the three container terminals operated by SCT. The facilities provided by the company include: container cleaning and management, storage and transport, inland goods storage and electronic data interchange.

The Waigaoqiao area is operated by Shanghai Pudong International Container Terminals, SIPG Zhendong Container Terminal Branch, Shanghai East Container Terminal Company and Shanghai Mingdong Container Terminals Limited. Shanghai Pudong operates in a 500,000m² area and has 147 container handling equipment and machinery, 36 RTG, ten quay cranes, 73 container trucks and 11 forklifts. Shanghai Mingdong facilitates container handling, storage and transfer. Other works carried out by the company include maintaining, cleaning and stripping of containers.

Shanghai Shengdong International Container Terminal Company is responsible for operating Yangshan Deepwater Port. The port's activities are carried out by 34 container quay cranes and 120 RTG. The terminal can handle containerised cargo of 2.2m TEU. The port is also facilitated by non-container terminals located on the Huangpu River. These terminals act as distribution centres for the remote areas of the port and contribute in the financial development of Yangtze River Valley.

4) Challenges for further port development and productivity enhancement

Main factors driving change in China's ports are;

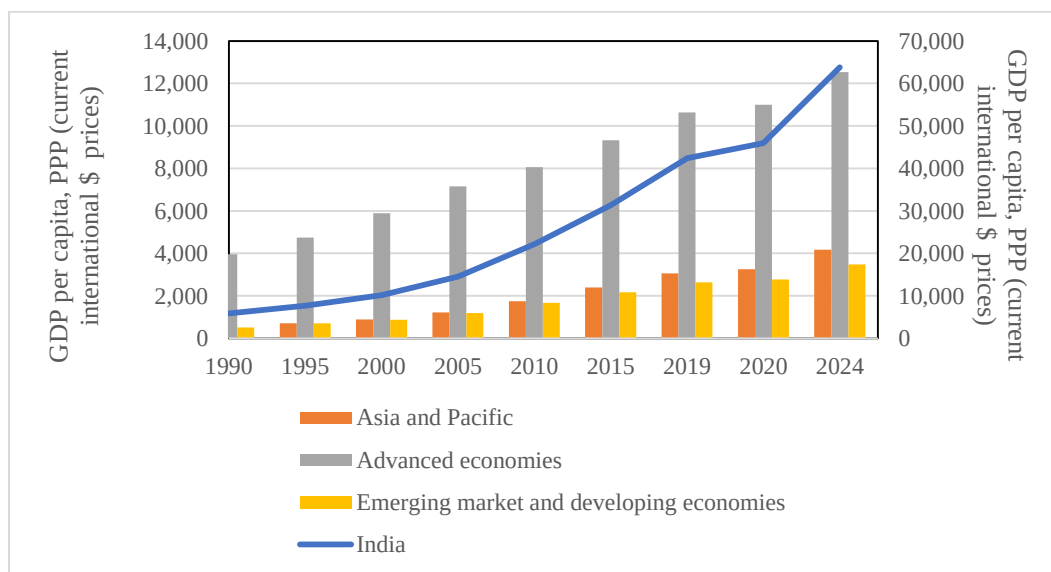
- Slower growth in container traffic due to the restructuring of the economy away from industrial production to consumer-oriented services.
- The shifting cargo base in the Pearl River Delta (PRD) and rising competition among PRD ports.
- Liner shipping industry consolidation requiring more scale in operations and better productivity.
- The development of the Shanghai Free Trade Zone and other major port zones.
- Environmental regulation seeking to tackle high emissions in port cities and high levels of public support for these policies.

2.1.4 India

1) Overview

India has emerged as the fastest growing major economy in the world and is expected to be in the top three economic power of the world over the next 10-15 years. The economy of India is a developing mixed economy. It is the world's seventh-largest economy by nominal GDP and the third largest by PPP. The per capita GDP (PPP) with 7,783 US dollars in 2018. After the 1991 economic liberalization, India achieved 6-7 percent average GDP growth annually. Since 2014 with the exception of 2017, India's economy has been the world's fastest growing major economy, surpassing China. The long-term growth perspective of Indian economy is positive due to its young population, corresponding low dependency ratio, healthy saving and investment rates, and increasing integration into the global economy. According to the World Bank's growth outlook, India was Number One in fiscal year 2015-2016, during which the economy grew 17.6 percent. Despite previous reform, economic growth is still significantly slowed by cumbersome procedures, shortage of infrastructure, and other factors.

Figure 2.1.4.a. India GDP per capita, PPP, Current international \$ price, 1980-2024 (Projected)



Source: IMF Data Mapper, accessed on April 2019

India exports approximately 7,500 commodities to about 190 countries, and imports around 6,000 commodities from 140 countries. In 2017, India exported 276 US billion dollars and imported 384 US billion dollars. Its key exports are engineering goods, petroleum products, gems and jewelry, agriculture products and textiles. It is also a major exporter of information technology and business outsourcing services. India major imports are petroleum products, gold and silver, electronic goods and precious stones. The major trading partner of India are China, the UAE, Singapore and the US. Meanwhile India is an active country which is a member of the Asia-Pacific Trade Agreement (APTA), The South Asian Association for Regional Cooperation (SAARC) and the World Trade Organization (WTO).

India is the sixteenth largest maritime country in the world, with a coastline of about 7,517 km, 14,500 km of potentially navigable waterways, forming one of the biggest peninsulas in the world. According to the Ministry of Shipping, around 95 percent of India's trading by volume and 70 percent value is done through maritime transport. Indian government has a federal structure, and according to its constitution, maritime transport is to be administered by both the Central and the State governments.

Figure 2.1.4.b. India ports



Source: <https://www.prokerala.com/maps/india/india-seaport-map.htm>

Figure 2.1.4.c. India port status

Ports in India	No. of Ports	Capacity (MTPA)	Traffic handled (2017-18) MT
Ports under Central (Federal) Government (Major Ports)	12	1451.19	679.37
Ports under State (Provincial) Government (Non-Major Ports)	200	832.19	529.10
Total	212	2283.38	1,208.47

Source: Government of India, 2019.

India has 12 major ports, administered by the Central Government, and around 200 “non-major” ports, administered by the nine coastal State Governments. Meanwhile, several of these minor and intermediate ports have been identified by the respective governments to be developed, in a phased manner, with a good proportion of them involving public-private partnership. In 2014-2015, out of the 200 Non-major ports, 69 ports were reported to have handled cargo traffic. The

infrastructure sector, particularly the Maritime sector is expected to grow significantly with the increase in international and domestic trade volumes. The Indian Government plays an important role in supporting the port sector. It has allowed Foreign Direct Investment (FDI) of up to 100 percent under the automatic route for port and harbor construction and maintenance projects. It has also facilitated a 10-year tax holiday to enterprises that develop, maintain and operate ports, inland waterways and inland ports.

2) National port development policies (Sagarmala Programme)¹⁵

India is one of the fastest growing large economies in the world and the ports play an important role in the overall economic development of the country. Many ports in India, such as JNPT, Mundra Port, Sikka Port, Hazira Port etc., are evolving into specialized centres of economic activities and services and are vital to sustain future economic growth of the country.

The Sagarmala Programme is an initiative by the Indian government and the flagship programme of the Ministry of Shipping, aimed to enhance the performance the country's logistics sector and to promote port-led development in the country. The programme envisages unlocking the potential of waterways and the coastline to minimize infrastructural investments required to meet these targets. This programme entails 130 billion US dollars on setting up new mega ports, modernizing India's existing ports, developing of 14 coastal economic zones (CEZs) and coastal employment units, enhancing port connectivity via road, rail, multi-modal logistics parks, pipelines and waterways and promoting coastal community development, with the aim of boosting merchandise exports by 110 billion US dollars and generating around 10,000,000 direct and indirect jobs. Sahamala aim to modernize India's Port so that port-led development can be augmented, and coastlines can be developed to contribute to India's growth. It also aims at "transforming the exiting ports into modern world-class ports and integrate the development of the ports, the industrial clusters and hinterland and efficient evacuation systems through road, rail, inland and coastal waterways resulting in ports becoming the drivers of economic activity in coastal areas."

Under Sagarmala programme, 577 projects, at an estimated investment of approximately 120 billion US dollars, have been identified across port modernization and new port development, port connectivity enhancement, port-linked coastal economic zone industrialization and coastal community development for phase wise implementation over the period 2015 to 2035. As per the approved implementation plan of Sagarmala scheme, these projects are to be taken up by the relevant Central Ministries/ Agencies and State Governments preferably through private/ PPP mode. The details are as below:

¹⁵Sagarmala programme <http://sagarmala.gov.in/about-sagarmala/background>

Figure 2.1.4.d. The projects of Sagarmala Programme

S. No.	Project Theme	No. of Projects	Project Cost (Rs 10)
1.	Port Modernisation	245	₹1,416,410 million (US\$20 billion or €18 billion)
2.	Connectivity Enhancement	210	₹2,444,640 million (equivalent to ₹2.6 trillion, US\$37 billion or €33 billion in 2018)
3.	Port-Linked Industrialisation	57	₹4,639,700 million (equivalent to ₹4.9 trillion, US\$70 billion or €63 billion in 2018)
4.	Coastal Community Development	65	₹69,760 million (equivalent to ₹73 billion, US\$1.1 billion or €940 million in 2018)
	Total	577	₹8,570,500 million (equivalent to ₹9.0 trillion, US\$130 billion or €120 billion in 2018)

Source: Ministry of Shipping, Government of India

Under Sagarmala programme, the following actions are envisaged:

- a) Port modernization and new port development:
 - 142 port capacity expansion projects (total cost: Rs. 91,434 Crore) identified for implementation over the next 20 years
 - New ports to come up at Vadhavan, Enayam, Sagar Island, Paradip Outer Harbour, Sirkazhi, Belekari
- b) Port connectivity enhancement;
 - India port rail corporation limited (IPRCL) has taken up 25 works across 9 major ports. 8 works have already been awarded and 5 more are targeted for award in the remaining part of FY 2016 to 2017. SPR is under preparation/ approval for the remaining 12 works
 - 27 rail connectivity projects identified, 21 projects (3300 km, total cost: Rs. 28,000 cr.) being taken up by Ministry of Railways and 4 projects (151 km, total cost: Rs. 3,590 cr.) are to be taken up either in Non-Government Rail (NGR) or JV model through Indian Port Rail Corporation Limited
 - 79 road connectivity projects identified, 45 will be done by MoRTH and NHAI, 34 will be done by State PWD, Port Authorities and Sagarmala Development Company in coordination with MoRTH / NHAI
 - DPR is under preparation for the heavy haul rail corridor between Talcher & Paradip
- c) Coastal Berth Scheme: This is a scheme to provide financial support to ports / State Governments for creation of infrastructure for movement of cargo/ passenger by sea or National Waterways. Under the Scheme, projects for construction/ up-gradation of exclusive coastal berths for coastal cargo and berths/jetties for passenger ferries; mechanization of coastal berths; capital dredging for operating non-major ports; construction of breakwaters for existing & Greenfield Non-major ports; construction of berths/ jetties in National

Waterways and islands by State Governments/UT; and construction of platforms/ jetties for hovercrafts/seaplanes will be considered for assistance.

- 5 projects sanctioned in FY 2015 to 2016; Fund of Rs. 70 Crore released
- 30 projects (cost: Rs.584.46 Crore) considered in FY 2016 to 2017
- Rs. 19.72 Crore sanctioned for 6 projects so far dedicated coastal berth at Porbandar Port (cost: Rs. 37 Crore)
- Construction of jetties at Bhayander (cost: Rs. 14.15 Crore)

d) Port-linked Industrialization

- 14 Coastal Economic Zones (CEZs) covering all the Maritime States and Union Territories have been proposed. CEZ perspective plans have been prepared and Detailed Master Plans will be prepared for 5 pilot CEZs (in Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh and Odisha) in the first phase of development.

e) Coastal Community Development

- Ministry is part-funding select fishing harbour projects under Sagarmala in convergence with Department of Animal Husbandry Dairying & Fisheries (DADF. Project for modernization & upgrading of Sassoon Dock, at a cost of Rs. 52.17 cr. has already been sanctioned. Ten additional proposals, across 5 Maritime States, are under consideration for approval
- Ministry is also supporting the development of deep-sea fishing vessels and fish processing centers in convergence with DADF
- A number of projects to enhance livelihood / employment opportunities for the coastal communities. Rs. 16.9 cr. Released under Sagarmala, for skilling projects covering more than 20,000 people across 20 coastal districts. This includes safety training for workers in Alang-Sosiya Shipyard in Bhavnagar District (Gujarat)
- Ministry is also undertaking skill gap analysis in 23 coastal districts to identify the skilling requirements and develop a roadmap for addressing the same. The action plan for 6 districts, in the first phase, has already been prepared
- To provide skilling for port & port user community, Ministry is planning to conduct cutting-edge skill training in ports & maritime sector and is evaluating the proposal for setting up Multi-Skill Development Centers linked to Major Ports, in collaboration with Ministry of Skill Development & Entrepreneurship

3) Example of national good practices

Under the project process, the global benchmarks were adopted to improve the efficiency and productivity KPIs for 12 major ports. Around 116 initiatives were identified across 12 major ports to unlock more than 100 MTPA capacity just through efficiency improvement. Out of which, 91 initiatives have been implemented to unlock around 80 MTPA capacity.

Figure 2.1.4.e. Status of operational productivity improvement at major ports

Port Name	Total Initiatives	Completed Initiatives	On Track Initiatives	Delayed Initiatives	Dropped Initiative
Paradip	14	13	0	0	1
Kandla	14	14	0	0	0
VOC	5	3	1	1	0
Kolkata	6	3	1	1	1
Haldia	9	5	1	3	0
JNPT	17	16	1	0	0
Mumbai	7	6	0	0	1
Goa	7	5	2	0	0
NMPT	5	2	0	0	3
Cochin	5	3	0	0	2
Vizag	5	5	0	0	0
Ennore	13	10	2	1	0
Chennai	9	6	0	2	1
TOTAL	116	91	8	8	9

Source: Ministry of Shipping, Government of India

For all the 13 major ports master plans have been finalized. From the port master plans, 106 port capacity expansion projects (cost: Rs. 67,697 Cr) have been identified for implementation over next 20 years and are expected to add 785 MTPA to the capacities at major ports.

Figure 2.1.4.f. Port master plan projects at major ports

Major	Port Master Plan Projects		
	No. of Projects	Project Cost (Rs. Cr)	Capacity Addition (MTPA)
Chennai	6	1187	14
Cochin	4	1388	4
KPL	16	12412	108
JNPT	10	17924	126
Kandla	14	6324	104
Kolkata	1	25	4
Haldia	8	3645	39
Mormugao	4	2345	23
Mumbai	8	5472	33
NMPT	4	843	18
Paradip	8	5224	78
Tuticorin	17	8974	182
Vizag	6	1935	52
Total	106	67,697	785

Source: Ministry of Shipping, Government of India

To fill the demand gap, 6 new major ports are planned which will bring in significant capacity expansion. The location of these new ports is deliberated after a detailed origin-destination study of cargo commodities. New port locations have been identified based on the cargo flow for key commodities and the projected traffic.

4) Challenges for further port development and productivity enhancement.

Despite their progress, India ports still need to address infrastructural and operational challenges before they evolve to the next level.

The operational efficiency of India ports has improved over the years, but it still lags the global average. For example, turnaround time (TAT) at major ports was approximately 4 days in 2014 to 2015, whereas global average benchmark is 1 to 2 days. Secondly, last mile connectivity to the ports is one of the major constraints in smooth movement of cargo to/from the hinterland. Around 87 percent India freight uses either road or rail for freight transport. A significant share of this cargo experiences “idle time” during its transit to the ports due to capacity constraints on highways and railway lines connecting ports to production and consumption centers.

