



Port Planning Consultancy for the Conceptual Master Plan of the Proposed Westports Expansion CT10-CT19

Stage 1 **Port Development** **Planning**

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Stage1 Port Development Planning

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Executive Summary

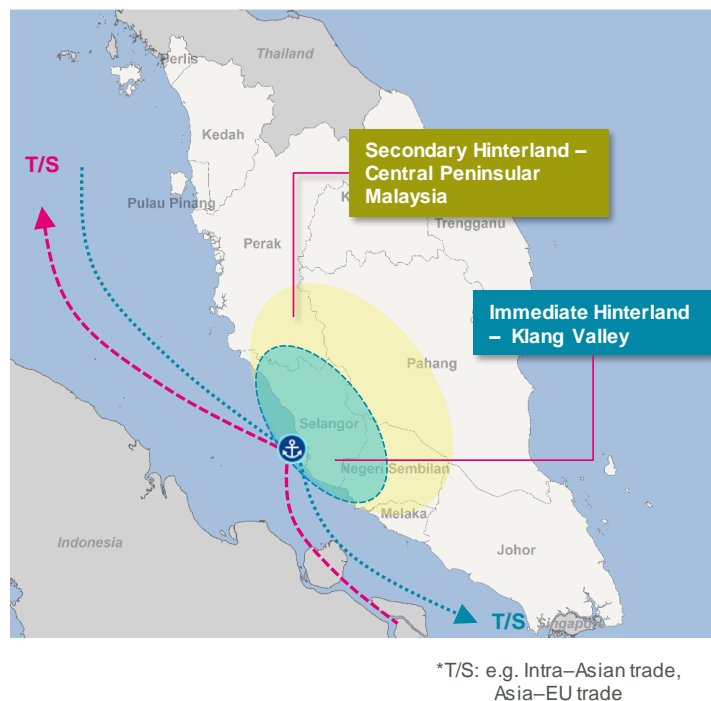
BMT has been commissioned to develop a Master Plan for Westports Expansion.

A key element in this is the review of market opportunities that may drive future port development. This report summarises key aspects of Westport's hinterland, the regional port market, the development of container shipping, port connectivity and competitiveness in order to derive forecasts for port throughput, facility requirements and preliminary market positioning.

Hinterland Economy

Gateway cargoes are directly linked to the economic development of the local hinterland. The hinterland of Westports covers an **immediate** hinterland (KL and Selangor) and **secondary** hinterland (Negeri Sembilan, Pahang and Perak).

Hinterland of Westports



Selangor and KL are the economic powerhouses of Malaysia and have seen strong economic growth in recent years ((CAGR of 7.5%-8.5%), and presently account for approximately 40% of the national GDP.

Over 350 industrial areas/parks are found within the hinterland, and value added growth at a CAGR of 9.1% for 2010-2015 has been forecast. The key commodities produced in the hinterland include electrical and electronics, food products, rubber and plastics products chemicals and chemical products, transport equipment and machinery.

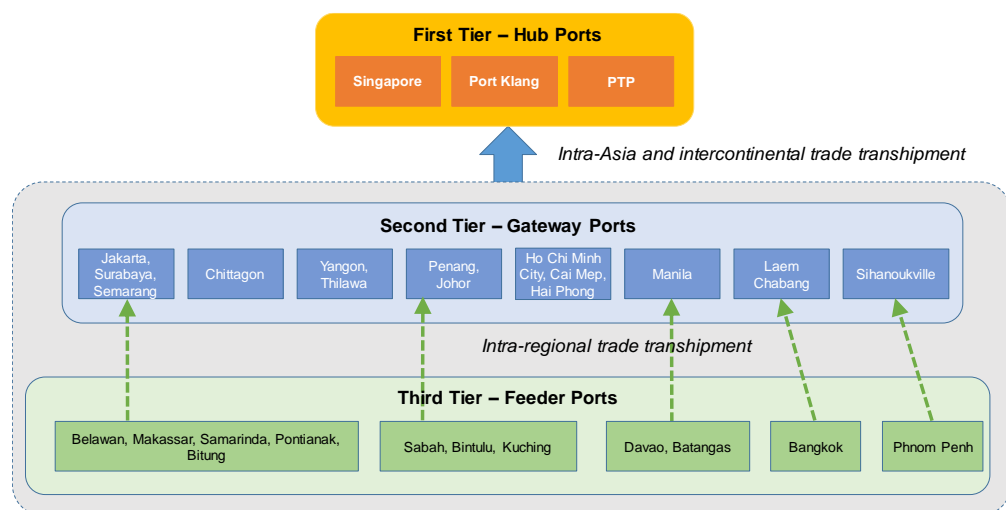
There are a number of **growth drivers** which will define future hinterland growth

- Strong regional and national economic growth create demand manufactured goods and container shipping.
- The hinterland is featured under different policies and economic corridors, receiving prioritised Government support.
- The core industries within the hinterland are focussed industries at the national level. Relevant facilitation, promotion and incentives are provided to maintain sustainable growth.
- New government to add renewed growth momentum
- Restoring oil price to benefit the 2nd largest oil exporter in SE Asia.

Regional Port Market

Southeast Asia, and the Malacca Straits, is at the crossroads of the world's east-west and north-south trade routes. It's at the heart of global shipping with vast volumes of cargo movement, supported by three types of regional ports: hub ports (53%), gateway ports (37%), and feeder ports (10%).

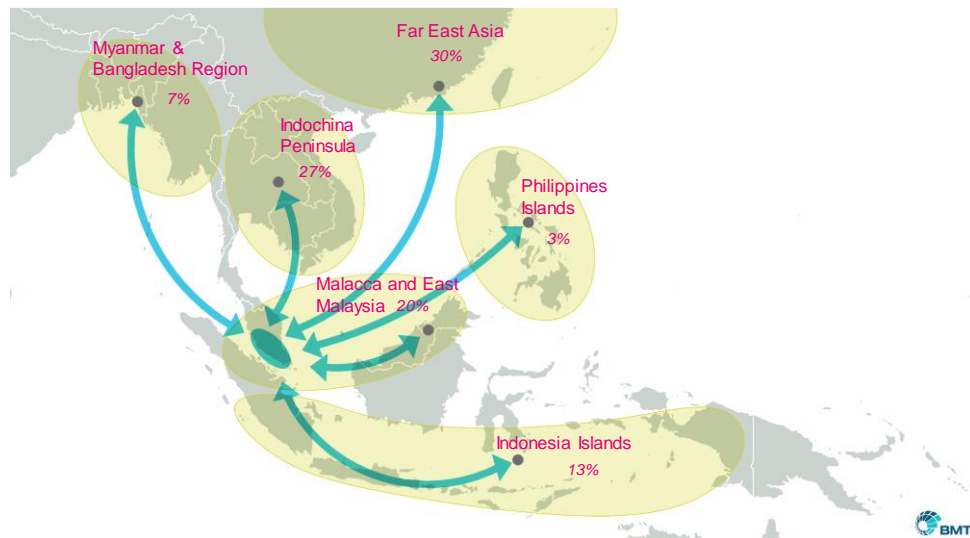
Southeast Asia Port Network



(multiple other feeder ports across the Region)

Intra-Asia trade led the total port throughput growth (CAGR 2012-2017 of 5.5% vs non- Intra-Asia of 3.8%). In recent years, the throughput growth of the ports in the region was concentrated in the gateway ports - the development of these ports may have negative impacts on the transshipment hubs (including Port Klang) in the long term as cargo transits directly between Origins-Destination.

Intra-Asia Transshipment Split at Westports



Container Shipping Market Development

Vessel upsizing in recent years is driven by the increasing demand for international trade and a chase for economics of scale. Larger vessels lead to the increased investment in ports to accommodate the vessels (longer berth, deeper water, more outreach, reinforced structures etc.)

Since April 2017, three mega shipping alliances, Ocean Alliance, THE Alliance, and 2M Alliance, have dominated the industry. The expanded shipping lines are putting more requirements on the terminals they use. Alliance reshuffles and industry consolidation is reshaping port of choice and calling frequency. The three mega alliances will likely to adopt a 2+1 model in SE Asia, i.e. 2 hub ports + 1 gateway port (potential future hub). Ocean will be using Port Klang, Singapore + Cai Mep; 2M for PTP, Singapore + Cai Mep; THE might evolve from the current solely Singapore to Singapore, Cai Mep + Laem Chabang.

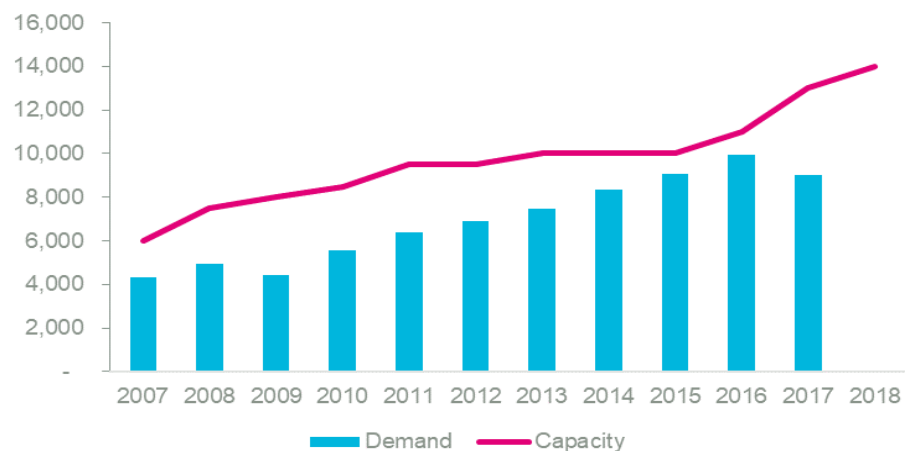
Currently THE is the only alliance that does not have any interest in any terminals in the Straits of Malacca. The opportunity to attract this alliance to anchor in Westports should be investigated, although THE may not have the scale of operations to justify a dual hub model at present.

Shipping lines are under extreme cost pressure. Thus, low cost continues to be a key arbiter of carrier choice, with better efficiency required of the terminal operators. The alliances strategy in SE Asia requires higher and less fragmented terminal capacity; increasing Inter Terminal Transport (ITT) and increasing volume peaks are also expected.

Port Infrastructure and Hinterland Connectivity

Westports has been expanding its handling capacity to support strong demand growth. The completion of CT9 (Phase 1) in early 2018 has boosted Westports' capacity to 14 million TEU per year. It will further increase to 15 million TEUs per year with the completion of phase 2 of CT9 by early 2019. Westports' berth occupancy reached a historical high of 80% in 2016 prior to CT8 being completed. Congestion issues occurred - with average vessel waiting time of 7.2 hours. Vessel waiting time decreased to only 3 hours with the commissioning of CT8 in 2017, and further improvements are expected with the operation of CT9.

Westports Capacity & Throughput (000 TEU)



95% of Westports' direct cargo is transported by road, only 5% by rail. Study reveals that the Level Of Service (LOS) of the major port access road of Westports including Pulau Indah Expressway, during most part of the day is at a level detrimental to the port's business. The main contributor of the high traffic volume is heavy vehicles, and containerised cargo comprises a significant percentage of the traffic.

Port Throughput Forecast

Forecasts have been developed based on a review of direct and transshipment cargo, and Westports competitive position within these markets.

The throughput of Westports is expected to grow to 26.8 million TEUs in 2040 in the Base Scenario, at an annual growth rate of 4.8%, but with the average annual growth slowing in the long run. Transshipment cargo has a faster growth than direct cargo.

Forecast Results for Container Throughput, 2018 – 2040

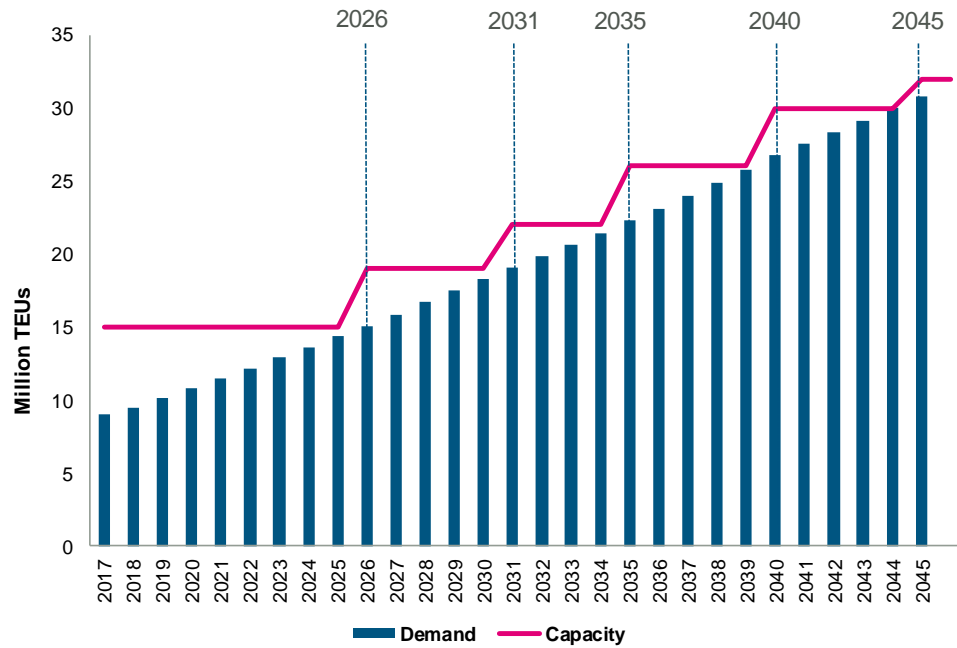
(Million TEUs)	2018	2022	2030	2040	CAGR 17-40
High Scenario	9.6	12.6	21.6	31.7	5.6%
<i>Direct</i>	2.9	3.5	5.0	6.7	3.9%
<i>T/S</i>	6.7	9.1	16.6	25.0	6.2%
Base Scenario	9.5	12.2	18.3	26.8	4.8%
<i>Direct</i>	2.9	3.5	5.0	6.7	3.9%
<i>T/S</i>	6.6	8.7	13.3	20.1	5.2%
Low Scenario	9.5	12.0	17.4	23.5	4.2%
<i>Direct</i>	2.9	3.5	5.0	6.7	3.9%
<i>T/S</i>	6.6	8.5	12.5	16.8	4.4%

Westports Operation Planning and Equipment Requirement

Quay length and terminal area requirements were established for the layout plan development in the next stage, with 400m berths being proposed with yard areas of a minimum 15ha each berth.

5 phases are initially proposed (phases to be developed in detail within the engineering studies that will be reflected back into this study upon completion).

Preliminary Capacity Planning of Westports



Additional Equipment Required (each phase)

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Capacity (mn TEUS)	4.0	3.0	4.0	4.0	2.0
QCs	20	15	20	20	10
RTGs	60	45	60	60	30
Tractors	168	126	168	168	84

Westports Business Plan and Strategies

Markets where Westports is best positioned (compared to PTP and Singapore) include Peninsular Cost Coast, Sumatra, Upper Bay of Bengal and East Malaysia. Currently they are not yet well tapped with less than 15% of cargo tranship at Westports. Strategies to expand into the contestable hinterland include:

- Expand the catchment area of Westports by working with lines on intermodal trades and trucking to target the contestable areas
- Integrate with the hinterland to be ultimately perceived as **the Port** of the hinterland.
- Further utilise / develop Port Klang Free Zone (PKFZ)

Other business strategies were recommended including:

- Provide dedicated berth / terminal model (engaging shipping lines in terminal development), which could be developed via JV / equity offering or VTA (volume commitment for discounted tariff, dedicated berthing, berth on arrival, prioritised berthing etc.)
- A dedicated team could be established to take up a promotional role for Westports. The team should work in join forces with relevant Government arms in promoting the use of the port.
- JV companies with shipping lines for feeder, trucking, intermodal services to secure and enhance hinterland coverage locally and regionally.

1 Hinterland Economy

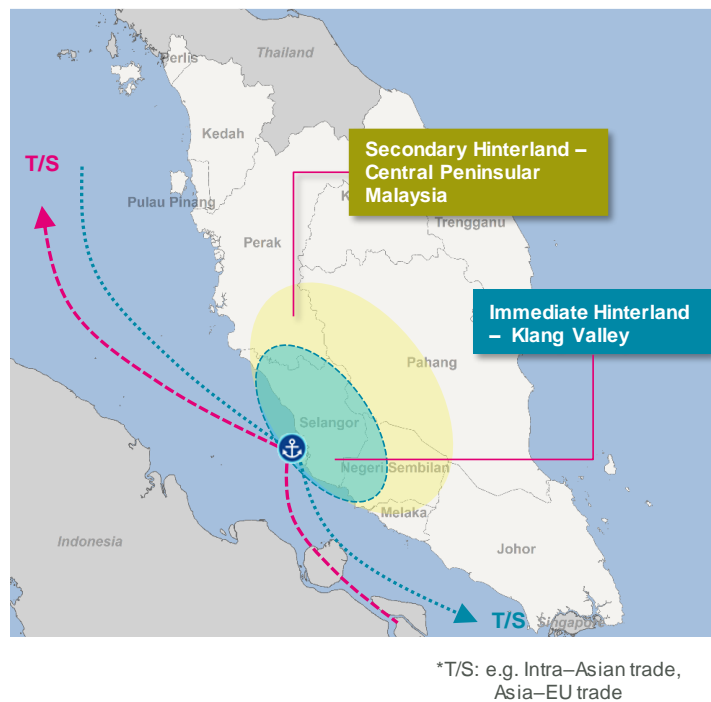
1.1 Introduction

Ports do not typically generate cargoes directly, but are the key facilitators for trading activities of their surrounding hinterland. The development of this local economy drives commodity trade and determines the volume of cargo to be handled by a port. Hence, understanding the economy in terms of GDP, trades (import/export), industrialisation and its related development policies is therefore essential for understanding a port's performance and forecasting its future growth.