Although water-borne transport is much safer, cheaper and cleaner, compared to other modes of transportation, it accounts for less than 6 percent of India’s modal split. By comparison, coastal and inland water transportation contribute to 47 percent of China’s freight modal mix, while in Japan and US, this share is 34 percent and 12.4 percent, respectively. Significant savings can be achieved by shifting movement of industrial commodities like coal, iron ore, cement and steel to coastal and inland waterways. However, more than 90 percent of coal currently moves via railways. These constraints on connectivity and sub-optimal modal mix results in higher logistics cost affecting the manufacturing sector and export competitiveness.

The location of industries/ manufacturing centre vis-à-vis the ports is also an issue. While cost differential between India and China is not significant on a per ton km basis, China still has a lower container exporting cost, than the cost in India, due to lower transport distances. Presence of major manufacturing and industrial zones in coastal regions in China, which were developed as part of the Port-Led policy of the government is the main reason for lower distances.¹⁶

2.1.5 Indonesia

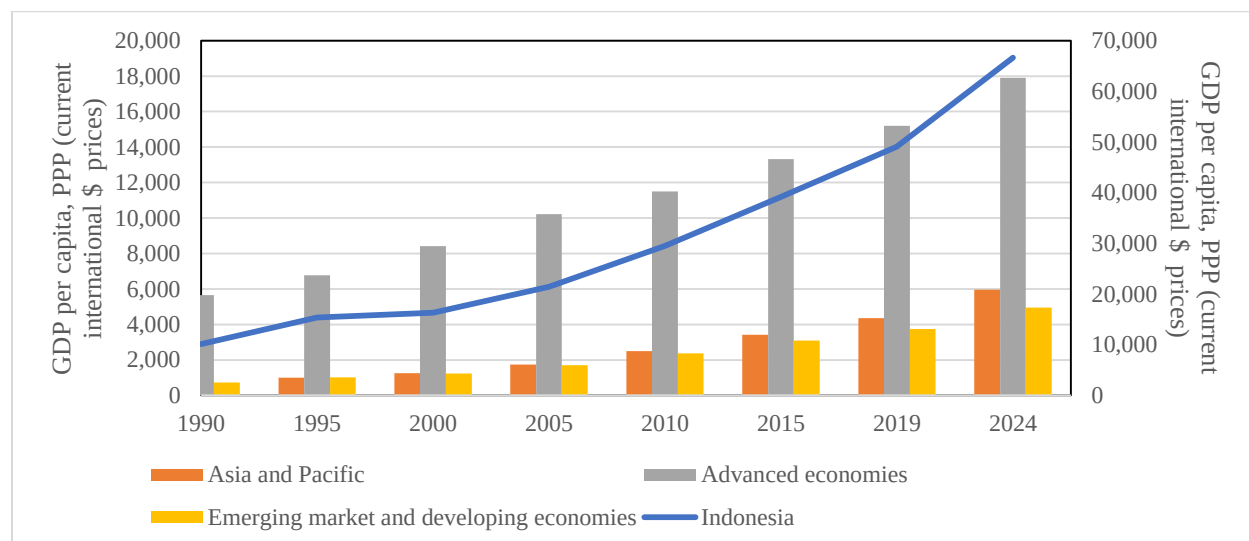
1) Overview

Indonesia has the largest economy in Southeast Asia and is one of the emerging market economies of the world. The country’s GDP per capita, PPP has steadily risen, from 4,665 dollars in the year 2000 to 13, 230 in 2018 (Figure 2.1.5.a), making it the world’s 10th largest economy in terms of purchasing power parity. Today, Indonesia is the world’s fourth most populous nation, a member of G20 and classified as a newly industrialized country. The country has made enormous progress in poverty reduction, cutting the poverty rate to more than half since 1999. Despite heightened global uncertainty, Indonesia’s economic outlook continues to be

¹⁶ Need for port-led development in India <http://sagarmala.gov.in/about-sagarmala/background>

positive, with domestic demand being the main drive of growth. According to the World Bank, supported by robust investment, stable inflation, and a strong job market, the country's economic growth is forecasted to reach 5.2 percent in 2019.

Figure 2.1.5.a. Indonesia GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: *Source: IMF Data Mapper, accessed on April 2019*

Indonesia's economic planning follows a 20-year development plan, spanning from 2005 to 2025. It is segmented into 5-year medium-term plans, called the RPJMN (Rencana Pembangunan Jangka Menengah Nasional) each with different development priorities. The current medium-term development plan is the third phase of the long-term plan which run from 2015 to 2020. It focuses on, among others, infrastructure development and social assistance programs.

Indonesia is the 25th largest export economy in the world and the 71st most complex economy according to the Economic Complexity Index (ECI). In 2017, Indonesia exported 188 billion US dollars and imported 153 billion US dollars, resulting in a positive trade balance of 35 billion US dollars. Indonesia top three export items are Coal Briquettes, Palm Oil and Petroleum Gas, its top export destinations are China, US and Japan. The country's top imports are Refined Petroleum, Crude Petroleum and Telephones, and its import origins are China, Singapore and Japan.

Indonesia is an archipelagic country located in Southeast Asia, lying between the Indian Ocean and the Pacific Ocean. It is in a strategic location astride or along major sea lanes connecting East Asia, South Asia and Oceania. The country extends about 5,120 kilometers from east to west and 1,760 kilometers from north to south, with 250 million people spread over some 17,000 islands. Indonesia's total sea area, including claimed exclusive economic zones (EEZs), is four times greater than its land area, encompassing 8 million square kilometers.

The unique geography means that Indonesia has lots of cargo moving in, out as well as within the country. As there are thousands of islands throughout the country, sea ports are essential to take charge of the goods that enter or leave the islands. Many of these ports operate 24 hours a

day, in particular, Tanjung Priok Port, Port of Belawan in Medan, and Port of Tanjung Perak in Surabaya, which are the three main sea ports in Indonesia are the most efficient and in the good function of all the sea ports in Indonesia.

Figure 2.1.5.b. Indonesia ports



Source: *The ASEAN Post*, 2019

2) National port development policies

Indonesia mandated the Directorate General of Sea Transportation (DGST) to prepare a National Port Master Plan (NPMP) by June 2010 as part of the country's port reform efforts, however the first version of the plan failed to meet technical expectations. Accordingly, the Indonesia infrastructure Initiative (IndII) sought assistance to reconstitute the plan in a manner that meets technical norms while rationalizing future port investment.

3) Example of national good practices : Tanjung Perak Port

Since 2015, the port of Tanjung Perak is working actively on improve productivity by streamlining its management, deploying new cranes and automating its operating system.

The port's operator also makes effort to streamline the decision-making process. It cut the number of supervisors from 64 to 26, assistant managers from 36 to 33, and reduced its number of managers by one from 12 to 11. The measures helped Tanjung Perak became the main gateway for imports and exports into and out of eastern Indonesia and raised the port's annual throughput capacity from 1.5 million 20-foot-equivalent units to 3.5 million TEUs. Currently, the port can accommodate 5,000 TEU ships. Container traffic there has increased in recent years, with volume up 8 percent to 3.13 million 20-foot-equivalent units in 2014 from 2.9 million TEUs in 2013. In the future, the port's operator is planning to increase efficiency revolve around an 8.25 million US dollars contract with Australia-based Realtime Business Solution to provide a

terminal operating system, and another deal with France-based Gaussin Manugistique to deliver 50 automated terminal trailers and 50 power packs.

4) Challenges for further port development and productivity enhancement.

Resource mobilization is a key factor for the realization of the national infrastructure plans in Indonesia. The infrastructure budget has reached IDR331 trillion in 2016, representing 15 per cent of total state expenditure and a significant jump compared to an average of 8 per cent during 2005 to 2014. However, the government cannot exclusively rely on state funding as it must contain the country's fiscal deficit below 3 per cent of GDP. Moreover, the government run the risk of revenue shortfall which many push it to delay the execution of various state-funded projects. In this case, private sector participation, both domestic and foreign, needs to be encouraged. But engaging the private sector in infrastructure funding requires a conducive investment climate. Land acquisition and coordination problem are the main challenges currently limiting Indonesia port development and its productivity.

Land acquisition has been a serious obstacle for many infrastructure projects with the private sector required to cover up to 30 to 40 percent of the total investment costs. The 2012 Land acquisition Law was unveiled, but implementation of the law depends on clear operational frameworks and capability of key executing agencies. Moreover, lack of clear, consolidated, nationwide land tenure data remain an ongoing challenge that need to be addressed quickly. Coordination problem

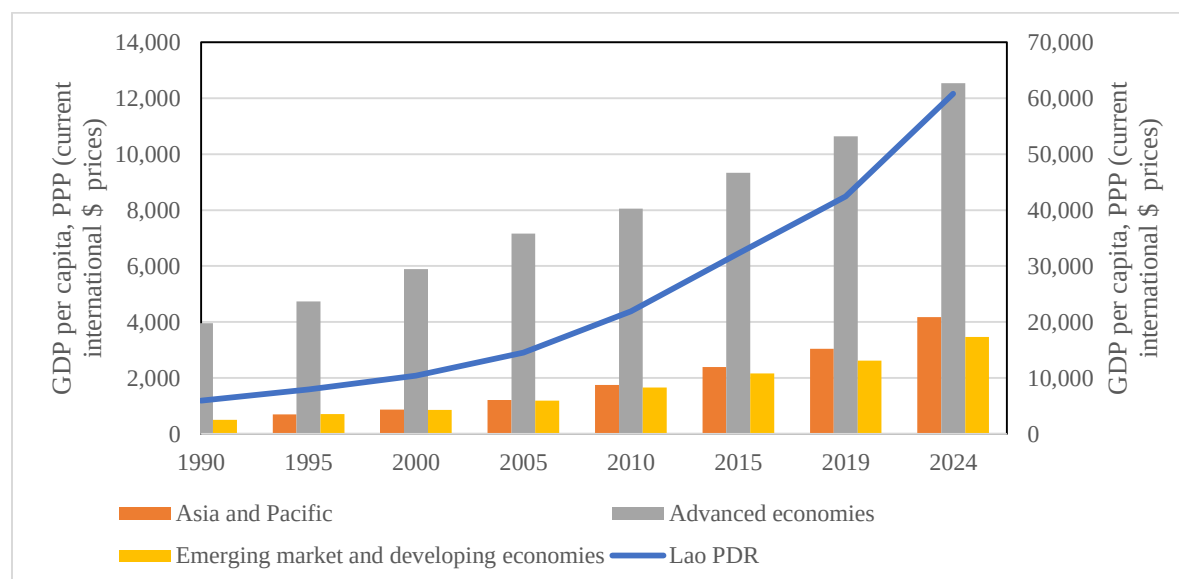
Lack of coordination between the central, provincial, and regional governments remains key obstacle for many infrastructure projects. Indonesia has complicated Public Private Partnership (PPP) permit process, which entails obtaining more than 40 permits and licenses from various government agencies. Moreover, Indonesia's decentralized government adds further complexity, with regional permitting agencies issuing conflicting approvals.

2.1.6 Lao PDR

1) Overview

Lao PDR ranks amongst the fastest growing economies in the world, averaging the rate of 8 percent of annual growth in GDP over the last decade, with GDP per capita reaching 7,925 dollars in 2018. Despite the flooding-related disasters of mid-2018, economic growth is expected to remain robust in 2018 and reach 6.5 percent. Growth in 2018 was driven primarily by the power, construction and manufacturing (electronic parts) sectors.

Figure 2.1.6.a. Lao PDR GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: IMF Data Mapper, accessed on April 2019

Lao PDR consistently runs trade deficits due to its underdeveloped infrastructure and undiversified export base. Its' main exports are wood, clothing, coffee, electricity, metals, corn and rubber. Lao PDR mainly imports oil, machinery and equipment, vehicles, iron and steel, telecommunication equipment, beverages and cement. The country's most important trading partners are the members of ASEAN (Thailand in particular), China and Republic of Korea, as it imports mainly from Thailand, China, Viet Nam, RoK and Japan. Lao PDR has suffered a trade deficit for many years, but this trend could be reverted in the coming year due to the steady growth of exports and the completion of infrastructure projects. In fact, the balance of trade in good showed a surplus in 2017, with exports rising to 4.8 billion US dollars while imports stood at 4.54 billion US dollars.

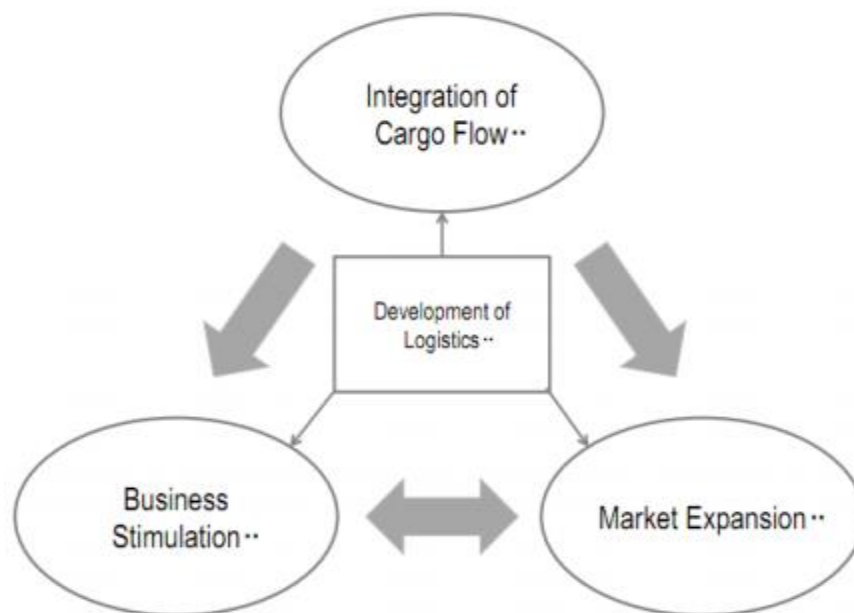
2) National port development policies

Lao PDR has developed a National Strategy on Freight Transport and Logistics Development. This Strategy aim to set clear development directions for logistics system development for period year from 2016 to 2025 with the vision to 2030 and to set clear short-term targets of 5 years development plan on national logistics system, to develop transport and logistics sector in line with the government policy and socio-economy development plan. Meanwhile, to attract more foreign investment in logistics system as well as strengthening domestic enterprises.

Vision 2030¹⁷

To ensure that the Public Works and Transport becomes “central sector for national socio-economic development, Safe and Sustainable”, the Government has defined the vision for logistics transportation development of Lao PDR until 2030 as follows: “Providing effective and efficient connectivity services and building domestic freight transport and logistics to be competitive and sustainable”.

Figure 2.1.6.b. Development strategy



Source: JICA study team

This strategy plan defined the collection and distribution centers in each region that connect with the neighboring countries, and identified the connection points to secure and facilitate two way cargos.

This strategy brought the overall directions until 2025, such as

- Strengthening capacities for freight transport and logistics companies to improve services and capabilities in order to compete with foreign firms and link with international transport companies along with improving the transport association
- Stimulating logistics transport businesses to increase market competition and able to connect with local and international markets while building high credibility and confidence to customers at national and international levels.

¹⁷ Accessible from:

https://www.unescap.org/sites/default/files/1.10_Country%20presentation_Lao%20PDR_Xaysomnuk.pdf

- Strengthening capacity for logistics administrative authorities to improve coordination mechanisms in order to address obstacles at each stage of the logistics process such as: custom clearance, efficiency of public and private logistic services
- Creating the inspection and monitoring system and providing the services according to schedule set

3) Example of national good practices: Savannakhet Dry Port

Lao PDR is operating its first dry port in Savannakhet province, where it is strategically positioned along the Greater Mekong Subregion East-West Economic Corridor, at the mid-point between the nearest Vietnamese seaport of Danang, and Thai ports in Bangkok and Laem Chabang.

The Savannakhet dry port is a free trade zone with on-site customs clearance, inventory tracking and quality control, and it provides for transfer, transshipment, and distribution services. It is located in Savan Park, in the Savan-Seno Special Economic Zone C, and is operated by Savan Logistics Co., Ltd. A report from Vientiane Times in October 2019 mentioned Savan Logistics' plans to further upgrade its services, by offering agricultural quarantine and inspection services and food and drug inspections at the dry port.

Setting up an inland container terminal is important for Lao PDR, a landlocked country that aspires to become a logistics hub in Southeast Asia. The dry port is an inland terminal directly linked to a seaport by rail or road. It is an important component of intermodal transport, which offers door-to-door freight service through the integration of different modes of transport (such as ship, rail, and truck) in the logistics chain, making the handling of goods more efficient and less costly. It is designed to connect carriers, freight forwarders, importers, and exporters with their markets.

4) Challenges for further port development and productivity enhancement.

Road transport in Lao PDR is dominant, because of its land locked situation. However, the existing road network is rather complicated, and it has not been integrated sustainable planning. Improving existing might be lengthy and costly. In addition to this there is an issue of empty return haulage, and limited transport volume.¹⁸

At infrastructure level, transport infrastructure is often below standards and there is an absence of transportation node to support multimodal transport. Lack of or inadequate dry ports, ICD or logistics centers must be tackled in order to improve hinterland connectivity.¹⁹

At operational level, there is a need of assistance to strengthen the capacities of Government officials and transport operators to facilitate procedures at border posts and implement new ICT solutions.

From an institutional perspective, regulation and legislation need to be improved to facilitate for goods transport and to prevent existing heavy dependence on neighboring countries' policy.

¹⁸ Adisone Silavong, Ministry of Public Works and Transport. Dry Port Development in Lao PDR, Bangkok, 8-9 March 2018.

¹⁹ MPWT-Lao PDR, 2013. *Transport Logistics Development in Lao PDR*.

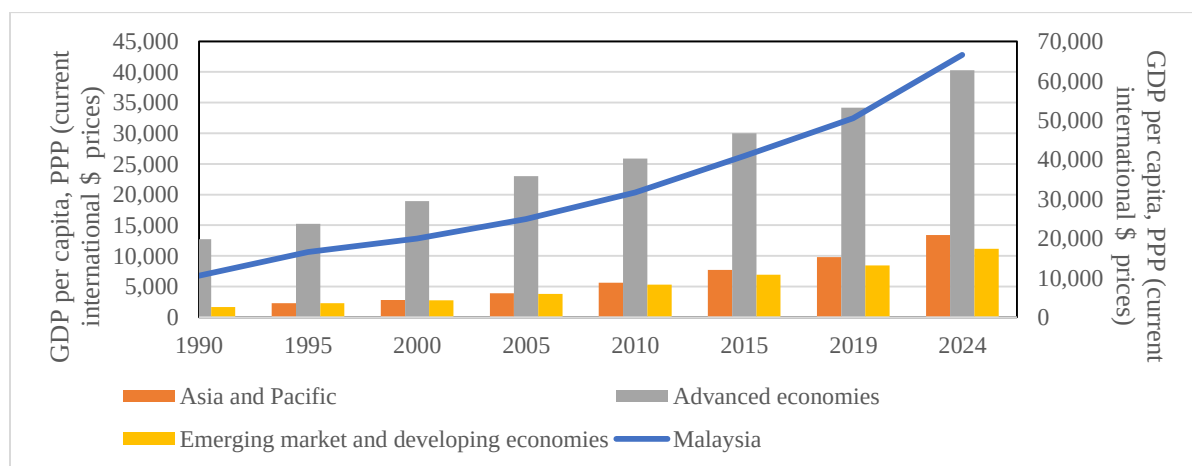
From the financial point of view, road network and transport system improvements remain limited due to limited public budget, lack of financial mechanisms, limited access to finance and difficulties in re-investing due to financial limitations of logistics companies.²⁰

2.1.7 Malaysia

1) Overview

After the Asian financial crisis 1997 to 1998, Malaysia's economy has on an upward trajectory, the economy of Malaysia ranked at the top three in Southeast Asia and is the 35th largest economy in the world in 2018.²¹ Its averaged growth of 5.4 percent since 2010. The World Bank expects the country to achieve its transition from an upper middle-income economy to a high-income economy by 2024. In 2018, Malaysia GDP PPP per capita reached to 30,860 dollars, which is twofold higher than the average of Asia-Pacific region. Due to the high density of knowledge-based industries and adoption of cutting-edge technology for manufacturing and digital economy, Malaysian labour productivity is significantly higher than neighboring Thailand, Indonesia, Philippines or Viet Nam. According to the global Competitiveness Report 2018, the Malaysian economy is the 25th most competitive country in the world in the period of 2018 to 2019.

Figure 2.1.7.a. Malaysia GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: Source: IMF Data Mapper, accessed on April 2019

Malaysia is one of the most opened economies in the world, with a trade to GDP ratio averaging over 130 percent since 2010, and it is the 19th largest export economy in the world. Openness to trade and investment has been instrumental in generating employment and income growth, with about 40 percent of jobs in Malaysia linked to export activities. In 2017, Malaysia exported 263 billion US dollars and imported 197 billion US dollars, resulting in a positive trade balance of 66.4 billion US dollars. The top of Malaysian exports are integrated circuits, refined petroleum,

²⁰ MoT, 2016. *Status on Dry Ports Development in Lao PDR*.

²¹ "World Economic Outlook (October 2018)". [International Monetary Fund](https://www.imf.org/en/Publications/WEO/Issues/2018/10/01/wEO-october-2018). Retrieved 1 April 2019.

office machine parts, petroleum gas and palm oil. Its top imports are integrated circuits, refined petroleum, crude petroleum, broadcasting equipment and office machine parts. The top export destinations of Malaysia are China, Singapore, US, and Japan. The top import origins are China, Singapore, US, Japan, and other Asian countries.

Malaysia is situated at the crossroad of Southeast Asia. On the west, Malaysia controls the Straits of Malacca, important and strategic waterways between east and to the east, at south, Malaysia is bordered by the South China Sea, and it is separated and connected by waters to Singapore and Indonesia. West Malaysia is a peninsula, an extension of mainland Asia while Eastern states are situated on one of the world's largest islands. Five of its neighbors share its maritime boundaries, namely, Singapore, Indonesia, Brunei, the Philippines and Thailand. Malaysia shares with Indonesia, an archipelagic state, the control of one of the most heavily trafficked sea lanes in the world, the Straits of Malacca. In the east, it shares maritime borders with Philippines, a nation of islands whose internal political developments have significant security, economic and social consequences for Malaysia.

In addition, the special geographical location led to the importance of maritime connectivity and port development in the economic and livelihood of the people. Major industrial and economic centres of Malaysia are located in Selangor on the West and Johore in the South which have important ports of Port Klang and Tanjung Pelepas. There are also ports in Sabah and Sarawak and on the East Coast of Peninsular Malaysia, which provide economic support to the country and the population.

Figure 2.1.7.b. Malaysia ports



Source: Ministry of transport, Government of Malaysia

Figure 2.1.7.c. Malaysia port container handling statistics 2017-2018, TEUs

PORTS	2018	2017	GROWTH
Northport	2,785,452	2,955,710	-5.76%
Westports	9,530,551	9,022,756	5.63%
Port Klang	12,316,003	11,978,466	2.82%
Johor	941,589	900,692	4.54%
Pulau Pinang	1,510,376	1,523,827	-0.9%
PTP	8,960,865	8,352,613	7.28%
Bintulu	345,991	307,520	12.51%
Kuantan	149,912	147,041	1.95%
Sepanggar	265,617	241,466	10%
Sabah	120,149	111,689	7.57%
Kuching	236,859	226,037	4.78%
Rajang	65,333	55,399	17.93%
Miri	34,994	36,233	-3.39%
Tanjung Manis	54,340	62,744	-13.39%
GRAND TOTAL	25,002,028	23,943,727	4.42%

Source: Ministry of transport, Government of Malaysia, 2019.

2) State of national port development policies

There is no dedicated national master plan on port development in Malaysia. However, since 2016 Malaysian port authorities put a lot of effort to develop and implement the Green Port Policy based on the national logistics and trade facilitation master plan (2015-2020), to guide port operators into becoming both environmentally friendly and commercially viable. The Green Port Policy is based on three elements, namely environment, community engagement, and sustainability. It includes initiatives such as ballast water management, study of fuel quality of ships on ports, and environmental as well as energy, electricity and fuel saving initiatives. The policy aims at trying to enhance safety and security, as well as improve connectivity and infrastructure from a holistic and cohesive development plan. The Green Port Policy in line with the nation's rapid transport development and deep commitment towards sustainable growth, Malaysia has pledged its support for the implementation of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs).

3) Example of national good practices

Malaysia has two ports which belong to the top twenty world's busiest container ports in terms of throughput volume handled. Port Klang and Port Tanjung Pelepas (PTP) were ranked 12th and 19th²², respectively. These two ports are strategically located along the Straits of Malacca, the world's busiest shipping lane and among the most strategic, can be considered world-class ports which are able to host the world's largest merchant vessels.

²² Llyod's list 2018

Port Klang

Located in Selangor, Port Klang is the largest port in Malaysia, which used to be known as Port of Swettenham during British colonization on Malaya. Malaysian government established the Port Swettenham Authority which later changed into Port Klang Authority.

To ensure the navigational safety and raise the port productivity, Port Klang introduced a system to manage the vessel traffic which is known as Vehicle Traffic Management System (VTMS). The Area Control Centre's radar are located on three location which are at West port, PulauAngsa and Bukit Jugra. This system should provide the information on vessels operating in harbor and also provide accurate information on the vessel's location and the density of the traffic.

Figure 2.1.7.d: Marine services provided

Vessels	North port	West port
Pilot Boats	5 units	8 units
Tug Boats	4 units	5 units

Source: Port Klang Authority

Kuching port

Kuching Port Authority was the first organized port in the state of Sarawak. It was established in 1961 under the Port Authorities Ordinance 1961. Being situated just outside Kuching, the capital city of Sarawak and the seat of the State Government and administration, it has grown to become a premier port of the State served by numerous shipping lines connecting it to the regional hub ports. All its terminals are in close proximity to the industrial estates to facilitate easy cargo movement. Both terminals have easy access to highway and coastal routes to all main towns in Sarawak. Kuching Port Authority is the first Malaysian port authority to have its Container Handling Management System accorded the MS ISO 9002 certification. Kuching port has to terminal which is Pending Terminal and Senari Terminal.

The port services and facilities provided by Kuching Port Authority to the port users are listed in the following figures.

Figure 2.1.7.e. Berthing facilities

Terminal	Type of Berth	Length (m)	Depth (m)	Max Vessel Size (dwt)
Pending	Multipurpose	613	7.6	12,500
Biawak Oil	BOJ 1	48	6.4	LOA - 110m
Senaril	BOJ 2	-	6.4	LOA - 110m
Sejingat	Multipurpose	635	9.3	20,000
	Multipurpose	125	7.5	5,000

Pipe Lines to Oil Jetty 2			
Pipe Line	Diameter	Product Handled	Average Pump Rate
Esso	6	Diesel, Jet A and Bitumen	150,000 liter/hr
Shell	8	Diesel, Jet A	180 tonnes/hr
		Bitumen	LPG-80 tonnes/hr
	6	LFO, Morgas Line (loading)	-
	4	Vapour return (Existing is 3)	-
	10	Lub Oil,MFO (Sesco)	-
Petronas	1 x 12	Diesel	250-450 tonnes/hr
	1 x 10	Other Products	-
Salcra	8	Crude Palm Oil	250-270 tonnes/hr

Source: Kuching Port Authority

Figure 2.1.7.f: Storage facilities

Terminal	Transit Shed	Units	Capacity (sqm)
Pending (Datuk Sim Kheng Heng Port)	Transit Shed A	1	7,443.00
	Transit Shed B	1	5,973.00
	Transit Shed C	1	11,484.00
	CFS	1	8,505.00
	Open Yard	1	26,505.00
	Dangerous Goods Shed	1	900.00
	Container Yard	1	74,598.00
	TGS	-	1,261 TEU
	Reefer Points	-	92 points
Sejingat	Transit Sheds	1	1,872.00
	Open Yard	1	2,070
	Reefer Points	-	12 points
Senari	Transit shed	1	10,000
	Open-sided shed	1	10,000
	CFC	1	8,000
	Open yard	1	45,000
	Dangerous Goods Shed	1	160,000
	TGS	-	3,371
Tanah Puteh Terminal	Reefer Points	-	-
	Transit Sheds	2	5,574.00
	Backup Sheds	6	8,026.00
	Load Factor	-	2,197.00 kg/sqm
	Open Yard	1	14,864.00
	Dangerous Goods	1	577.70

Source: Kuching Port Authority

4) Challenges for further port development and productivity enhancement.

Hinterland multimodal transport planning and integration remains a key issue. Although the existing Malaysia rail network connects container seaports and hinterlands, it is not well utilized. The low share of rail freight of containers of about 2 percent. The extreme imbalance of modal split in land freight transport creates challenges to seaports' hinterland connectivity as a result of

road congestion. Each container port has a road network to its hinterlands, however, the quality of connections requires improvement. In addition to the traffic congestion, the high number of road accidents in the congested area, especially close to main seaports, undermines the transport connectivity.

In addition, a lack of effective and integrated government policy direction in terms of promoting trade competitiveness, increasing transport efficiency, and enhancing domestic and international integration limits progress in the area.

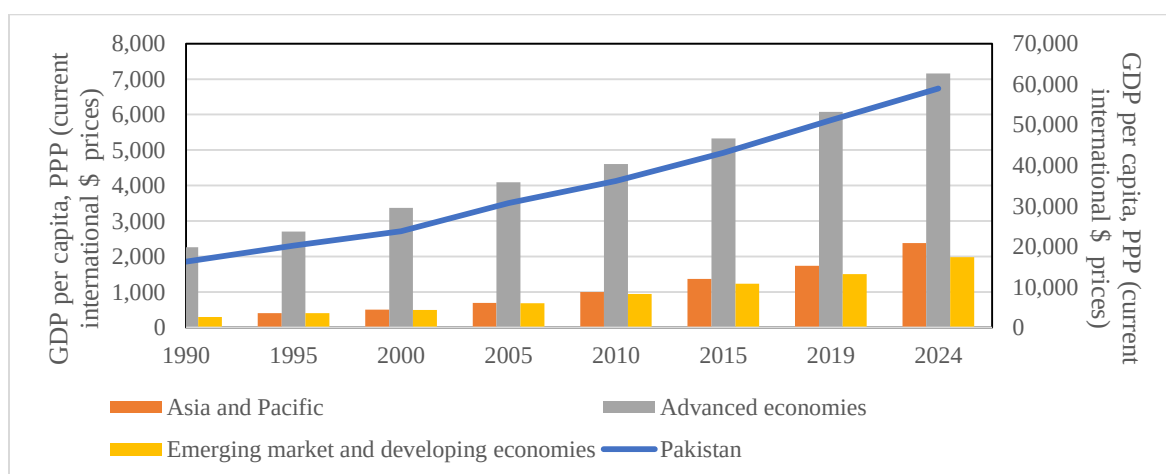
Finally, despite their strategic locations along the Straits of Malacca-one of the most important waterways in the world- Malaysian ports are not coordinated at national level and are losing their competitiveness in container transshipment operations to Singapore.

2.1.8 Pakistan

1) Overview

The economy of Pakistan is the 23rd largest in the world in terms of PPP, and 40th largest in terms of nominal gross domestic product. Pakistan has a population of over 207 million (the world's 6th-largest), giving it a nominal GDP per capita of 1,340 US dollars in 2019, which ranks 147th in the world and giving it a PPP GDP per capita of 5,709 in 2018, which ranks 130th in the world for 2018.