Westports handles both transshipment and gateway cargoes:

- Transshipment cargoes includes transshipment cargoes from all over the world as well as transshipment cargoes that originate or are destined for another Malaysian port. Transshipment in Westports therefore relates more to global or national economic growth than local economic development.
- Gateway cargoes are directly related to the economic development of the local hinterland and are thus also called direct cargoes. The hinterland of Westports covers:
 - Immediate hinterland: Klang Valley (WP Kuala Lumpur and Selangor)
 - Secondary hinterland: Central Peninsular Malaysia (Negeri Sembilan, Pahang and Perak)

These cargo flows and hinterland are illustrated in **Figure 1-1**:

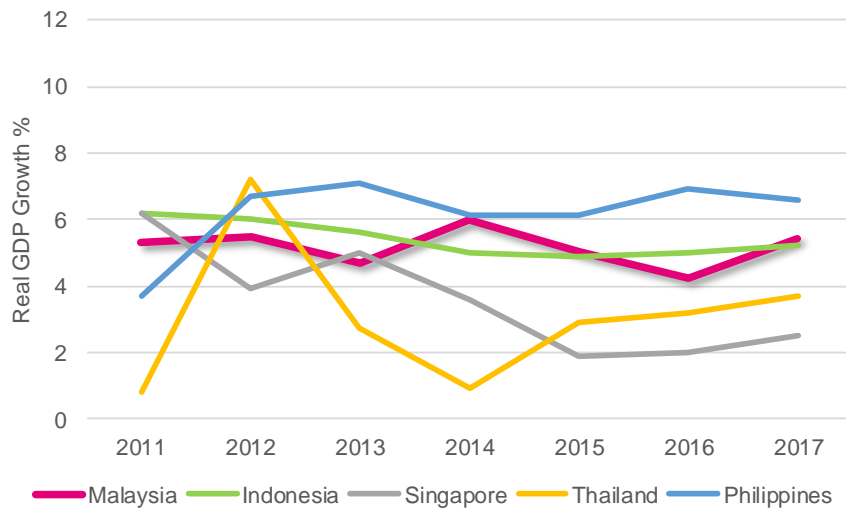
Figure 1-1 Hinterland of Westports

1.2 Review of Malaysia Economy

1.2.1 GDP

Malaysia is one of the most developed and prosperous countries in Southeast Asia. According to the International Monetary Fund (IMF), Malaysia recorded a GDP of USD 309.9 billion in 2017. Malaysia's average annual real GDP growth between 2013 and 2017 was a solid 5.1% - which far outpaced the world's average at only 3.5% p.a.. Malaysia, together with Philippines and Indonesia are the fastest growing countries in Southeast Asia.

Figure 1-2 GDP Growth of Southeast Asian Countries



Source: IMF

The immediate hinterland of Westports, Selangor & Kuala Lumpur, are considered the economic powerhouse of Malaysia. Their combined GDP accounted for about 40% of the national total. In particular, Selangor grew at a Compound Annual Growth Rate (CAGR) of 7.5% while Kuala Lumpur grew at a CAGR of 8.5% from 2012 to 2016.

Figure 1-3 GDP and Growth Rate by Malaysian States

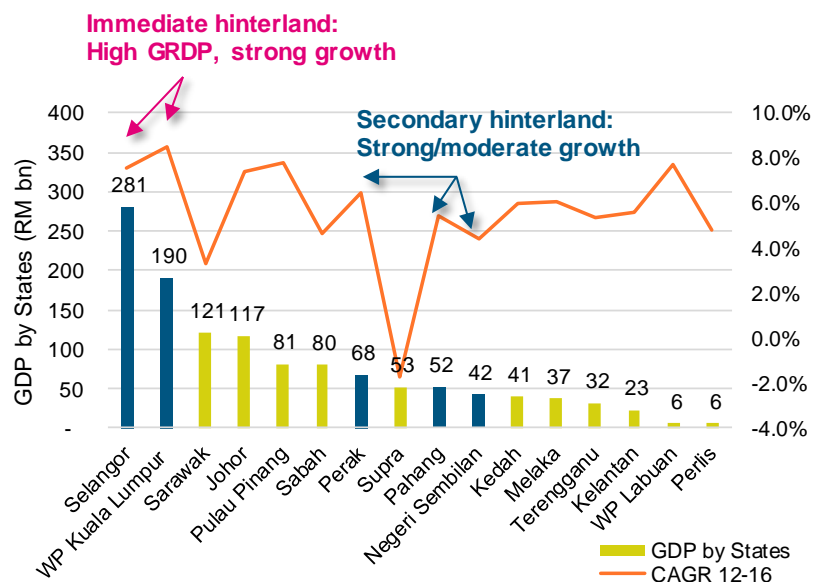


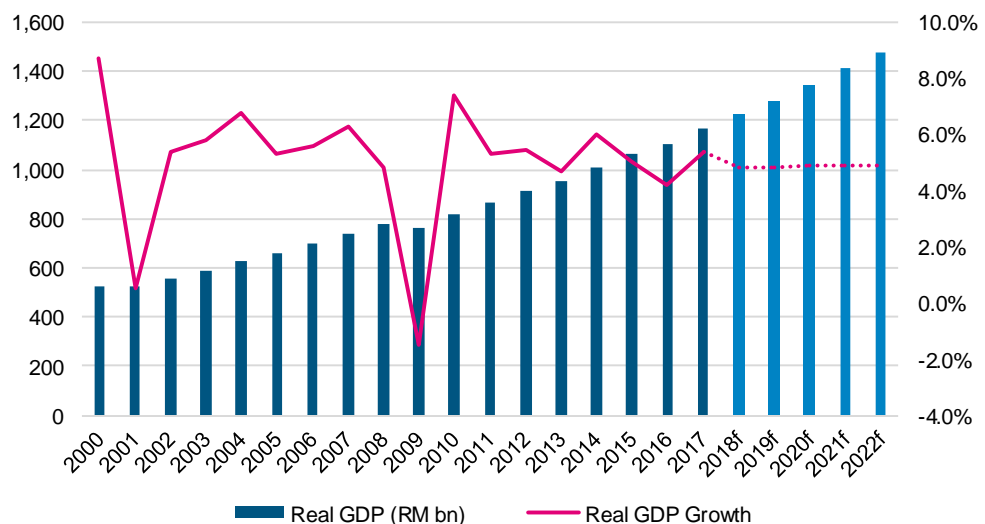
Table 1-1 GDP by Malaysian State, 2010-2016 (RM Million)

	2012	2013	2014	2015e	2016p
Johor	87,783	91,405	99,991	106,709	116,679
Kedah	32,195	33,894	35,741	38,274	40,596
Kelantan	18,519	18,997	20,252	21,281	23,020
Melaka	29,483	30,582	33,698	35,425	37,274
Negeri Sembilan	35,710	36,580	38,714	39,952	42,389
Pahang	42,409	43,698	46,699	48,814	52,452
Pulau Pinang	60,145	63,995	70,678	76,130	81,284
Perak	52,693	54,927	59,330	62,793	67,629
Perlis	4,677	4,888	5,148	5,322	5,642
Selangor	209,845	224,801	245,346	263,315	280,698
Terengganu	26,188	27,221	30,093	30,812	32,270
Sabah	66,896	67,464	72,383	73,528	80,167
Sarawak	106,625	110,365	118,862	119,119	121,414
WP Kuala Lumpur	137,221	148,223	164,641	176,723	190,075
WP Labuan	4,451	4,897	5,211	5,570	5,984
Supra	56,412	56,677	59,657	53,957	52,547
Total	971,252	1,018,614	1,106,443	1,157,723	1,230,120

e: estimated; p: preliminary

Source: Department of Statistics Malaysia

Looking forward, IMF forecast the real GDP of Malaysia to grow at around 5% p.a. from 2018 to 2022. In the long term, real GDP growth in Malaysia is expected to be around 3.5% to 4.5% p.a., according to the macro-economic forecast of country issued by Economist Intelligence Unit.