Figure 2.1.8.a Pakistan GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



Source: Source: IMF Data Mapper, accessed on April 2019

Trade has grown into one of the major sectors of the Pakistani economy and it employs a significant proportion of the workforce. Although there has been a trend toward increasing exports, the country has had a chronic annual trade deficit, with imports often outstripping exports.

Over the years, important changes have taken place in the composition of foreign trade. In particular, while the proportion of total exports from primary commodities, including raw cotton, has fallen, the share of manufactures has greatly increased. But the bulk of the manufactured products coming into the export trade consists of cotton goods, so that Pakistan remains as

dependent as ever on its leading cash crop. The other manufactures exported come mostly from industries based on agriculture, such as leather and leather goods and carpets; exports of rice and petroleum products are also important. The shift toward manufactured agricultural exports, which have a higher added-value content than primary commodities, has been encouraged by the government. The trade deficits and shortages of foreign exchange have made it necessary for the government to restrict imports and to provide financial incentives to promote export trade. Major imports consist of machinery, chemicals and chemical products, crude oil, refined petroleum, food and edible oils, and motor vehicles. Pakistan's most important trading partners are the United States, the United Arab Emirates, Saudi Arabia, Afghanistan, and China.

Geographically, Pakistan is endowed with diversified natural capital spanning from a long coast to the second highest mountain peak of the world. The 990 kilometers long coastline, shared by the coastal provinces of Sindh and Balochistan, leads onto the maritime zones of Pakistan. These extend up to 350 nautical miles. Firstly there are the offshore territorial waters up to 12 nautical miles (22.22 kilometers), then the area between 12 and 20 nautical miles acts as the buffer zone; finally, the area beyond the 20 nautical mile line up to 200 nautical miles is regarded as the exclusive economic zone (EEZ) which covers an area of about 240,000 km² of the Arabian Sea. More recently the EEZ has been further extended by about 50,000 km² through the recognition of Pakistan's continental shelf claim under article 76 of UNCLOS (UN Conference on the Laws of the Seas).

Figure 2.1.8.b. Pakistan ports



Source: WPS, 2019

The coastal and marine resources constitute an integral part of Pakistan's economy, also acting as the country's strategic gateway. Three operational seaports and major urban and industrial centers located along the coast are hubs for economic development and exhibit a great potential for emerging economic development opportunities such as the China Pakistan Economic Corridor (CPEC). These are Karachi port, Port Qasim and Gwadar port.

2) National port development policies

The development of Gwadar is a strategic priority for the Government of Pakistan. The commercial, political, socio-economic, defense and regional connectivity related benefits that can be realized once the port (and the city) reaches its full potential make it imperative to develop the area without any further delay. Lying at the mouth of the Persian Gulf, Gwadar is a strategic warm water deep sea port developed by the Government with assistance from the People's Republic of China. Inaugurated in 2007, the port is ideally located to serve the shipping lanes coming in and out of the Persian Gulf via the chokepoint of the Strait of Hormuz. In spite of the fact that the sea channels off the coast of Gwadar carry roughly 15-17 million barrels of oil every day (or a third of all the seaborne oil traded in the world), the port of Gwadar has yet to fulfil its promise and take advantage of its strategic location. A shortage of resources, the non-fulfilment of concession agreements by the Government and the original concessionaire (the Port of Singapore Authority), and the limited commercial activity in Gwadar city have together retarded the development of the port over the last few years.

The current master plan (last updated in 2005) has two interdependent elements: the port, and the city of Gwadar. This strategic focus on simultaneous development is primarily due to the natural, symbiotic relationship that exists between a port and the city that surrounds it; one cannot be developed without the other. In addition, the city around a port must also be planned carefully in order to lay the foundation of a sustainable regional economy, drive local business and increase port throughput.

With the inclusion of the port in the China Pakistan Economic Corridor project (CPEC), there is an urgent need to update the existing city plans to reflect the new strategic direction. It is pertinent to mention here that the CPEC is already in the early stages of execution and comprises of a comprehensive package of motorways/expressways, national and urban railways, high-speed connectivity and associated urban and social infrastructure, stretching from Kashgar (in China) to Gwadar (in Pakistan). Under the plans for the corridor, it is envisaged that the port would be declared a 'free' port (to facilitate trans-shipment) and the city would be declared a 'Special Economic Zone', in order to spur trade and investment.

Now Gwadar Port is entering its Phase II, the second phase of construction is currently underway as part of planned improvements under CPEC and other ancillary projects. The total project is expected to cost 1.02 billion US dollars. In September 2018, the Pakistan Senate expressed concern at slow rate of progress of most projects of Phase II at Gwadar as construction had not started for most projects.

Ongoing:

- Approach Channel: To be dredged to 14.5 m depth and max draft (hull) of channel
- 6 lane East Bay Expressway to connect the port to the Makran Coastal Highway
- New international airport to be built in vicinity of the port
- Desalination plant

Planned:

- 4 Container Berths along 3.2 kilometers of shoreline

- 1 Bulk Cargo Terminal (capacity: 100,000 DWT ships)
- 1 Grain Terminal
- 1 Ro-Ro Terminal
- 2 Oil Terminals (capacity: 200,000 DWT ships each)
- Floating liquefied natural gas terminal with capacity of 500 million cubic feet of gas per day
- 2,292 acre special economic zone to be developed adjacent to port
- 360 megawatt coal-fired power plant

Longer term plans

- Dredging of approach channel to depth of 20 meters
- 150 berths to be built by 2045
- Capacity to handle 400 million tons of cargo per year

3) Example of national good practices: Gwadar Deep Water Port

Gwadar Deep Water Port has been constructed as the third port of Pakistan. Situated on the Balochistan coast, it is about 460 km away from Karachi and 120 km from the Iranian border. Because of its ideal location at the mouth of the gulf and opposite strategic choke points of the Strait of Hormuz and Gulf of Oman, the port is visualized to become a regional hub serving incoming and outgoing commercial traffic of the Middle East and Gulf countries. Keeping in view the significance of Gwadar Port, the government has declared Gwadar as a Duty Free Port and Free Economic Zone.

4) Challenges for further port development and productivity enhancement.

The challenges include a need for greater infrastructure investment and high levels of security for the port, which is meant to replace the outdated and congested port of Karachi, and the port of Qasim, which is limited by its location 40 miles inland.

Under the original development master plan, Gwadar was to handle about 100 million tonnes (110.2 million tons) of cargo in 2017, but it is nowhere near achieving that figure. Just one major shipping company, Cosco Shipping, currently serves the port, mostly carrying construction materials for the China Pakistan Economic Corridor, or CPEC, a set of infrastructure projects costing \$44.5 billion and the highest profile undertaking of China's Belt and Road Program.

Education and training of local human resources are integral parts of all developmental activities. Human resources in all academic disciplines including engineering, medical, computer, social, business, and natural sciences will be required for the sustainable and productivity port development. In Pakistan, the skilled labors constitute about 6% of the entire labor-force. The number of technical institutions, students' enrollment capacity and the number of pass-outs figures are very low. Establishment of technical and vocational institutions are required on an emergency basis to fulfill the present and future demands in diverse technical and professional trades.

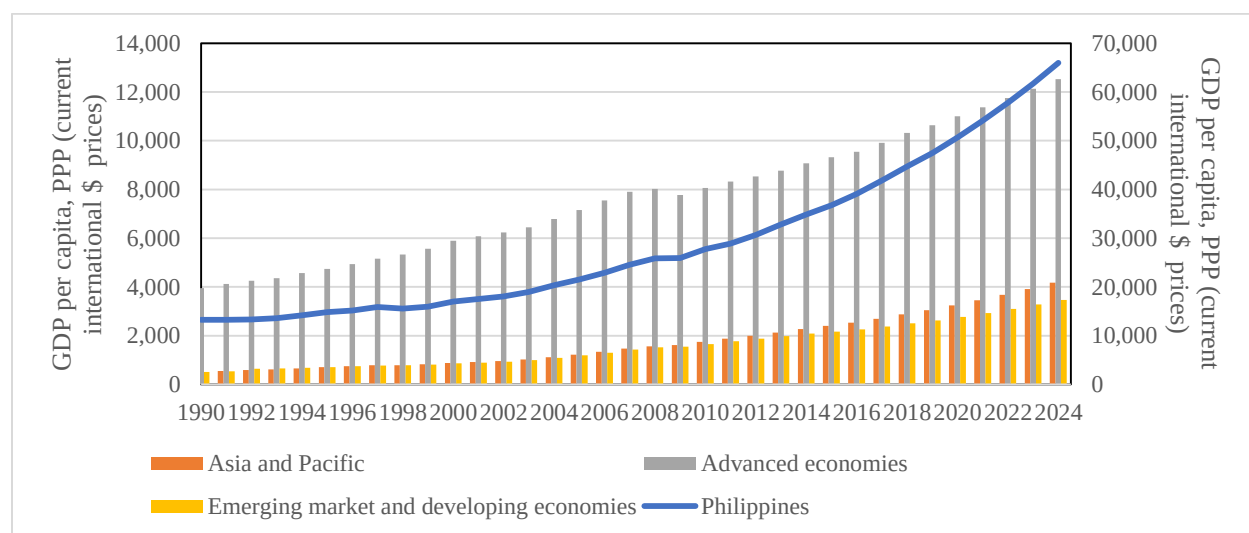
2.1.9 The Philippines

1) Overview

The Philippines is one of the most dynamic economies in the East Asia and the Pacific region. With increasing urbanization, a growing middle-income class, and a large and young population, the Philippines' economic dynamism is rooted in strong consumer demand supported by vibrant labor market and robust remittances. The country has sustained an average annual growth of 6.3 percent between 2010 to 2017 from an average of 4.5 percent between 2000 to 2009, the country is poised to make the leap from a lower-middle income country with a gross national income per capita of 3,660 US dollars in 2017 to an upper-middle income country (per capita income range of 3,896 US dollars to 2,055 US dollars) in the near term.

In 2018, Philippine economic growth averaged between 6.2 percent and 6.7 percent in 2017, the GDP per capital PPP is 8,935 dollars (figure 2.1.9.a), impacted by lower growth in global trade and domestic high inflation. However, growth is projected to reach 6.4 percent as inflation winds down and spending due to the upcoming midterm elections is likely to boost private consumption growth. Export growth, however, is likely to remain weak, as global growth and trade activities are projected to moderate in the medium term. The government is expected to continue its expansionary fiscal policy agenda, while the BSP may take a pause in its tightening stance as inflationary pressure diminishes. The World Bank forecasted that the country would sustain this growth momentum with a growth forecast of 6.5 percent in 2020 and 2021.

Figure 2.1.9.a. Philippines GDP per capita, PPP, current international \$ price, 1980-2024
(Projected)



Source: Source: IMF Data Mapper, accessed on April 2019

In recent years, the Philippine economy has made progress in delivering inclusive growth, as evidenced by the declining poverty rates and a decreasing Gini coefficient. Poverty declined from 26.6 percent in 2006 to 21.6 percent in 2015 while Gini coefficient declined from 42.9 to 40.1 over the same period. Unemployment has reached historic low rates, but underemployment remains high, near its 18 to 20 percent decade-long average. Although a large share of Filipino

workers transitioned out of agriculture, most of them end up in low-end service jobs. Thus, while employment increased between 2006 and 2015, average wages remained stagnant. Measures to generate good jobs and better wages therefore are essential to achieve shared prosperity.

The Philippines is the 37th largest export economy in the world and the 43rd most complex economy according to the Economic Complexity Index (ECI). In 2018, the Philippines exported 99 billion US dollars and imported 105 billion US dollars, resulting in a negative trade balance of 5.9 billion US dollars. The top exports of the Philippines are Integrated Circuits, Office Machine Parts, Computers, Semiconductor Devices and Insulated Wire. Its top imports are Integrated Circuits, Refined Petroleum, Cars, Crude Petroleum and Industrial Printers. The top export destinations of the Philippines are China, US, Japan and Germany. The top import origins are China, Japan, Republic of Korea, US and Thailand.

The Philippines constitutes an archipelago of 7,107 islands with a total land area of approximately 300,000 square kilometers. It borders the Philippine Sea on the east, the South China Sea on the west, and the Celebes Sea on the south. The island of Borneo lies a few hundred kilometers southwest and Taiwan directly north. The Moluccas and Sulawesi are to the south/southwest, and Palau is to the east beyond the Philippine Sea. The islands are commonly divided into three island groups: Luzon (Regions I to V, NCR and CAR), Visayas (VI to VIII), and Mindanao (IX to XIII and ARMM).

Due to the archipelagic nature of the country, the maritime industry in Philippines is a vital component in achieving socio-economic progress. In fact, shipping remains the major means by which islands are linked and through which movement of goods and people is achieved. There is no known island that cannot be reached by ship or small boat. The significant role of shipping is even more emphasized if one is to consider the government's objective of achieving national unity by bridging cultural values and social norms.

In terms of port infrastructure, the importance of the ports depends on the type of cargo or passengers being moved. Cebu and Manila for example serve as the main hubs in the movement of people between Luzon and the Visayas region. Davao is a major port in Mindanao in terms of transport of cargoes from that region to Luzon. In most areas though, there is a balance in the transport of cargo and people, which explains the significant number of passengers – cargo ships in the domestic fleet.

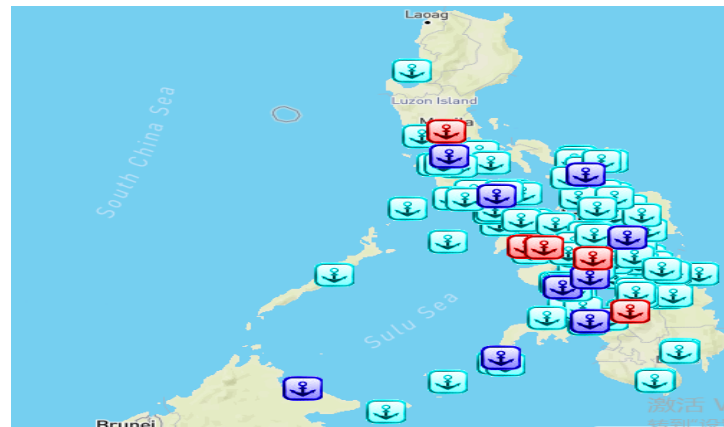
The Port of Iloilo, Iloilo, Philippines, is serving the general area of Iloilo and is the premier port on Panay Island. The new port of Iloilo is strategically located at a new site away from the older port facilities. Situated in the Southern coast of Panay Island, in the Panay Gulf, it has one of the country's safest and most natural harbors. Guimaras Island guards the port from violent storms and makes it ideal for harboring ships and vessels.

The Port of Manila is the largest seaport of the Philippines and located in the vicinity of Manila Bay, one of the finest natural harbors in the world. The Port of Manila is the premier international shipping gateway to the Philippines.

The Port of Subic, Subic, Zambales, Philippines, located in the vicinity of Subic Bay, One of the Philippines finest harbors and most strategically based. The Port of Subic is one of the busiest, largest, historical and most important of Ports in the Philippines Islands.

The Port of Zamboanga, Zamboanga, Philippines, is located on the island of Mindanao, in one of the fastest growing zones in Mindanao, Zamboanga. The Port of Zamboanga consists of a number of ports, all contained by the Zamboanga City Special Economic Zone Authority (Zamboecozone), otherwise known by its corporate name as the Zamboanga Freeport Authority.

Figure 2.1.9.b. Philippines ports



Source: Philippine Ports Authority

2) National port development policies

The Philippine Maritime Industry Development Plan (MIDP) 2019-2028 is the first comprehensive effort to understand and address the core problem of the Philippine maritime sector in order to plan and implement more responsive programs that meet demand of the maritime industry to successfully address key challenges and seize opportunities both at the domestic and global arena.

The plan seeks to ensure the achievement of nationally integrated and globally competitive maritime industry by developing and sustaining an organizational culture and practice of leading maritime education, innovation, technology and sustainability anchored on National plan, SDG 2030, and other national development plans and international conventions. MIDP establishes a concept of “nationally-integrated maritime industry” which is viewed as the “effective integration of all key stakeholders’ policies, plans, programs, operations and resources in terms of geographical/spatial, functional and institutional dimensions”. The national goal of achieving global competitiveness of the maritime industry will concentrate on the key elements of competitiveness, such as: increasing capacity, efficiency, safety and security of all Philippine-registered sea vessels including shipyards and maritime ancillary services. MIDP will complement this effort through the development, improvement and/or expansion of domestic shipping routes, tourist destination areas, and coastal and inland waterways; and enhancement of enabling policies and institutions.

In the next ten years, from 2019 to 2028, MIDP aims to achieve the following specific objectives:

1. Increase domestic production capacity in shipbuilding and ship repair based on global and domestic demand for shipping, fishing and maritime tourism

2. Upgrade maritime technologies, and support localization of the supply chain
3. Develop and expand shipping and maritime tourism routes and destinations in support of the national government's priority programs
4. Continuously upgrade higher maritime education and training program consistent with STCW conventions
5. Develop, implement and/or support best practices in maritime safety and security
6. Strengthen inter-agency and multi-sectoral collaboration, and public participation in MIDP implementation

The collective aspiration for a nationally-integrated maritime industry evolves from an increasing recognition of the vital role of all key stakeholders – government, industry, educators and civil society organizations - “working together” by sharing expertise, information, technology and other resources.

Three cross-cutting strategies will be implemented to support the priority programs toward achieving the above goal and objectives of MIDP:

1. Increase awareness of MIDP's priority programs and projects, and promote sustained industry and civil society engagement in MIDP implementation
2. Educate and train Filipinos for maritime careers, and develop and provide training program for and with K+12 educators and training service providers to prepare high school students, as well as college students, for career path development in the maritime sector, and high opportunities for highly skilled and well-paid occupations in the sector
3. Improve government and other key stakeholders' capacities for an integrated and multi-stakeholder maritime sector development

Moreover, in order to harmonize with global plans, the national-level integration of the maritime industry will be achieved by:

- (i) improving the capacity, efficiency, safety and security of shipping and SBSR services to support the government's Nautical Highway Development Program, Maritime Tourism Program, and National Fishery Industry Development Program;
- (ii) developing a global maritime hub for SBRS and related ancillary businesses with a world class research and training center in the country to bring together all maritime related companies in one eco-maritime industrial park in order to provide more comprehensive services to international passenger, cruise and cargo ships plying the Philippine waters for maintenance and other related services, as well as for crew training;
- (iii) developing CIWT system to reduce urban traffic congestion and pollution, increase intermodal transport network, and create new business opportunities; and
- (iv) establishing a Maritime Innovation and Knowledge Center (MIKC) to develop common industry classification coding standards consistent with the International

Standard Industrial Classification (ISIS) and the PSIC for improved quality of information for planning, policy-making and implementation.

The improvements in maritime infrastructure and services are expected to upgrade the capacity of the country's sea- and land-based maritime sub-sectors and the allied businesses and companies to become more globally competitive in maritime education, shipping and cruise tourism, ship management, SBSR and related ancillary services, among others. The priority programs will also support other national development plans and strategies, namely: Philippine Transport Strategy 2017-2022, National Cruise Tourism Development Strategy and Action Plan 2016-2022, and Comprehensive National Fisheries Industry Development Plan 2016-2020.

MIDP is also aligned with United Nation's SDG 2030 in terms of poverty eradication; zero hunger; decent work and economic growth; reducing inequality; gender equality and social inclusion; industry, innovation and infrastructure; life below water; and multi-stakeholder partnerships. These eight SDGs will be addressed by the different program activities. MARINA and other government agencies and stakeholders who participated in the road-mapping workshops and succeeding planning and validation workshops are well aware of these SDGs, as well as other international and regional commitments of the Philippine government, in the preparation of MIDP including its priority programs²³.

3) Example of national good practices: Manila Port

The Port of Manila is the largest port in the Philippines. It leapt four steps higher to 32nd place in maritime journal Lloyd's List's latest report ranking the top 100 container port worldwide. The port also moved one step up to 22nd place among the top ports in Asia in the 100 Container Ports 2016 report, according to a statement by the Philippine Port Authority (PPA).

Through the development of port efficiency and productivity, the higher volume handled at Manila port's international terminals-Manila South Harbor and Manila International Container Terminal (MICT)-was due to the Terminal Appointment Booking System (TABS) that was implemented in 2015. The online booking platform has smoothened the flow of containers, resulting in a 14 percent hike in volume to 5 million TEU in 2015 from 4 million TEUs a year earlier. From the total volume in 2015, some 2 million TEUs were handled by MICT, an increase of 11 percent from the previous year. Manila South Harbor, meanwhile, handled 1 million TEUs, a 19 percent hike from 2014. North Port, Manila's domestic terminal, handled the rest of the volume, or some 1 million TEUs, an increase of 14 percent.

4) Challenges for further port development and productivity enhancement.

The port sector must face many challenges in order to achieve the development of sustainable and productive port goals. The major issues are a) planning, b) management and operation, and c) investment and financing.

a) Planning

- Insufficient Nationwide Coordination on Port Planning: While several public port development bodies have been organized to manage a port(s) individually, there is a lack

²³ Philippines: Maritime Industry Development Plan (MIDP) 2019-2028: http://marina.gov.ph/wp-content/uploads/2018/12/Draft-MIDP-2019-2028_LPE_LMC_26Nov_8Dec2018.pdf

of coordination among the port development plans of these organizations. Moreover, the planning lacks a national focus. This results in an inefficient national port network and / or redundant investment.

- Lack of Development Strategies for Small-scale Ports: Generally speaking, the revenue generated by the operation of a small-scale port is small. Thus, port authorities / public port development bodies, which are required to be financially autonomous, have little incentive to develop such ports. The government also cannot develop small-scale ports due to budget constraints. As a result, the strategic development of small-scale ports has not been carried out.
- Insufficient RO/RO Route Development RO/RO routes, which can enhance the intermodal transport network, are not fully developed. Small vessels such as motorized boats are unable to carry vehicles safely and are not a viable alternative to RO/RO routes.

b) Management and Operation

- Lack of Institution for Coordination at Planning Stage: One of the causes of insufficient nationwide coordination in port planning is the lack of institution to coordinate port development plans in terms of the establishment of an efficient nationwide maritime transport network at planning stage.
- Inefficient Port Operation: Inefficient port operation can be seen in some ports partly due to the lack of proper equipment as well as unsuitable use of port facilities.
- Suboptimal Setting of Port Charges: Domestic port charges are set at a low level. This undermines not only the sound financial position of port authorities / public port development bodies but also the mechanization of cargo handling which can improve the cargo handling efficiency.

c) Investment and Financing

- a) Lack of Investment Strategy for Future Nationwide Port Development: Under the budget constraints of the national and local governments, investment strategy, which would take into account possible source of funds including private funds for future nationwide development, has not been established yet.
- Disparity of Investment Capacity among Public Port Development Bodies: Some public port development bodies find it difficult to finance future development projects due to insufficient revenues.
- Insufficient Incentives to Attract Private Investment: Although the private investment in port development is greatly desired, the private sector is reluctant to invest because insufficient incentives have not been offered.

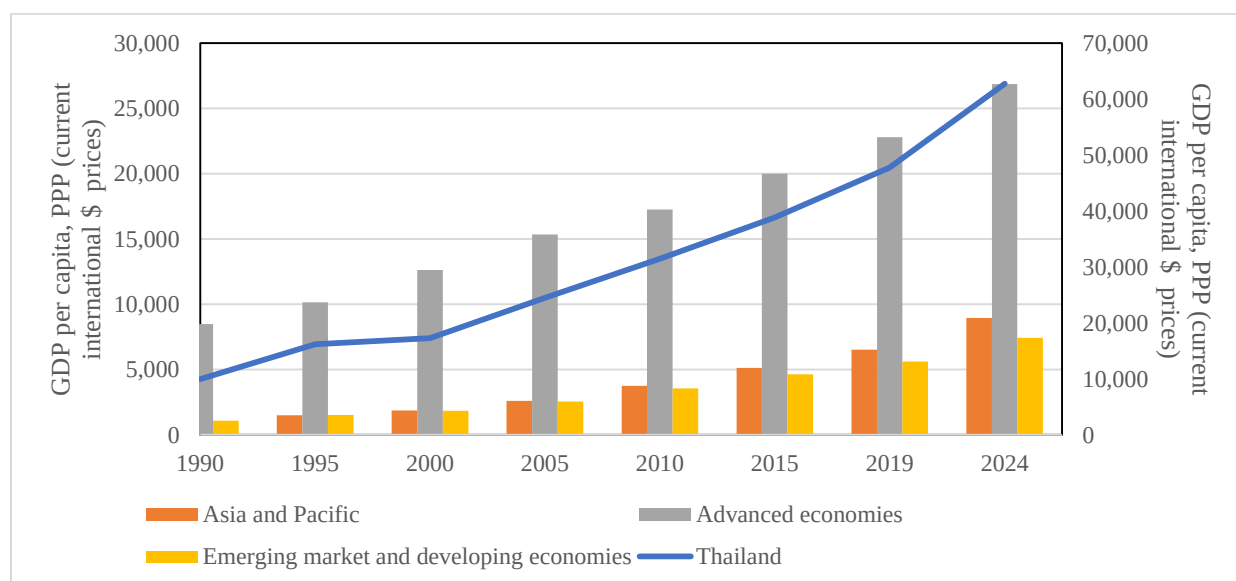
2.1.10 Thailand

1) Overview

Thailand is a newly industrialized country. Its economy is highly export-oriented, with exports accounting for more than two-third of its GDP. Over the last four decades, Thailand has reached

a remarkable progress in social and economic development, moving from a low-income country to an upper-income country in less than a generation. After average growth slowed to 3.5 percent over 2005 to 2015, with a dip to 2.3 percent in 2014 to 2016, Thailand is now on the path to recovery. Its economy posted the highest growth rate in six years, at 4.1 percent in 2018, which had a GDP of 455 billion US dollars, and its GDP per capita, PPP is reaching 19,476 dollars which is higher than the average of Asia and the Pacific countries and other developing countries, it ranked at the 8th largest economy of Asia. The nation is recognized by the World Bank as “one of the great development success stories” in social and development indicators²⁹.

Figure 2.1.10.a. Thailand GDP per capita, PPP, current international \$ price, 1980-2024
(Projected)



Source: Source: IMF Data Mapper, accessed on April 2019

As an export-oriented country, Thailand is highly exposed to external economic shocks, which lower demand for domestic products. Thailand major exports are electronics, vehicles, machinery and equipment. The country mainly imports fuel, electronic and machinery appliances. After China became the second economy in the world, it has replaced the US as Thailand's largest export market while the latter still holds its position as its second -largest supplier. The other main trading partners of Thailand include Japan, the European Union (EU) and Malaysia.

Thailand puts lots of effort in promoting trade influence on the international level. It is a member of the World Trade Organization (WTO), the Cairns Group of agricultural exporters and the ASEAN Free Trade Area (AFTA), and has pursued free-trade agreements. A China-Thailand Free Trade Agreement (FTA) began in October 2003. This agreement was limited to agricultural products, with a more comprehensive FTA planned to be signed by 2010. Thailand also has a limited free-trade agreement with India (since 2003) and a comprehensive Australia-Thailand Free Trade Agreement, which began on 1 January 2005.

²⁹ "Thailand". World Bank. Retrieved 17 July 2012.

Thailand began free trade negotiations with Japan in February 2004, and an in-principle agreement was agreed to in September 2005. Negotiations for a US-Thailand free trade agreement has been underway, with a fifth round of meetings held in November 2005.

Thailand with an area of 514,000 square kilometers is located at the center of peninsular Southeast Asia. A long stretch of the Mekong River divides Thailand from Lao PDR in the North and east, The Mekong and mountains of Dongrak from the border to Cambodia in the East and Malaysia in the South, and Myanmar and Andaman Sea in the North and West of Thailand. The south coast of Thailand faces the Gulf of Thailand, while the Isthmus of Kra is bordered on the west by the Andaman Sea and on the east by the Gulf of Thailand. Thailand also has coastal islands in the Andaman Sea and the Gulf of Thailand. The largest, with provincial status, is Phuket, off the west coast; on the gulf side, the largest islands are Samui and Pangan. The coastline is 3,219 kilometers long: 750 kilometers on the Andaman Sea and 2,469 kilometers on the Gulf of Thailand. The Andaman Sea on the east side of Thailand and Myanmar connects to the Indian Ocean. The Gulf of Thailand south of Bangkok connects with the Pacific Ocean. There are five major ports in Thailand, which are Bangkok Port, Laem Chabang Port, Chiang Saen Port, Chiang Khong Port and Ranong Port under Port Authority of Thailand. It plays a significant role for serving industrial development and supporting international trade of Thailand.

Figure 2.1.10.b. Thailand major ports



Source: Port Authority of Thailand, 2018

2) National port development policies

Thailand does not have an individual national master plan on port development. However, the transport development master plan (2015-2020)³⁰ provide a framework for all agencies within the Ministry of Transport to make investment plans and implementation plans. The master plan set a vision as “Towards Sustainable Transport”, and then goals, strategies, outcomes and key performance indicators. The development strategy is laid out as below:

³⁰ Access from: https://www.esci-ksp.org/archives/project/thailand-transport-and-traffic-development-master-plan-2011-2020?task_id=594

Strategy 1: Upgrade capability of agencies and personnel for the development of an environmentally sustainable transport system.

Strategy 2: Establish appropriate plans and mechanisms for interfacing and monitoring of transport and traffic work plans/measures/projects; and to move them forward to implementation.

Strategy 3: Establish comprehensive and inter-connected transport infrastructure.

Strategy 4: Efficient transport management for sustainability and greenhouse gas reduction.

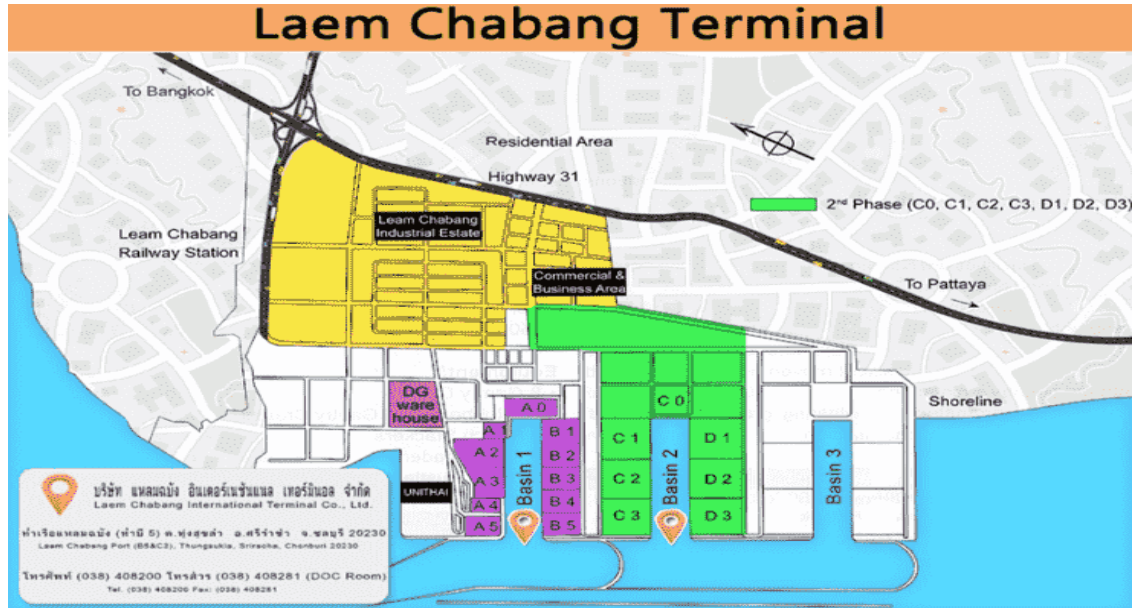
Strategy 5: Promote transport R&D and adoption of environment-friendly innovations and technologies.