Figure 1-4 Real GDP and Real GDP Growth in Malaysia, 2000 to 2022

Source: IMF World Economic Outlook

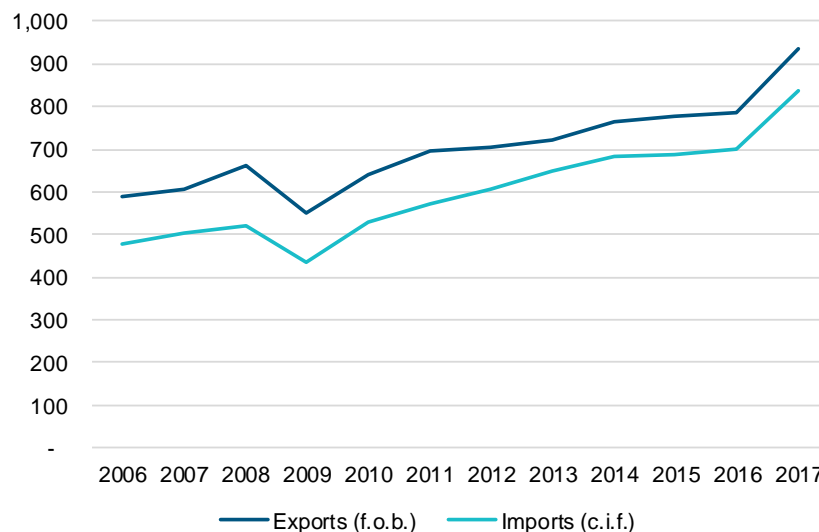
1.2.2

External Trade

Malaysia is an export driven economy with a positive balance of trade. In 2017, its total exports valued RM 935 billion and total imports valued RM 838 billion. The trade surplus has been hovering at about RM 100 billion in the past decade.

Malaysia's trade activities grew very strongly, at CAGR of 6.3% from 2012-2017. This growth, primarily driven by the cyclical recovery of global trade activity, and it was broad-based: with strong growth for both E&E and non-E&E manufactured trade.

Figure 1-5 Malaysia Import and Export, 2006-2016 (RM Billion)



Source: Department of Statistics Malaysia

Key import and export commodities include “Machinery and Transport Equipment” (44%), “Mineral Fuels, Lubricants” (12%), “Manufactured Goods” (11%), “Miscellaneous Manufactured Articles” (10%) and “Chemicals” (9%). Most of these commodity categories include goods which can be shipped in containers.

Table 1-2 Key Trading Commodities, 2016 (RM Million)

Trading Commodity (2016)	Exports (RM mn)	Imports (RM mn)
Food	30,218	46,766
Beverages and Tobacco	4,906	4,534
Crude Materials, Inedible	22,514	24,882
Mineral Fuels, Lubricants, etc.	111,163	72,184
Animal and Vegetable Oils and Fats	50,637	5,469
Chemicals	64,669	73,571
Manufactured Goods	70,015	87,922
Machinery and Transport Equipment	338,785	316,348
Miscellaneous Manufactured Articles	89,029	54,559
Miscellaneous Transactions and Commodities	5,028	12,585

1.2.3**Industry and Manufacturing**

Manufacturing industry is thriving in Westport's hinterland which generates demand for container trade and port services.

Table 1-3 Share of GDP by Economic Activities, 2016

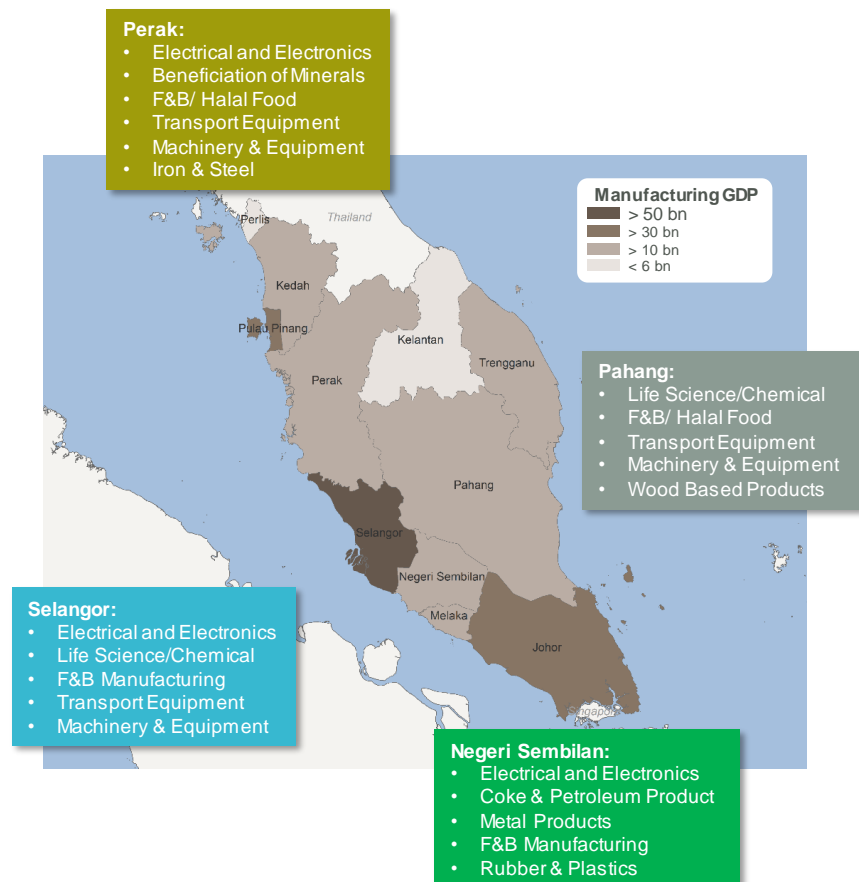
% of GDP by Economic Activities	Immediate Hinterland		Secondary Hinterland		
	Selangor	WP Kuala Lumpur	Perak	Pahang	Negeri Sembilan
Agriculture	2%	0%	17%	25%	11%
Mining and Quarrying	0%	0%	0%	2%	0%
Manufacturing	30%	4%	18%	22%	42%
Construction	6%	7%	4%	3%	3%
Utilities, Transport, Storage & Communication	18%	10%	19%	5%	13%
Wholesale & Retail Trade, Accommodation, Food and Beverage	21%	35%	15%	16%	12%
Finance, Insurance, Real Estate and Business Services	12%	27%	9%	5%	6%
Other Services	5%	4%	6%	10%	4%
Government Services	6%	13%	11%	11%	9%
Gross Regional Domestic Product (GRDP)					

Except Kuala Lumpur which is mostly service oriented, manufacturing industry has been an important economic activity in the hinterland Selangor, Perak, Pahang, Negeri Sembilan, accounting for 18%-42% of individual regional GDP.

A closer look at the manufacturing industry reveals that the top sub-industries include the following.

- Manufacture of computer, electronic and optical products (15% of total manufacturing VA in hinterland)
- Manufacture of food products (12%)
- Manufacture of rubber and plastics products (10%)
- Manufacture of chemicals and chemical products (9%)
- Manufacture of motor vehicles, trailers and semi-trailers (8%)

Figure 1-6 Distribution of Manufacturing Activity, 2014 (RM Million)



Source: Department of Statistics Malaysia

Industrial Areas

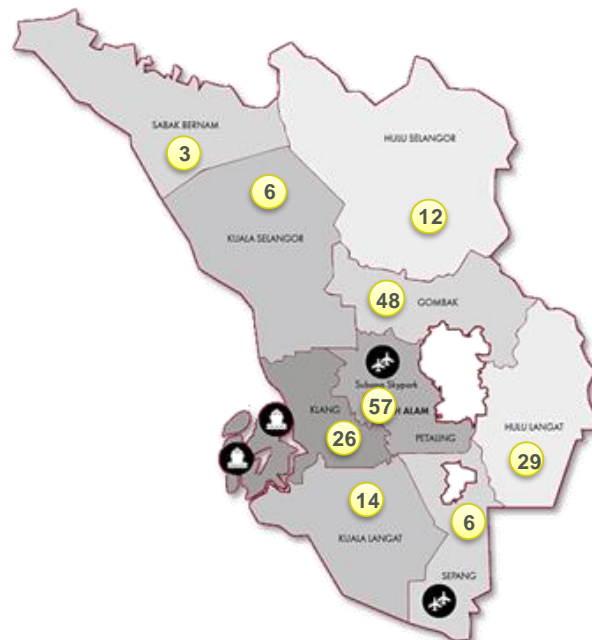
The manufacturing industry in the primary and secondary hinterland has been growing, from about 9,000 establishments in 2010 to over 10,000 establishment in 2015. Value added increased from RM 48 Billion (bn) in 2010 to RM 74 bn in 2015, at a CAGR of 9.1%.

Currently, there are over 200 industrial areas/parks within Selangor. Geographically speaking, the majority of industrial areas/parks are located in Petaling, Gombak, Klang and Hulu Langat . In particular, Petaling is the light industry hub of Selangor, and is the home to about 60 industrial areas/parks.

Additionally, the secondary hinterland Negeri Sembilan Pahang and Perak boasts over 150 industrial parks.

These industrial areas/parks produce goods for both local consumption and exports, and thus form a solid cargo base for Westport.

Figure 1-7 Distribution of Industrial Areas/Parks within Selangor



6 Number refers to the number of industrial areas/parks

1.2.4

Foreign Direct Investment (FDI)

Foreign Direct Investment (FDI) has been one of the important drivers for economic development and foreign trade growth.

Malaysia is a net recipient of FDI with constantly positive capital inflow in recent five years. In 2017, FDI in Malaysia recorded a net inflow of MYR 39.2 billion, 17% down from 2016 but still in the same pace with the trend of global FDI flows, which fell 16% in 2017.