Strategy 6: Promote public awareness of the environment.

3) Example of national good practices : Laem Chabang Port

Laem Chabang Port is the largest freight transport port in Thailand and is approximately 14 meters deep from main sea level (MSL) and can support post Panamax vessels containing and bigger vessels which served main trunk routes.

Figure 2.1.10.c. Laem Chabang Port Terminal



Source: Port Authority of Thailand, 2018

With the intention to develop Laem Chabang Port to be entitled one of the World Class Port; all requirements to meet the high standard service provision have to be implemented. Some of the implementations are as follows:

1. Increase the service capacity to ensure all services as mentioned are achieved.
2. Utilize port area to also support other relevant activities.
3. Increase productivity.
4. Employ modern technology to function docking field and yard operation.
5. Initiate new projects and activities to fulfill and cover all services requirements such as Container Care Centre Project.

Laem Chabang Port has the modern state-of-art infrastructure and hi-technology facilities to support all services. It has sufficient supporting areas for docking operations and related activities. Moreover, the port is served by network of highways, railways, and waterways, connecting both the country regions and neighboring countries.

Furthermore, Laem Chabang Port has sufficient areas to extend related business such truck terminals, distribution centre, free trade area, etc. and also to include other crucial facilities such as hazardous bulks warehouse and fire damage prevention centre. These facilities comply with international standards and are managed by a professional administration and flexible management to service customers. Their performance is due to the decision to sub-contract the port operational functions to private sectors, offering benefits to the customers from competitive private port operators.

For development or construction of a sustainable deep-sea port, a feasibility study must address not just economic but also environmental issues. Third phase development of Laem Chabang Port, therefore, seeks to minimize environmental impacts on air, water, and ecological systems. There is also significant focus on energy-use efficiency in the design and construction of new facilities to achieve the goal of creating a truly modern and green port from clean air, clean water, sustainable energy and healthy environment.

The Ministry of Transport has formulated water transport development policies to provide a low-cost transportation alternative that will help turn Laem Chabang into one of the world's top 10 ports.

4) Challenges for further port development and productivity enhancement.

Goods transported by waterborne transport are subject to various extra costs such as double handling and time costs. Access to most transport routes and networks for inland waterways is seasonal. Four countries in the GMS zone (China, Thailand, Myanmar, and Lao PDR) are increasing navigation capacities by reef explosions in the Mekong River. This adversely affects the ecology of the Mekong River.

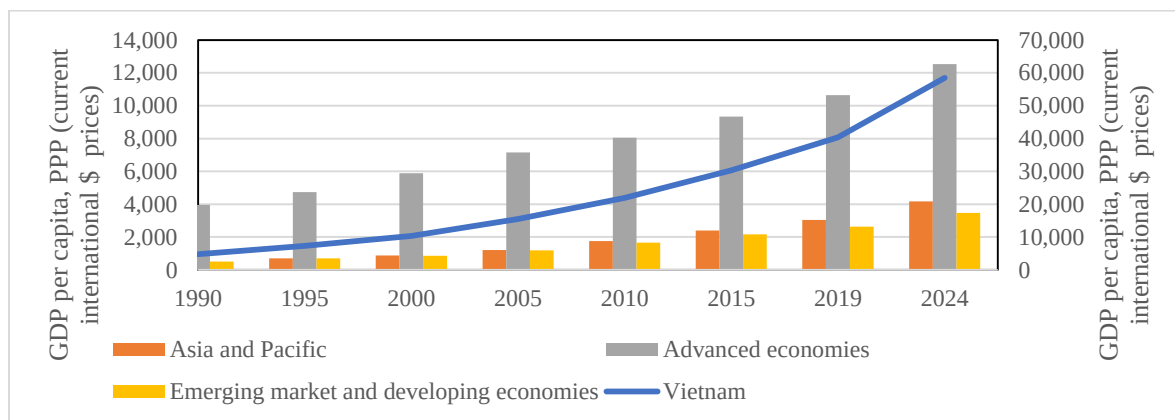
Furthermore, ports are facing various internal challenges, as terminal operators and port authorities are pushed into making significant investments in larger cranes, longer berths and deeper water to accommodate a small number of large shipping groups joint services on key trade routes and larger vessels, which allow shipping lines to benefit from economies of scale.

2.1.11 Viet Nam

1) Overview

Over the past 30 years, Viet Nam has had a remarkable development record, spurred rapid economic growth and development and transformation which propelled Viet Nam from one of the world's poorest nations to a lower middle-income country. Its economy transition from agrarian to industrialized and from centrally planned to market based. With a young and increasingly wealthy population of around 93 million and favorable geography, notably proximity to growth engines in the region, Viet Nam has a significant long-term potential. In 2017, Viet Nam GDP growth reaching 6.8 percent, preliminary data indicate that GDP growth accelerated to 7.1 percent in 2018 with GDP PPP, per capita is 7,511 dollars (figure 2.1.11.a), underpinned by a broad-based pickup in economic activity. Viet Nam's growth is projected to moderate to 6.6 percent in 2019. GDP growth was broad-based, led by strong manufacturing growth of 13 percent, bolstered by strong external demand. Agriculture output growth also accelerated to 3.9 percent largely due to strong performance in the export-oriented fishery subsector. Meanwhile, expansion of the service sector remained robust at 6.9 percent underpinned by strong underlying retail sector growth supported by buoyant private consumption and record tourist arrivals.

Figure 2.1.11.a. Viet Nam GDP per capita, PPP, current international \$ price, 1980-2024 (Projected)



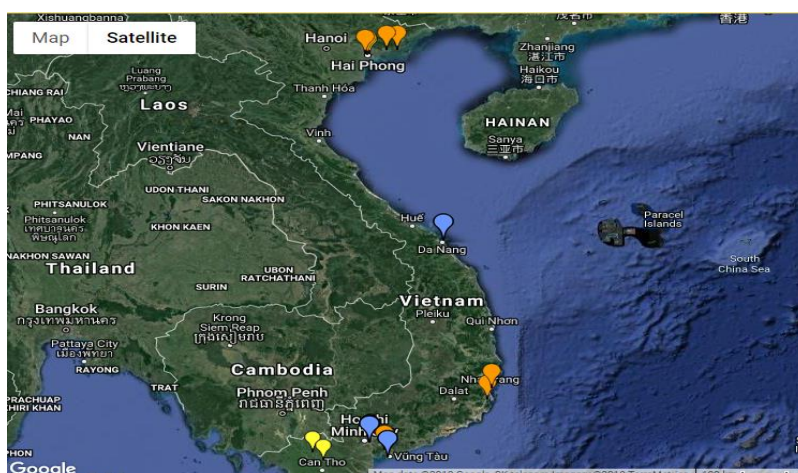
Source: IMF Data Mapper, accessed on April 2019

Viet Nam is one of the most open economies in Asia. According to the World Bank's report, trade represented 200 percent of GDP in 2017, and goods and services exports now constitute 94 percent of Viet Nam's GDP, as opposed to 30 percent recorded in the mid-1990s. Viet Nam is among the world's largest rice exporters and it also exports textiles, clothing and footwear, technology products and crude oil. Its imports include toll machinery, refined oil and steel. Vietnamese trade is characterized by strong geographic inequality: the country shows a trade surplus with Western countries, but a growing deficit with its Asian neighbors. In 2018, the US remained Viet Nam's largest export market (20.1 per cent), followed by China (14.5 percent) and Japan (7.9 percent). The major import in Viet Nam are telecommunications equipment,

electronic circuits, refined petroleum, electrical circuits equipment, fabrics and animal feed. China was the biggest exporter of products to Viet Nam, accounting for 25.8 percent of all imports into the country, followed by the RoK (20.4 percent) and Japan (7.8 percent).

Geographically, Vietnam faces borders with China, Thailand, Laos, and Cambodia, and has long territories to the north and south, making the coastline 3,444 kilometers in length. Viet Nam's sea area is located on sea arterial routes connecting the Pacific Ocean to the Indian Ocean, Middle East and Europe to Asian. The geographic advantages have brought a large volume of cargo from neighboring countries such as China and Lao PDR. According to the statistics of the World Bank (2018) on container port traffic, there was the fast increase of Viet Nam's throughput volume during the period of 16 years, particular the growth ratio was around 614 percent between 2000 and 2016. While this growth rate in recent six years in Viet Nam has constantly taken a high position, about 44 percent among these following selected Asian countries (Table 2.1).

Figure 2.1.11.b. Viet Nam ports



Source: World Ports Source

Table 2.1. The container throughput in some Asian countries

No	Country Name	2000	2010	2016	Growth ratio (2016 / 2000)	Growth ratio (2016 / 2010)
1	China	41,000,000	139,358,200	199,565,501	387%	43%
2	India	2,450,656	9,112,108	12,083,010	393%	33%
3	Indonesia	3,797,948	8,089,047	12,431,700	227%	54%
4	Korea, Rep.	9,030,174	18,516,901	26,373,000	192%	42%
5	Malaysia	4,642,428	18,203,567	24,570,000	429%	35%
6	Singapore	17,100,000	29,178,500	31,688,000	85%	9%
7	Thailand	3,178,779	6,520,905	8,239,363	159%	26%
8	Vietnam	1,189,796	5,886,249	8,495,730	614%	44%
9	Philippines	3,031,548	5,087,499	7,421,441	145%	46%

Source: World Development Indicators, accessed by May 2019

2) National port development policies

Viet Nam government is preparing a new Port Master Plan for the period 2020-2030, which focuses on development of seaports in order to foster Viet Nam's economic growth. This plan represents a significant progress since previously the development of seaports played a secondary role to industrial development. The Master plan puts emphasis on enhancing the infrastructure and development of channels, access roads and connection of regional ports. The implementation of the plan stipulate mobilizing of domestic and international investments and specifies that, in order to ensure sustainable growth, the developments should be consistent with environmental management and protection.

Management and administration mechanisms that are applied in Viet Nam considerably differ from those in other countries. In other parts of the world, local governments often take responsibility to manage and control local ports, in Viet Nam however, it falls within the scope of responsibility of the central government. The connection of different terminals into big port seems to be practically challenging and will take some time before relevant legal framework is ready. This is because the ownership of each terminal is different from the central government, local government, navy, shipping company, global terminal operator, logistics company and etc. as well as the share of stock is much complicated. In other words, although the government's influence is strong, there are limitations in coordinating numerous interests, and recently, a strategy to newly develop ports in deep sea has been adopted rather than making a large port through a merger between terminals.

While drafting the plan, four key aspects were prioritized: development concepts; development objectives; development scale, and prioritized strategic projects by 2015.³¹

The development concept focused on synchronized planning and building the supported infrastructure, while the main stress should be consistently put on the construction of port infrastructure and logistic centers. Beside this, priority is given to the development of international transshipment and gateway ports with application of new advanced technologies. The concept also considered relocation of river ports into areas close to the coast in order to compensate for the lack of channels and passages.

The objectives of this development consisted in coordinated development of seaports and port-related infrastructure in all regions. In doing so, Vietnamese seaport development plan are identified six groups, which are:

- Group 1: consist of seaports in North (QuangNinh and NinhBinh provinces)
- Group 2: includes sea ports in the North of Central Viet Nam (ThanhHoa and Ha Tinh provinces)
- Group 3: covers sea ports of the middle region of Central Viet Nam (Quang Binh and Quang Ngai provinces)

³¹ Duane Morries, "Seaport development – Vietnam's new Master Plan for seaport system development 2020-2030", Feb. 2015. <https://www.lexology.com/library/detail.aspx?g=bf1f8c5d-a7ad-404d-a6b4-4b5fe9b9a939>

- Group 4: includes seaports in the south region of Central Viet Nam (BinhDinh and BinhNinhThuan provinces)
- Group 5: encompasses seaports of the east region of South Viet Nam (Ho Chi Minh City, Dong Nai, Ba Ria Vung Tau and along soai Rap River in Long An and Tien Giang provinces)
- Group 6: covers seaports in the Mekong Delta region (Mekong Delta, PhuQuoc Island and southwestern Islands)

The development scale for six groups are as follows:

Group 1

- Estimated cargo volume for Group 1 ports by 2020 amounts to 95- 150 mln tons annually (Container: 4.5-5.5 mln TEUS (0.6-0.8mln tourists); until 2030: 340-315 mln tons annually (Container: 10-16 mln TEUS; 1.4-1.9 mln tourists)
- Hai Phong international gateway port:
 - LachHuyen-accommodates vessels of 50,000-80,000 DWT and 4,000-6,000 TEUS length. Every 600m there is a berth for two ships. Vinamarine will begin with construction work at LachHuyen.
 - Dinh Vu-accommodates vessels up to 20,000-30,000 DWT
 - Cam River-offers place for ship up to 5,000-10,000 DWT
 - Chanh River-accommodates vessels up to 10,000-40,000 DWT, this seaport specializes also in ship repair and shipbuilding and is suitable for industrial purposes
- Hon Gai is the regional focal port with CaiLan terminals for vessels of 50,000 DWT, 3,000 TEUS.
 - Other specialized ports are Cam Pha, Hai Ha, Van Gia, Mui Chua and Van Hoa
 - Additionally, an oil terminal should be built in this region to replace the existing B2 at CaiLan

Group 2

- Estimated cargo volume by 2020 amounts to 140-160 mln tons annually (Container: 102,000-130,000 TEUS; until 2030: 210-230mln tons annually (Container: 180,000-350,000TEUS)
- Nghi Son the region's focal port with capacity of 25,000 DWT oil tankers and ships of 30,000-50,000 DWT. Other ports are Cua Lo, Cua Hoi and Ben Thuy

Group 3

- Cargo volume by 2020 estimated at 80-105 mln tons annually (Container: 0.3-0.4 mln TEUS, 0.4-0.5mln tourists); until 2030: 140-205 mln tons annually (Container: 0.6-1.1 mln TEUS; 0.8-1.2 mln tourists)
- Da Nang is the region's focal port for ships of 20,000-30,000 DWT. Other ports are Dung Quat, ThuaThien Hue, QuangBinh und Quang Tri

Group 4

- Cargo volume by 2020 forecasted at 160-210 mln tons annually (Container: 4.5-5mln TEUS, 0.3-0.5 mln tourists); by 2030: 270-380 mln tons annually (Container: 9.0-10.5 mln TEUS; 0.9-1.3 mln tourists)
- Van Phong, an international transshipment port for vessels of 9,000 TEUS und 30,000DWT, oil tankers.
- QuyNhon is the region's focal port for ships of 30,000-50,000 DWT. Other ports are Ba Ngoi, NhaTrang, Ca Na und Ke Ga

Group 5

- Cargo volume by 2020 estimated at 250-310 mln tons annually (Container: 15-20 mln TEUS, 0.4-0.6 mln tourists); by 2030: 500-650 mln tons annually (Container: 35-52mln TEUS; 1.0-1.3 mln tourists)
- Vung Tau is an international gateway with terminals
- CaiMep, Sao Mai-Ben Dinh for vessels of 6,000-8,000 TEUS
- Phu My-ThiVai for vessels of 50,000 DWT, 4,000TEUS
- Long Son for petrochemical complex, for vessels of 300,000 DWT and vessels of 30,000-80,000 DWT
- Ho Chi Minh City is the region's focal port with the following functional areas: HiepPhuoc along the Soai Rap River for vessels of 50,000 DWT, 4,000 TEUS; Cat Lai for ships of 30,000 DWT; Can Giuoc (in the Long An Province) and Gp Cong (in the Tien Giang Province) along Soai Rap River for ships of 30,000 DWT

Group 6

- Cargo volume by 2020 expected at 130-160 mln tons annually (Container: 92,000-125,000 TEUS, 55,000-70,000 tourists); by 2030: 200-300 mln tons annually (Container: 180,000-350,000 TEU; 80,000-120,000 mln tourists)

Can Tho is the focal port for ships of 10,000-20,000 DWT. Other ports include ports along the rivers Tien, Hau and Cai Lon, Hon Chong in KienGiang Province, n Thoi und Vinh Dam in Phu Quoc, and specialized ports to import coal for power plants.