The majority of the investments came from China, Switzerland, Singapore, the Netherlands, and Germany (56% of foreign investments). China is the top FDI source, and its investments have diversified into many industries including non-metallic products, transport equipment, rubber products and electronics.

52.6% of the FDI flows were channelled to the services sector, mainly in the utilities sub-sector and financial & insurance/ takaful activities. Manufacturing and mining & quarrying sectors constituted 25.4% and 7.8% of the total FDI flows respectively.

Figure 1-8 Malaysia FDI Net Flow, 2010-2017 (MYR million)

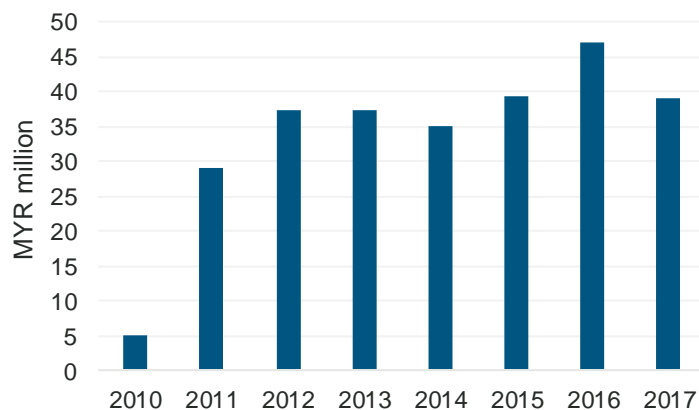


Table 1-4 Major Source of FDI, 2017

Main Investing Countries	2017, in %
China	21.0
Switzerland	14.6
Singapore	8.6
Netherlands	7.0
Germany	5.3

1.3

Growth Drivers

1.3.1

National Strategy and Policy Supports

The economic growth in the hinterland is supported by national strategy and government policies.

- **The Eleventh Malaysia Plan** projected the Malaysian **economy** to grow at 5-6% per annum, with growth of gross **exports** at 4.6% p.a.. The GDP of **Selangor** is expected to growth by 6.9% p.a. until 2020.
- The manufacturing sector will be **enhanced** through a shift towards the production of more complex and diverse products and improving productivity by adopting greater automation and upgrading skills.
- **The Selangor Structure Plan 2035** forecast that the Selangor economy will grow by 5.4% p.a. until 2035. The GDP of **manufacturing** industry is projected to grow by **4.7% p.a.** to about RM 160 bn in 2035.
- Manufacturing industry will be developed with clean and high value industry promoted. The manufacturing industry will be supported by **improvement in infrastructure, investment incentives**, etc.



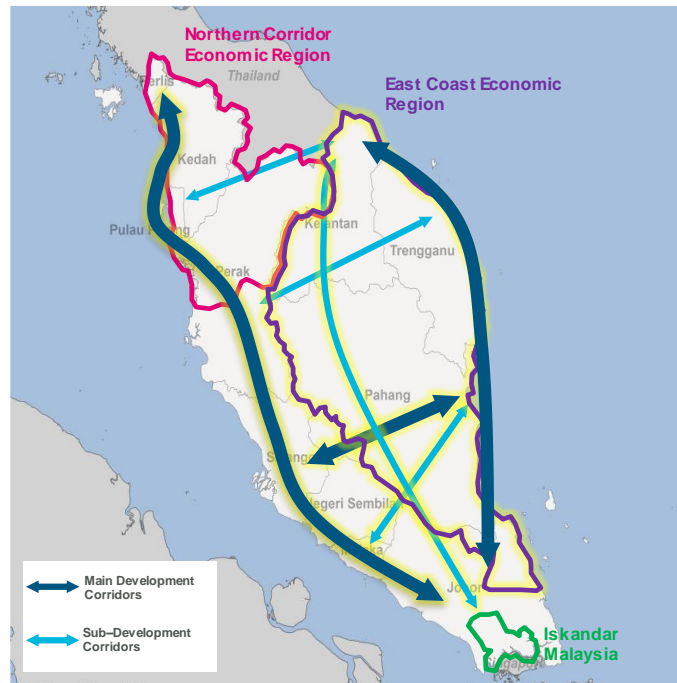
Core industries in the hinterland are promoted:

- The core manufacturing industries (e.g. electrical electronics, chemical) in the hinterland are selected as the **National Key Economic Areas (NKEAs)** which receive prioritised Government support. Different entry point projects are planned to grow the NKEAs
- Development of Klang Valley is also a NKEA itself.
- The **Third Industrial Master Plan** selected 12 industries in the manufacturing sector for further development and promotion, including some of the core industries in the hinterland, such as electrical and electronics, food processing, machinery and equipment, transport equipment, pharmaceutical (/life science), rubber-based.
- **Strategies** identified to encourage growth, facilitate trade, establish cluster industrial development, support application of technology, encourage partnership and strength capability and competitiveness.



Hinterland strategy implemented at national level:

- The **National Physical Plan 2 (NPP-2)** specifies Kuala Lumpur Conurbation (covering KL, parts of Selangor, Negeri Sembilan and Pahang) as the **national growth conurbation** which shall be supported and with global competitiveness enhanced.
- Selangor/KL, Perak and Negeri Sembilan lie within the “North-South Corridor” which forms the **core industrial belt** and an important food belt.
- Pahang and Selangor/KL lie on the “Central East-West Corridor” - the important secondary industrial corridor with East Coast Rail Link (**ECRL**) – albeit recently suspended, still a long-term strategic initiative.
- Pahang also lies in sub-development corridors of “North-South **Sub-Corridor**” and “Kuantan-Muar Sub-Corridor” which are potential **agriculture belt**. It also belongs to the **East Coast Economic Region (ECER)** which has one of the aims to be an exporter of resource-based and manufactured products.

Figure 1-9 Economic Regions and Development Corridors**1.3.2****Strong Domestic and External Demand**

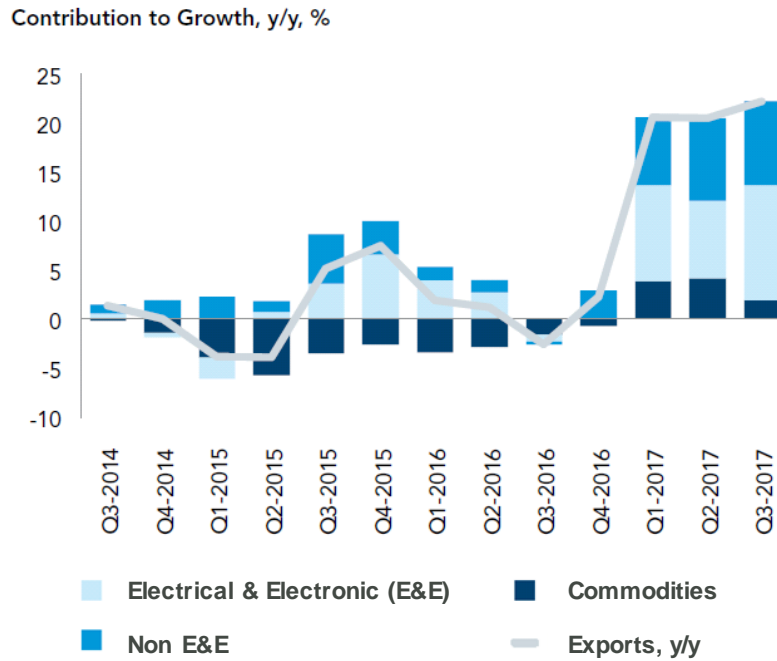
A broad based global recovery is seen across most of the world's major economies. Robust export growth has been underpinned, driven by strong global demand for electronics and improved terms of trade for commodities, especially oil and gas.

Private investment is also projected to continue supporting growth (World Bank), with sustained flows of infrastructure projects and capacity expansion in the manufacturing and services sectors.

Malaysia domestic consumption is expected to be boosted by:

- MYR appreciation increases buying power for importing goods
- Increase on income, expected to achieve high-income country in next few years

Figure 1-10 Export Growth and Key Contributors, 2014 – 2017



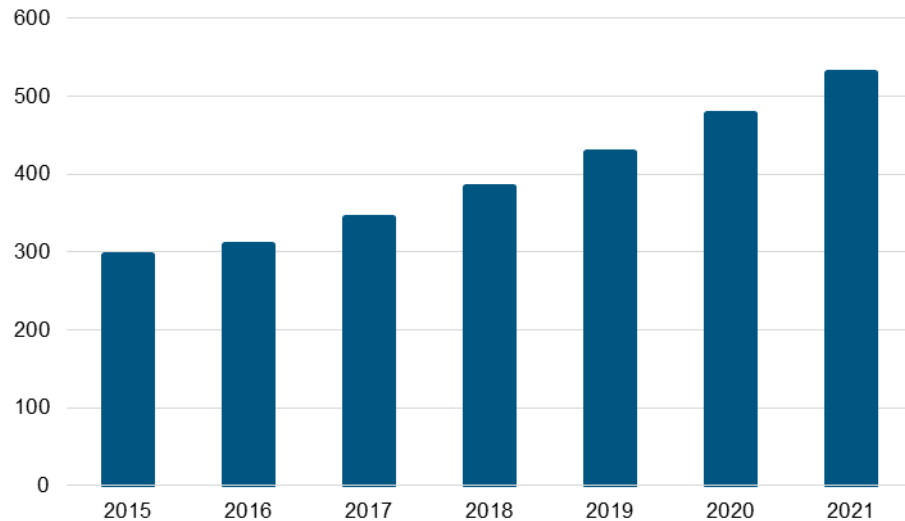
Source: World Bank

1.3.3

Economic Outlook

The outlook for Malaysia’s economy continues to be positive. Healthy growth in manufacturing and consumption sectors is expected, while commodity and energy prices are predicted to recover from recent lows.