On the basis of these considerations, Viet Nam direction elaborated the development plan, which identified priority projects by 2015, such as deepen waterway in the specific ports such as Haiphong, CaiMep-thiVai, Ho Chi Minh City on the river Soai Rap and Can Tho harbor on river Hau; building general and container terminals and harbors such as in CaiMep-thiVai harbor, HiepPhuoc harbor; completing of Phase 1 at the international transshipment port Van Phong and construction of international gateways port LachHyun.

3) *Example of national good practices*

Northern Viet Nam: Haiphong port

One of the most crowded and crucial port systems in Viet Nam, especially in Northern Viet Nam. As the biggest port in the North, Haiphong's container throughput always takes a leading position in the region. Particularly, the volume of container throughput in 2016 was about 2.7

million TEUs, approximately 100 percent of northern part's figures and 20.26 percent of the whole country's capacity. However, the volume of exported cargoes passing through the Northern ports in Viet Nam has been affected by the strong competition from other exporting countries such as China, Bangladesh and Indonesia. Therefore, being the international gateway in the North of Viet Nam, with one- fourth of Viet Nam's wharf length, the port of Haiphong has many opportunities and challenges to promote a national competitive edge in future developments. Other infrastructure projects are complementing Haiphong's port project. A new expressway connecting the port city with the capital Hanoi cuts travel time in half to roughly 90 minutes. Another highway to Quang Ninh province in northeastern Viet Nam.

Table 2.2. The container throughput of main Vietnamese ports in 2016

Number	Ports	Container throughput (TEUs)	%
A	Northern	2,664,566	20.27%
1	Quang Ninh	1,594	0.01%
2	Hai Phong	2,662,972	20.26%
B	Central	476,748	3.63%
3	Quy Nhon	96,892	0.74%
4	Nghe Tinh	59,856	0.46%
5	Da Nang	320,000	2.43%
C	Southern	9,933,335	75.58%
6	Dong Nai	12,793	0.10%
5	Binh Duong	201,387	1.53%
7	Ba Ria Vung Tau	1,988,507	15.13%
8	Ho Chi Minh City	7,730,648	58.82%
	Others	68,728	0.52%
-	Total	13,143,377	100.00%

Source: Viet Nam Seaports Association (VPA,2018)

Central Viet Nam: Qui Nhon and Da Nang port

The Qui Nhon and Da Nang port are the major ports in Central Viet Nam, the latter being a deep-water port. In addition, the region has nine minor ports. In 2016, the region accounted for 11.65 percent of the total throughput, with Da Nang handling the majority of the traffic. Qui Nhon port is mostly used for transporting goods from Mekong Delta and Western Viet Nam, along with transloading of goods heading for Cambodia.

Southern Viet Nam

In the south, ports in Ho Chi Minh City are the main gateway for the region, accounting for 67 percent of the total throughput of all Vietnamese ports. The Cai Mep-Thi Via Port (Cai Mep) is a deep-water port located around 80 km south of Ho Chi Minh City. It mostly handles goods for Dong Nai and Binh Duong, which are major production centers.

Viet Nam is actively developing its port infrastructure. Two new container terminals are planned to be constructed at Haiphong port, and will be completed at 2018. The Lach Huyen International Gateway Port in Northern Viet Nam is currently under construction. This port will be a deep-water port and planned completed its construction at 2018 as well. In Southern Viet

Nam, undertakings are under way for further development of the container section of Ho Chi Minh City's port. Also, there are plans to improve connections of the Mekong Delta to international ocean freight shipping routes.

4) Challenges for further port development and productivity enhancement.

The major challenge faced by the largest ports in Viet Nam is the increasing use of smaller ports and vessels, which account for around 80 percent of container imports and exports. Underdeveloped shipping infrastructure has started to impact the industry, with annual freight related losses reaching 2.4 billion US dollars. Some ports also suffer from being over-burdened with shipments, leading to congestion and huge delays.

The Government not only needs to invest in increasing the existing port capacity but also to construct new deep-water ports to reduce transportation costs and increase efficiency, especially in Mekong Delta. The government had introduced a master plan related to the development of seaport system by 2020 and 2030. It focuses on achieving a cargo clearance target of at least 1 billion tons by 2020 and 1.2 to 1.6 billion tons by 2030. However, other issues, such as placement, connectivity with economic hubs, and proximity to international maritime routes, still need to be considered in the plan.

Viet Nam has over 42,000 km of inland waters, mostly in Mekong and Red River delta, that have the potential to reduce transport costs and address the current lack of connectivity of major production centers and inland ports. The development of waterway transport should be a priority for the government to increase market access, connectivity, and efficiency.

The major burden facing the sustainable port development and productive functioning of the existing ones is the lack of connecting infrastructures such as roads, railways, bridges, or warehouses. Smaller ports are being preferred due to their proximity to production hubs, which has led to congestion and huge delays. Infrastructure investments focusing on connecting the ports to the customers is vital, which will allow them to function to their maximum capacity³².

As in the rest of the world, shipping emissions are another crucial issue. Emissions in port areas and the vicinity of ports have resulted in many environmental and health problems. In other words, when berthing, vessels use auxiliary engines to generate electrical power for lighting, communication, cargo handling of an onboard crane, and other activities on board (Winkel et al., 2016). The use of auxiliary engines increases greenhouse gas (GHG) emissions. On the other hand, port equipment and machines using diesel oil emit a massive amount of NO₂, SO₂, CO₂. Moreover, dust from bulk cargo and the operation of equipment are also significantly harmful to the health of labors and residents in the adjacent area of ports. The emission in the port not only affects human health but also contributes considerably to the climate change due to the adverse effect on air, water, soil quality as well as the marine ecosystem, etc. Therefore, it is critically urgent to propose and implement the global strategies and solution to reduce the emission in ports in particular and in the shipping industry in general (Tonsich, 2017).

³² Port infrastructure in Viet Nam <https://www.vietnam-briefing.com/news/port-infrastructure-vietnam.html/>

Chapter 3. Towards regional guidelines for sustainable port development and improving port productivity in ESCAP member countries

The strategic vision for port development in the ESCAP region is to lead sustainable development and improve port productivity for current and future generations.

The regional guidelines would provide standards and requirements for sustainable and productivity port development. Meanwhile, they would ensure a high standard and cost-effective for port developments in the region, and development proponents as well. Moreover, the guideline would also encourage the incorporation of sustainable development principles and innovative design into new developments.

The objectives of these guidelines are to:

- a) ensure a consistent general high standard of development across all ESCAP region countries
- b) provide a safe working environment in all ESCAP member countries
- c) protect environmental values of the port and reduce the environmental impact of shipping and port operators through specific environmental-friendly (soft and hard) measures towards greener, safer and more efficient port systems
- d) improve the capacity of ports to plan and implement sustainable action plan

Notwithstanding, the integrated guidelines of port development may not suit each ESCAP member countries, because of the sub-regional and national variations. However, the integrated guidelines would promote a harmonized approach to sustainable port development for all member countries, particularly, for the countries which do not have a National port development plan yet.

3.1 Linkages between the Agenda 2030, Paris Agreement and sustainable port development

On 25 September 2015 the United Nations member countries adopted the 2030 Agenda for Sustainable Development. It is a new plan of the action for people, planet and prosperity, with 17 Sustainable Development Goals (SDGs) and 169 associated targets at its core. Additionally, the 2030 Agenda and the Sustainable Development Goals, as well as the Paris Agreement, have reinforced the commitment of international community to achieving a sustainable development path. Together, they underscore the importance of mainstreaming sustainability principles and climate action criteria into all economic activities and sectors.

At the other side, UNCTAD report that some 80 per cent of trade is channeled through ports³⁴. Port adds value to the economy and generates social gains, including by supporting trade, linking supply chains, enhancing connectivity, allowing for market access, generating employment and enabling business opportunities. Thus, ports play a key role in connecting the many developing countries and within the country itself that have port communities to trade. Meanwhile, Ports are nodal points in global supply chain. As a result, ports must respond to worldwide, regional and domestic challenges, such as climate change, mobility, digitalization, migration and social

³⁴ UNCTAD, Review of Maritime Transport 2019.

integration, whilst adding value to international supply chains. Hence, port development plays as an important role at the initial stage of the whole port sector, and it creates a support platform to port become globally connected entities and centres of key economic activity. It is positioned to take the lead in a significant contribution to the global agenda - the 2030 Agenda for Sustainable Development.

In these regards, the nexus between the 2030 Agenda, the goals, the Paris Agreement and sustainable port development is strong. The Port development is linked to wide-ranging aspects of modern societies and economic structures and can bring a wide range of benefits. However, such benefits may be eroded if unsustainable practice continues in the port development. Adopting a triple bottom-line view, which promotes balanced trade-offs that ensure optimum economic and social gains with minimum environmental damage, is key to resolving the growth and sustainability dilemma and supporting the achievement of Goals. Additionally, recognizing every port is different, the approach to aligning SDG would need to tailor to each port business to optimize outcomes.

3.2 Guidelines for sustainable port development

The guidelines aim to change and reform drive the strategic direction of modern port towards greater competitiveness and higher standards of performance. They are designed to streamline certain processes according to the existing best practices. These guidelines are open to interpretation and national adaptation. They are distinct from policy, standards and procedures:

- They are more general vs. specific rules
- They provide flexibility for unforeseen circumstances
- They should not be mistaken with formal policy statements

With that in mind, the proposed guidelines for sustainable port development are composed of two parts: strategic considerations and action plan.

1. Strategic considerations:

Strategic considerations focus on establishing a clear link between port development and national development objectives. Generally, countries will have a wide variety of strategies that include resources from all the different parts, or sectors, of the community.

Sustainable port development tends to initially focus on efficiency reforms for port industry. Its scope gradually expanded to other dimensions, such as the economic, environment, social and institutional dimensions. Managing a port in sustainable manner requires, first of all, designing a strategy that will contribute to sustainability in all of its dimensions. Any strategic diagnostic review should focus on the factors that are essential for mapping a strategic agenda geared towards the sustainable development of a port system.

The following figure 3.2.1. illustrates the sustainable port development strategy from four dimensions: the substantive dimensions and the institutional one.

Figure 3.2.1. Strategic objectives for the four dimensions of port sustainability



Source: Authors, based on Octavio Doerr and *Guía para la elaboración de memorias de sostenibilidad en el Sistema Portuario Español*, 2008

Economic dimension covers:

- Improve efficiency of existing port facilities
- Promote responsible port redevelopment by providing integrated logistics services based on the latest logistics technologies and user demand
- Work with stakeholders across the supply chain to increase the speed of goods movement and the overall efficiency of end-to-end logistics systems
- Collaborate with all level of transportation agencies to promote and national goods movement policy that increases international trade
- Increase market share and profit by promoting port competitiveness
- Secure financial resources necessary for port development and operation from various sources including the central government
- Lerverage public-private partnerships for cost sharing opportunities
- Proactively manage and minimize risk exposure
- Use performance-based budget management aligned with strategic goals
- Enable the long-term strategic growth and innovative goals of the port through effective use of information and digital technologies

- Collaboratively improve the port's business process and enable access to accurate and use information systems to access data accurately and timely.
- Work with supply chain stakeholders to make a beneficial impact on the port city and regional economy
- Improve the flow of goods, rearranging the hinterland transport network and improving the urban transport system

Environmental dimension includes:

- Reduce health risks and polluted emission, including greenhouse gases, noise and light pollutions, from port-related activities through changes in policy and use of alternative equipment, technologies and energy sources
- Enhance the quality of Harbor water
- Upgrade and retrofit cargo equipment
- Promote increased indigenous wildlife in and around harbor lands and waters and prevent the introduction of invasive species
- Remove, treat or render suitable for beneficial use contaminated soil and sediments
- Promote enduring partnerships with the health and environmental organizations to strengthen the Port's strategic planning process
- Create incentives for ships to use cleaner burning fuels or more efficient engines, such incentives can include reduced harbor usage fees. The incentive system can be based on port capacity
- Foster research, development, and integration of diversified, renewable Port-related energy applications

Social dimension focuses on the actions to :

- Promote and develop safe and efficient transportation systems
- Utilize design guidelines and physical branding opportunities to create a more attractive harbor district for working environment and habitation. The waterfront sector of the port area provides amenities for citizens and tourists, and the port makes it closely related to the daily life of citizens
- Implement the outreach to promote interest in and understanding of sustainable port development for the port city people
- Engage students and teachers with the port's comprehensive education outreach program and implement innovative programs to foster opportunities for students to learn about maritime and port industry careers
- Utilize virtual port system to create domain awareness and assist in the identification and control of threats to the port

Finally, the institutional dimension addresses the measures to:

- Develop and maintain port-wide policies and procedure that preserve flexibility while providing strong internal controls
- Foster relationships with local community, industry and key organizations and opinion leaders

- Advocate and collaborate with stakeholders to achieve common goals
- Build and maintain relationships with local, regional, and international institutions, agency leaders, as well as with community and industry partners
- Develop a local and national legislative agenda that educates and engages elected officials about port policies and initiatives
- Cooperate with academic, international organizations and other research institutions, provide research, share knowledge and information platform, exchange pro and con during the sustainable port development process
- Enhance the ability to respond to various natural and social disasters through joint training and practice with related organizations

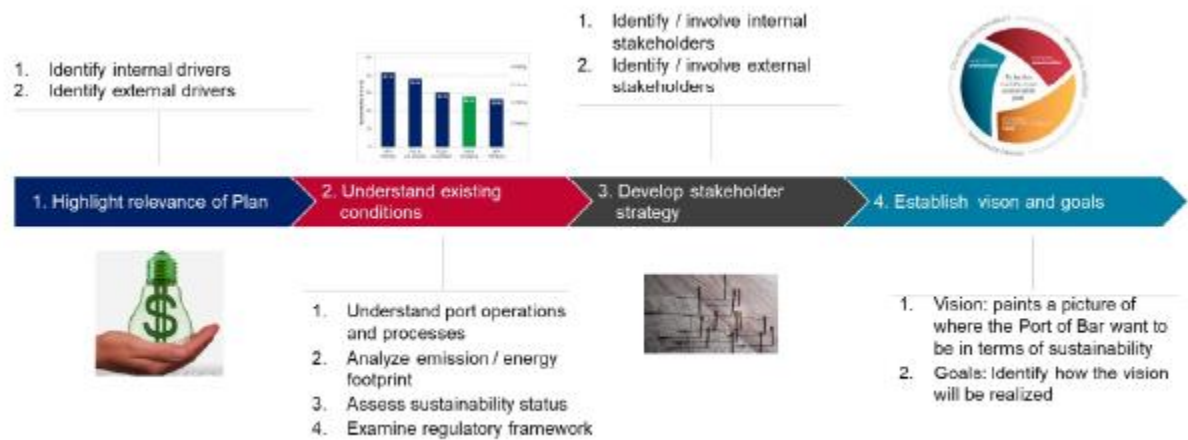
Sustainable port development and operation has limitations in achieving its goals by ports alone, and requires a multi-dimensional strategy that includes all economic, social and environmental factors such as cooperation with port cities, civil society and the central government.