Intra-ASEAN trade is growing rapidly as neighbouring economies develop at a breakneck pace. The International Monetary Fund (IMF) has forecast a real GDP growth of over 5% for Malaysian after 2016. The nation’s GDP is forecasted to increase to over 530 billion USD or over 2 trillion RM at the present exchange rate by 2021.

Figure 1-11 Malaysia GDP Forecast, 2015-2021 (in billion USD)

Source: *International Monetary Fund*

Overall, the economic outlook for Malaysia is positive as commodity prices and currencies continue to recover. Interregional trade will develop rapidly, allowing Malaysia to ride the wave of healthy economic growth in Asia. Port Klang as the Malaysia's most important window for international trade must be developed accordingly to ensure the nation's future prosperity. Of course the recent 14th General Election Malaysia (GE14) may impact the situation, but the following is noted::

- The new Government will review China's regional infrastructure initiative,
- Prime Minister's Mahathir's strong track record in handling the Asian financial crisis of 1997 could put the economy on a more stable path in the long run if he delivers on pledges to clean up a legacy of corruption

- Abolishing a 6 percent Goods and Services Tax is expected to reduce living costs and boost domestic consumptions in the short term.

Additionally, oil prices reached 3-year high and would likely to sustain due to concerns about further decline on supply from Venezuela and Iran – which will benefit Malaysia's economy – as a net exporter.

The following table summarises the economic outlook of Malaysia forecaste by different parties. In general, all expect that the short term growth will be about 5% p.a. and that a long term growth of about 4% p.a. is expected. For Selangor, the 11th Malaysia Plan expected it to grow at about 7% p.a. in short term, higher than the national average while in long term the Selangor Structure Plan 2035 expected the state to grow at 5.4% p.a..

Table 1-5 Malaysia Economic Growth Rate Forecast

National GDP	Short term till 2020/22	Longer term till 2035
IMF	4.7% – 5.0%	3.5% – 4.5%
World Bank	4.8% – 5.4%	–
EIU	4.5% – 5.0%	4.0%
OECD	4.9%	–
JCER	–	4.0% – 5.0%
11 th Malaysia Plan	5.0% – 6.0%	–

Source: IMF, World Bank, EIU, OECD, JCER, 11th Malaysia Plan

Table 1-6 Selangor Economic Growth Rate Forecast

National GDP	Short term till 2020/22	Longer term till 2035
11th Malaysia Plan	6.9%	–
The Selangor Structure Plan 2035	–	5.4%

Source: 11th Malaysia Plan, The Selangor Structure Plan 2035

1.4

Summary

Gateway cargoes are directly linked to the economic development of the local hinterland. The hinterland of Westports covers **immediate** hinterland (KL and Selangor) and **secondary** hinterland (Negeri Sembilan, Pahang and Perak).

Selangor and KL are the economic powerhouses of Malaysia and accounted for about 40% of the national GDP. Economic growth in Selangor and KL has been strong (CAGR of 7.5%-8.5%).

Strong **manufacturing** industry and growing **agricultural** products are also potential drivers for container shipping. Increasing number of establishments with value added growth a CAGR of 9.1% for 2010-2015. Over 350 industrial areas/parks are found within the hinterland.

The **key commodities** produced in the hinterland include electrical and electronics, food products, rubber and plastics products chemicals and chemical products, transport equipment and machinery.

There are a number of growth drivers which define future hinterland growth

- **Strong** regional and national **economic growth** create demand manufactured goods and container shipping.
- The hinterland is featured under different **policies** and **economic corridors**, receiving **prioritised Government support**.
- The core industries within the hinterland are **focussed industries** at the national level. Relevant **facilitation**, **promotion** and **incentives** are provided to maintain sustainable growth.
- New government to add **renewed** growth momentum
- **Restoring oil price** also to benefit the 2nd largest oil exporting country in SE Asia.

2 Regional Port Market

2.1 Study Approach

This chapter gives an overview and in-depth analysis on the regional port market development, covering the following key issues:

- **Key Ports in Southeast Asia (SEA).** SEA ports will be classified into hub ports, gateway ports and feeder ports. Volume and growth analysis is conducted for these three port categories, respectively.
- **Trade Types and Trends.** Trade types in SEA ports are analysed and future trends are identified.
- **Port Market Structure and Volume Analysis in SEA.** Based on a clear understanding of regional port market structure from previous sections, Origin-Destination (OD) analysis for SEA transshipment market and volume & share analysis for each port cluster are conducted.
- **Summary and Implications.** Summary on SEA port market structure, volumes and future outlook is developed.

2.2 SEA Port Market Structure

Due to the unique geographical features and unbalanced economic development, the container ports in Southeast Asia have developed in a complex manner.

According to the nature of container trade and service network at ports, we can divide Southeast Asian ports into three port categories: **hub ports, gateway ports**, and **feeder ports**.

First Tier: Malacca Strait Transshipment Hubs. Many major intercontinental and intra-Asia services call at these hubs. They are the main transshipment ports for Asia-Europe, Trans-Pacific and Intra-Asia container trades. Ports in this category include:

- Singapore
- Port Klang
- Tanjung Pelepas

Second Tier: Gateway Ports. These ports are the major ports in Southeast Asian countries. Gateway ports mainly handle country's OD cargo and serve as transshipment centre (Intra-Asia trades) to other feeder ports. These ports include:

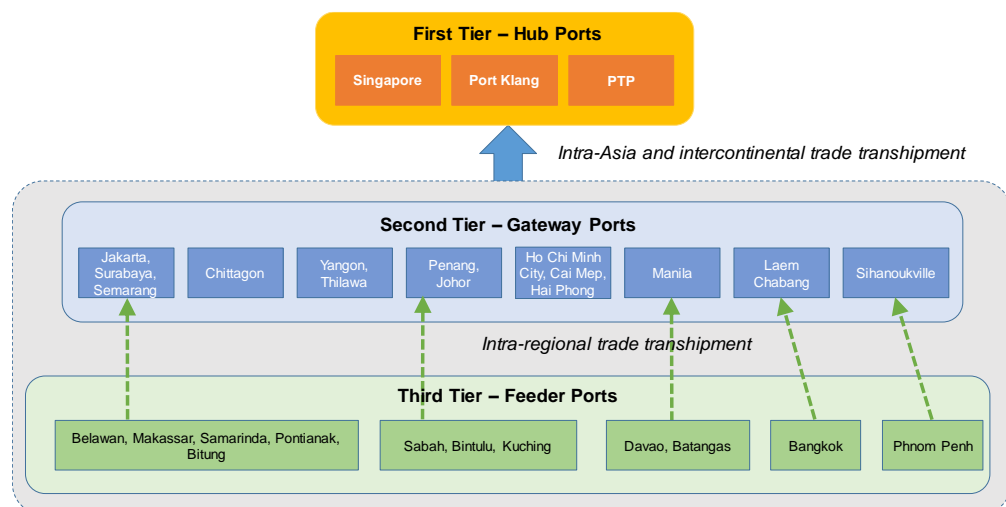
- Thailand: Laem Chabang
- Philippines: Manila
- Indonesia: Jakarta, Surabaya, Semarang
- Vietnam: Ho Chi Minh City, Cai Mep, Hai Phong
- Malaysia: Penang, Johor
- Myanmar: Yangon, Thilawa
- Bangladesh: Chittagon
- Cambodia: Sihanoukville

Third Tier: Feeder Ports. These ports have no or few direct services connections. Hence, foreign trade mainly depends on transshipment at first or second tier ports. These ports include (but are not limited to) key centres at:

- Thailand: Bangkok
- Philippines: Davao, Batangas
- Indonesia: Belawan, Makassar, Samarinda, Pontianak, Bitung
- Malaysia: Kuantan, Sabah, Bintulu, Kuching
- Cambodia: Phnom Penh

The classification process helps us to have a clearer view when analysing the characteristics, structure and development trend of the SEA ports.

Figure 2-1 Southeast Asia Port Network



(multiple other feeder ports across the Region)

2.3 Containerised Cargo Volume Analysis

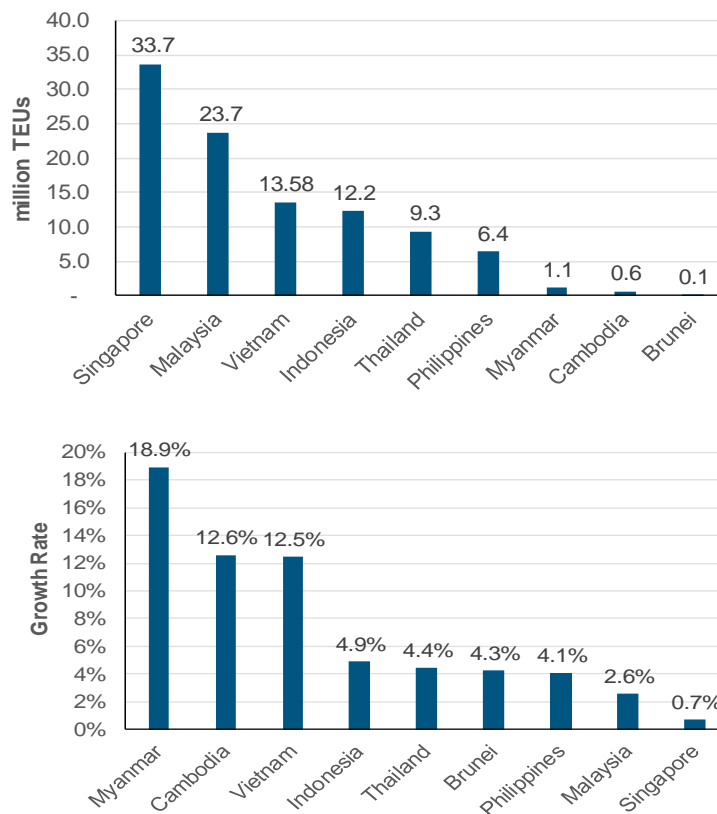
2.3.1 Port Throughput

The throughput of Southeast Asian ports has grown in recent years, from 84 million TEUs in 2012 to 100 million TEUs in 2017, with a CAGR of 3.7% p.a..

At present, Singapore is still the country with the largest container throughput in Southeast Asia, accounting for 33% of Southeast Asian container port volume, followed by Malaysia, Vietnam, Indonesia, Thailand, the Philippines, Myanmar, Cambodia and Brunei.

From a growth perspective, the growth rate of port throughput in developing countries is generally higher than that of developed countries. Myanmar recorded the fastest growth during the past five years, with CAGR of 19%, followed by Cambodia (12.6%), Vietnam (12.5%), Indonesia (4.9%), Thailand (4.4%), Brunei (4.3%), Philippines (4.1%). Malaysia and Singapore were 2.6% and 0.7% respectively.

Figure 2-2 Southeast Asia Country National Container Throughput and Growth Rate, 2017



2.3.2

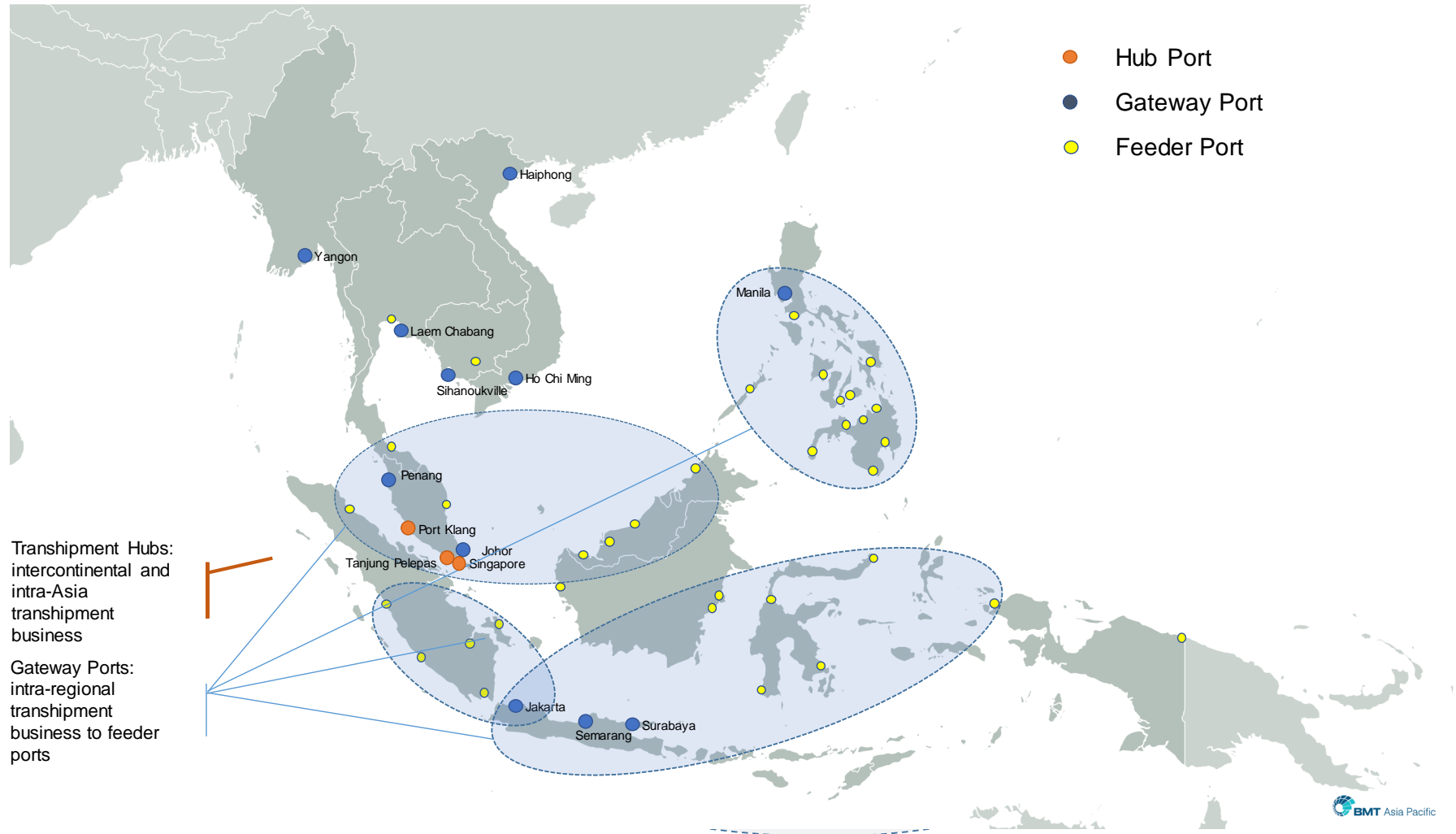
Southeast Asia Port Clusters and Volume

Considering the 3 main transshipment hubs, Singapore and PTP are pure transshipment ports, while Port Klang is a hybrid hub that features as both transshipment hub and gateway port for OD cargo (as discussed in **Section 1**).

Located at the crossroads of world's trunk shipping routes (east-west and north-south), Singapore became the first Regional transshipment hub; PTP, in close proximity to Singapore, was rapidly developed into a new hub by Maersk (and now also MSC) and EMC moving in transshipment bases. Despite a small deviation from the location where trades converge, Port Klang is still en-route the major trades, and supported by an ample cargo base generated from its hinterland, Port Klang has also developed from a gateway port to an integrated hub sitting on the Malacca Straits.

Looking forward, Cai Mep, Laem Chabang and Jakarta also have the potential to become integrated hub supported by abundant hinterland cargo.

Figure 2-3 Southeast Asia Port Distribution and Hierarchy



2.3.3

Southeast Growth Prospects by Different Port Types**Transshipment Cargo Diluting to Major Gateway Ports**

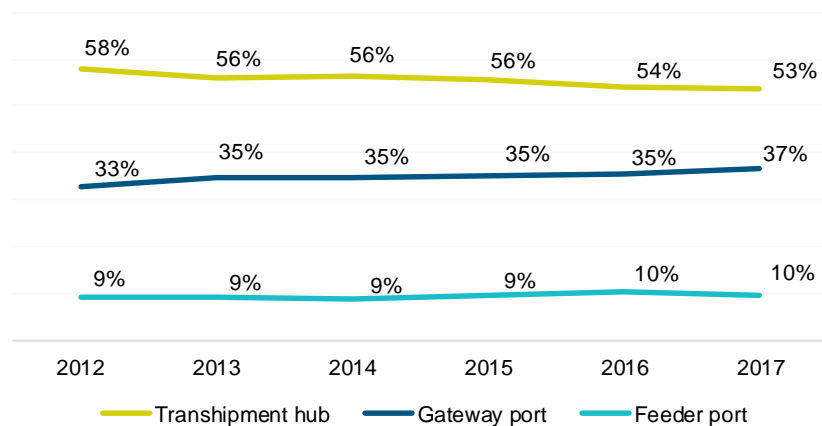
The throughput at transshipment hubs (Singapore, Port Klang and PTP) in 2017 was 53.9 million TEUs, accounting for 53.5% of SEA total port throughput, while the share for gateway ports is 36.8% and feeder port is 9.7%

The market share of the transshipment hubs is on a decreasing trend whereas gateway ports are rising quite fast. A slight increase on share is also observed for feeder ports.