2. Action plan

The action plan- component is a long-term structural and strategic plan. It identifies problems and solutions to enhance the accessibility and sustainability of port systems. Furthermore, the port action plan fixes not only the goals to be achieved, but also a monitoring and evaluation system through the identification of a set of performance indicators. It elaborates in detail on how sustainable port development strategies will be implemented to accomplish the above-mentioned objectives. The goal of designing the action plan is to integrate it in the national logistics network and to establish the port terminal as a modern multi-modal unit by achieving high quality port services, provision of high level of safety and security, environmental protection and improvement of the conditions for fair competition between the different means of transport.

Therefore, the port action plan should be based on a long-term vision and maintain the coordination of the short-term executive plans and programmes by stimulating, guiding, monitoring and assessing their implementation; it should also encourage a wide diffusion and a continuous revision of the plan, as well as an increasingly participation of stakeholders and citizen in the planning process. Furthermore, it should refer to two elements: a) specific (community and systems) change to be sought, and b) the specific action steps necessary to bring about changes in all of the relevant sectors, or parts, of the community.

Figure 3.2.2. Strategic planning phase of Action Plan



Source: Action plan for sustainable and Low-carbon Port of Bar, October 2019.

The sustainable port development action plan, as developed and presented in the proposed guidelines, will provide a general framework for the member countries and their partner’s sustainable policy in which the most important medium and long-term goals are defined and set out in a basic strategy, where appropriate including concrete measures. In particular, the action plan should be designed to support the port industry, and to implement its sustainability practices into its whole development progress.

The following table summarizes overall desk research and international good practice outcomes to provide some suggestions to be used in the development of sustainable port action plans.

Table 3.2.1. Summary of sustainable port development action plan

Sustainability Objectives (Goals)		Indicators	Action Plans
Economics	Economic development and relevant issues	GDP contribution profitability productivity added value recycled waste (quantity)	updating port equipment, automatizing machinery developing recycling and rescues process and activities
Social	People: society, employment & safety	perceptions (survey) job market: skill, career development paths incidents, inspections	"open port" initiatives providing skill training programme, reducing the conflict between terminal automation and labour; education programme support cooperation strategies among in charge organizations (police, fire department, customs, etc.)
	The natural environment	cleanliness index biodiversity hectares of conservation area habitats and ecosystems	ecological networks avoiding and creating conservation areas
Government & stakeholders	Port development relevant policies	Land use financial indicators	providing supportive land use policy during the port development process drawing adequate budget plan via PPP to support port development
	Supply chain responsibility and stakeholder engagement	meetings with stakeholders and customers	promoting regular meetings with stakeholders and partners
Environmental	Air quality	emissions (greenhouse gas, including SOx,	adopting detection methods, installing emission detector

Sustainability Objectives (Goals)		Indicators	Action Plans
		NOx, dust) Clean shipping: emission standards & emission reduction technologies fuel used type of engine	designing support policy and framework to implement clean energy usage
	Energy consumption	CO2 footprint energy efficiency (CO2/output)	encouraging ships using green energy instead of fuel, providing limited subsidies/ discount on port dues/ incentive programmes to ships which are using new energy adopting clean energy investments (renewable, LNG, methanol, wind) decarbonisation strategies
	Noise	emissions (surveys, maps)	building differentiated port charging systems providing onshore power supply
	Water quality and management	ships waste: water ballast, oil & oily water, chemical waste, sewage, garbage cargo spillage dredging sediment contamination oxygen conditions salinity nutrients levels chemical conditions emissions of metals and hydrocarbons	alternative ways to use dredging sediments ship waste management plans cleaning tools and equipment

Sustainability Objectives (Goals)		Indicators	Action Plans
	Water management	water consumption clean shipping (ships waste) dock litter (empty cans, plastic, wood, etc.)	port waste management plans (collection, transport, processing)
	Soil	soil contamination (survey on soil pollution) contaminated land	actions minimizing impacts
Other Issues	Accessibility and mobility	modal shift information provision to port users commuting trips	promoting modal shift, also for commuting trips technological tools providing information to port users and stakeholders EDI systems and platforms involving port users and stakeholders infrastructures upgrades
	Innovation and R&D	innovative companies (numbers and allocated spaces) R &D investments	development programs fostering innovation (e.g. allocating port spaces to innovative companies), also in cooperation with the city involving R&D center in the sustainable port development plan

Source: The author, based on *Guidelines for sustainable and low carbon ports*, 2018

3.3 Measures for improving port productivity

The definition of port productivity at the container terminal varies, but most commonly refers to the throughput of the container per unit time. That is, the container handling performance in the port measured in TEU is measured in various ways, such as productivity per berth, yard productivity, or productivity per crane, depending on measurement standards and measurement locations.³⁵ Port productivity is not just an infrastructure issue, it can be said that it reflects the overall capabilities of the port, such as operating system, workers' proficiency, and the hinterland connectivity, information technology and so on. The strategies that ports are adopting to increase productivity while oriented towards sustainable ports are well described in the context UNCTAD publication below.

“To minimize ship time in ports – for a given volume of cargo handled – ports, maritime authorities and policymakers may wish to adopt a multipronged approach featuring the following measures: port call optimization (ships should only arrive when they need to arrive, as arriving too early implies additional costs in port, as well as extra expenditures and more pollution, including air emissions); trade and transport facilitation (once a ship arrives at the pier, operations should start immediately, without having to wait for authorities to clear paperwork or carry out other procedures); and port operations (fast and reliable loading and unloading operations require investment in infrastructure and superstructures, as well as technological and human capacities)” (UNCTAD, Review of Maritime Transport 2019).

Against this background, this section examines key issues and response policies in terms of infrastructure and operation to enhance port productivity.

1. Infrastructure

Infrastructure is inseparable from the sustainable and productive port development.

The infrastructure layer involves exploitation of basic structures for both links and nodes in the transport system. “This is where the intrinsic accessibility is valorized since a port site has little meaning unless capital investment is provided. The availability of adequate infrastructure in transport nodes (seaports and inland terminals) and on the links/corridors in the network is a prerequisite for the development of activities by transport operators and logistics players. Infrastructure should act as a strong enabler of port-related market dynamics that lead to efficient and sustainable co-modal freight transport services. Ports commonly face a range of freight mobility challenges at the infrastructural layer.”³⁶ A fundamental and direct way to improve port productivity is investment in port facilities. This is because it leads to the increasing of cargo handling capacity through securing new port facilities or expanding existing facilities. However, as discussed earlier, investment in port facilities is not easily made due to the following challenges, so most ports in developing countries are considering policies in terms of operation and institutional aspects in addition to capacity enhancement through port infrastructure investment.

³⁵ Wayne.K.Talley, Container port efficiency and output measures, January 2009.

³⁶ International Transport Forum, OECD 2015. *Port Hinterland Connectivity*.

Although port facilities are a key infrastructure for regional and national economic development, they are often overlooked by investments in other infrastructure, such as roads. In most cases, it takes a long time from consensus on the necessity of port construction to actual national planning. Since port construction takes a long time from start to completion, there are many cases where a step-by-step development strategy is taken in accordance with the trend of increase in cargo volume. In addition, private investment is being promoted to supplement insufficient government finance, but the private sector, which prioritizes profitability, often requires various incentives to recover investment costs, which is sometimes a problem in the course of the project.

In most developing countries, port development is implemented as a national project because it takes astronomical capital to establish port development plan, procure investment resources, actual construction, secure users including shipping companies, build an operating system, and construct hinterland transport network. In particular, developing countries in the region require large-scale investment to develop national ports and its supporting facilities, but securing investment resources is the biggest obstacle. Although it takes massive capital to invest, the payback period is long, so many countries offer various incentives to encourage private investment, and Public Private Partnership (PPP) based investment is also widely adopted.

Infrastructure investments to increase port productivity include building new terminals or automation, as well as investing to dredging the channels and supportive facilities for safety entry and departure of ships. In addition to investments in quay cranes suitable for larger vessels, yard crane, container transfer equipment and gate automation are also included in these facility investments. In particular, port digitalization, including the use of the latest IT technology to reduce the idle time of unloading equipment, is also considered to be an important factor in improving productivity. This should include an vehicle monitoring system to control traffic in port and an efficient connectivity system to road, rail and inland waterways. “The transport layer involves the operation of transport services on links and corridors between the port and other nodes within the multimodal transport system and the transshipment operations in the nodes of the system. It is a matter of volume and capacity.”³⁷ In particular, in the case of a port and inland transport system, a modal shift that converts a road-dependent transport system to a railroad or inland waterway is widely promoted.

2. Facilitation and Operation

Frequently, it is often observed that cargo cannot be transported in a timely manner even after unloading due to delays or inefficiencies in customs and quarantine procedures, and one of the challenges that shippers and transport service providers complain about is the customs clearance and quarantine system. Port productivity should be ensured not only in terms of infrastructure, but also in terms of institutional aspects such as customs clearance and quarantine. Information sharing and processing systems using advanced IT, including EDI, are actively being introduced by many ports because they contribute to enhancing the transparency and efficiency of business procedures. One of the most overlooked aspects of port productivity enhancement is Human Resource management.

³⁷ International Transport Forum, OECD 2015. *Port Hinterland Connectivity*.

Despite the massive investment in infrastructure and hardware, sometimes the expected results are not achieved because of the lack of understanding and consideration of all stakeholders and port personnel who manage and operate these facilities and equipment. Therefore, education and training for those who are relocated by automation and those who operate new equipment are recognized as important factors in improving productivity. Port safety and security are becoming increasingly important because natural disasters such as typhoons, earthquakes and tsunamis are frequently occurring in the ESCAP region, and hacking and cyber terrorism are also recognized as factors that hinder efficient port operations.

In this light, it should be highlighted that the current diversity in governance models and management arrangements in port and supply chain business poses a problem for the development of systematic responses to negative impacts. In order to deal with these impacts, higher level authorities need to be involved and appropriate incentive structures are required.”³⁹ For example, pollutants emitted by ships and stevedoring equipment sometimes affect not only the port area but also the local community. In order to solve these issues, cooperation and dialogue between various stakeholders, including port authorities and local governments, is important. There are many policies to increase port productivity, from macroscopic, such as large-scale facility investments, to microscopic things like business process re-engineering. Most ports pursue a policy mix strategy that includes hardware, such as infrastructure investments, and software, such as information system improvements, and chooses the right policy for the current situation and future vision. Improving port productivity is a backbone strategy for achieving a mid- to long-term vision for the port, and it is also a key measure to enable sustainable development. Therefore, it is limited to achieve strategic goals such like sustainable development only by a strong drive of a specific entity such as top management, and it takes some time, but the participation and cooperation of all stakeholders is the key to improve port productivity.

³⁹ OECD/ITF, *Port Competition and Hinterland Connections*, 2009..

Chapter 4. Conclusions

Based on lessons learned from workshop's presentations and extensive literature reviews, this chapter provides policy recommendations to help overcome the capacity constraints in ports and port operation network and advance on sustainable port development and port productivity.

4.1 Summary of policy recommendations for Asia and the Pacific

In the recent years, Asia and the Pacific region countries have been seeking to develop mega port due to the increasing demand. In this region, port development is an established area and, for some time now, Asia-Pacific has been a leading region on the sustainable port development with major ports in Singapore, China, Malaysia and Republic of Korea, for example. Sustainable maritime transport and port development not only enhance economic development and regional integration but contribute, directly and indirectly, to achieving Sustainable Development Goals (SDGs) at global, regional and national levels. In order to ensure that sustainable port development and improving port productivity can effectively achieve SDGs in the ESCAP region, port development in individual countries needs to be harmonized with port development in other countries in the region.

Sea-borne trade will continue to dominate global trade flows. The Asia and the Pacific economies will continue to provide a platform for growth and global trade. For these reasons alone, Asia-Pacific ports will continue to provide opportunities for investment and development capital. Sustainable port development is not just related to the additional supply of port facilities but is a project that has a very comprehensive impact on financing, building regional transport networks, jobs creation and environment protection. Therefore, port development should not only be approached from the aspect of transport infrastructure, but also need to take into account the social and economic impacts of the region. The participation of major stakeholders is essential. Thus, port development plan in individual countries should be a comprehensive exercise, including national sustainable transport policies, integrated multimodal transport policies, dry port development, inland waterways and coastal transport development, improved transport connectivity through transit and border crossing and related action plans. It must be promoted under a mid to long term master plan.

Along with the development of new ports, the way to respond to the increased demand is to enhance the productivity of existing ports. Productivity gains rely on a number of variables, such as available resources, technologies levels, investment, and workers' capabilities, depending on the country. However, the most widely used method is to apply advanced technologies such as container terminal automation and smart port. It is clear that automation, digitization and expansion and upgrades of port facilities not only improves productivity, but also promotes environmentally friendly port policies and increases the value of the entire logistics chain. Still it is important to keep in mind that this requires significant investment and time. For example, port automation is often linked to the restructuring of the workforce, so consultation with workers is crucial. A comprehensive master plan at the national level is important for port development that contributes to achieving sustainable development goals, and cooperation with international institutions such as ESCAP and IMO, investment banks such as ADB, and international aid organizations in major countries are important in developing and implementing such national plans.

4.2 Way forward

To strengthen sustainable port development and port productivity in an inclusive manner the following considerations, based on a substantive review and an analysis of the experiences so far, could be of use:

1. Countries should adopt a National Long-term Master plan addressing the aspects of smarter, greener, safer sustainable port development and productivity improvement.
2. Port development and investment should be driven by setting specific and realistic goals, such as building a stable infrastructure focused on reducing trade costs and contribute to achieving sustainable transport.
3. In order to establish a comprehensive port development master plan, cooperation with financial, environmental, technical, energy, transportation and urban development authorities is essential and must reflect the needs of users, including shippers and shipping lines.
4. A balanced view is necessary to avoid overinvestment and severe port competition, and collaboration with international organizations, academics and private sectors is also needed to contribute to the SDG and successful development. Public including port authorities to continuously collaborate with related stakeholders to reduce environmental damage they produce and improve productivity. In particular, academia and civil society contribute to paying more attention to harmonized urban development and environmental protection than economic oriented port development.

Through corresponding improvements in sustainability and productivity, the port can achieve more economic stability and continuous improvements in subsequent performance within the bounds of the environmental regulations. All these sustainable and productivity motivations and opportunities are encouraging a port as to adopt a policy of active and advanced environmental and social management. For example, annual sustainability reports published on port websites, offer guidelines and strategic advice towards port sustainability to address issues related to sustainable port operations and development with economic, social and environmental considerations.

The concept of sustainability and productivity in ports requires a simultaneous pursuit of economic prosperity, environmental quality and social responsibility. In the shipping and ports industries, with broadened port functions as an economic catalyst for revenue and employment and a central position for industries related to international trade, economic stability (highlighted by the economic crisis in 2008) and corporate responsibility issues may shed new light on port operations. Moreover, recently, owing to the growing environmental and social concerns regarding potential environmental impacts, “sustainability” has been progressively framed in port operations and development literature.

Sustainable port development and port productivity strategies “Not only address problems in port areas including safe handling of goods or environmental management, but also include the actual capacity development for the ports and the establishment of related training capacities in the region, aiming to develop a port and the area surrounding the port through a systematic approach working with the ports and addressing their specific needs” (UNCTAD, 2009). Sustainable development and port productivity themes such as safety, health and environment should already be high on the shipping companies' list of priorities. However, currently sustainable development

and port productivity is mostly supported and dominated by land-based industries. It is apparent that the interest of many stakeholders in the social and environmental performance of the shipping industry has increased and that stakeholders pay more attention to sustainability issues, putting greater pressure on port and maritime industry.