From a growth rate perspective, gateway ports experienced fast growth at a CAGR of 6.1% during past five years, significantly highly than transshipment hubs (2.2% p.a.) and feeder ports (3.3% p.a.). Key reasons include:

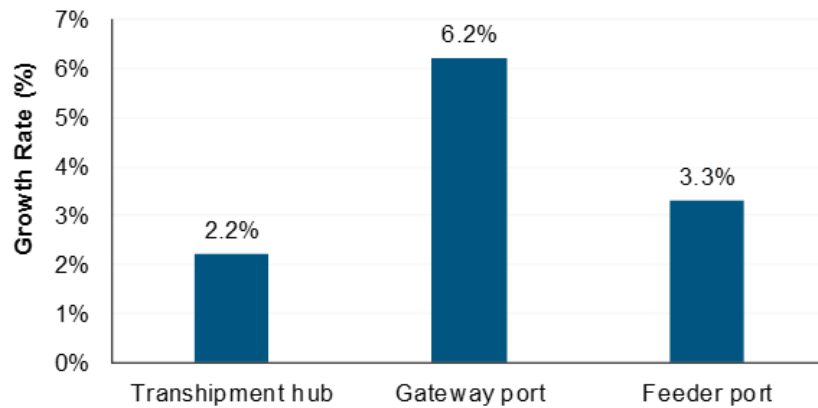
- Southeast Asia's economic growth continues to outpace the world average;
- More Asia services choose to directly call traditional gateway ports, aiming to reduce trading costs and further promote trade growth.
- These gateway ports have gradually taken over the transshipment cargo from nearby feeder ports, driving the throughput of the gateway ports to further increase.

Figure 2-4 Market Share by Port Type



Source: BMT

Figure 2-5 Volume Growth Rate for Different Port Types



Source: BMT

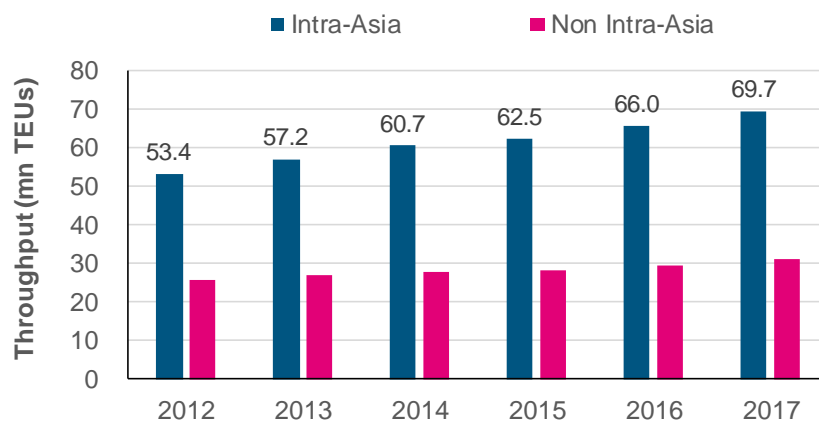
Intra-Asia Cargo is the Main Growth Driver

Southeast Asian container ports are dominated by intra-Asia cargo which accounts for 69% of total trade.

For the three hub ports, Intra-Asian trade accounted for 57% of the overall trade; gateway ports and feeder ports were dominated by intra-Asia trade, accounting for 81% and 90% respectively

Meanwhile, growth rate of intra-Asia trade is significantly higher than non-Asian trade. From 2012 to 2017, intra-Asia trade volume at Southeast Asia ports expanded by CAGR of 5.5% p.a., while non intra-Asia trade grew at a low pace at CAGR 3.8% p.a.

Figure 2-6 SEA Country National Container Throughput



Source: BMT

2.3.4

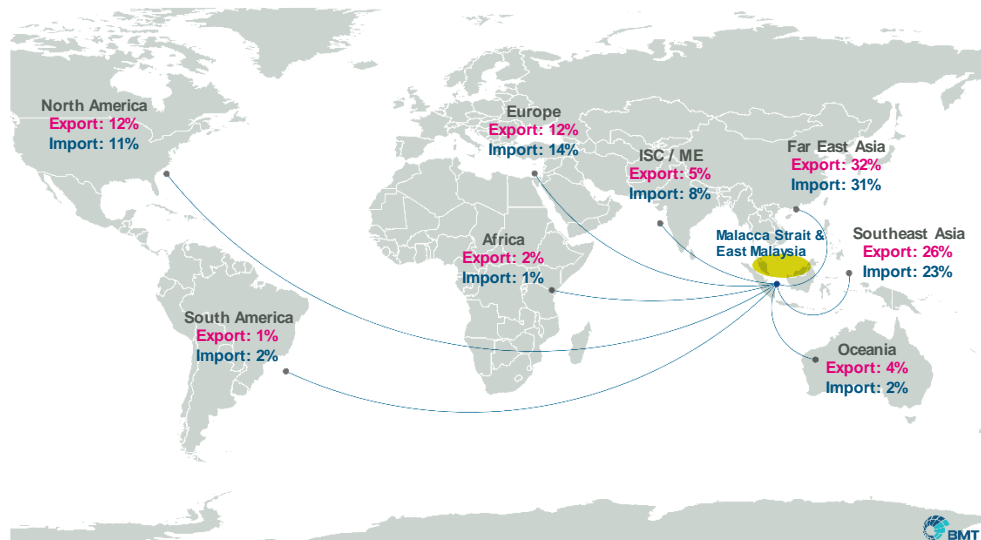
Direct Cargo Analysis – Malacca Strait & East Malaysia

The containerised cargo generated in the region is about 57.4 million TEUs, of which 13.2 million are direct imports and exports, and the container penetration is around 60 to 70%.

Exports from Malacca and East Malaysia are mainly exported to East Asia (32%), Southeast Asia (26%), North America (12%) and Europe (12%).

Imports from Malacca and East Malaysia mainly came from East Asia (31%), Southeast Asia (23%) and Europe (14%). About 30% of the container cargo in the area was transferred via Malacca.

Figure 2-7 Direct Cargo OD Distribution



Source: BMT

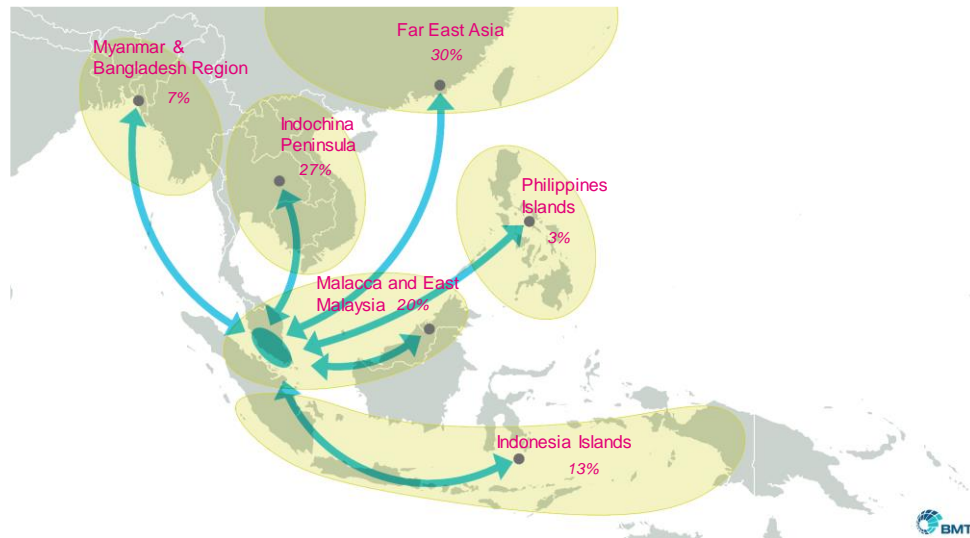
2.3.5

Transshipment Cargo Analysis – Malacca Strait

Transshipment operations within Southeast Asia mainly concentrate, as noted, in 3 hub ports at Malacca Strait. Singapore, Port Klang and PTP - handling 44 million transshipment cargo in 2017.

The largest origin and destination for transshipment cargo is Asia (42%), followed by the ISC/ME (28%), Europe (17%).

For the Asia transshipment cargo handled in Malacca, 30% to/from Far East Asia, 27% to/from Indochina, 20% to/from Malacca and East Malaysia, 13% to/from Indonesia, and 7% to/from Myanmar and Bangladesh.

Figure 2-8 Intra-Asia Transshipment Split at Westports

Source: BMT

2.4

Summary

Southeast Asia, and the Malacca Straits, is at the crossroads of the world's east-west and north-south trade routes. It's at the heart of global shipping with vast amount of cargo movement, supported by three types of regional ports:

- Hub ports (53%) – Singapore, PTP and Klang Port. Many major intercontinental and intra-Asia services call at these three hubs.
- Gateway ports (37%) – such as Leam Chabang, Jakarta, Manila, etc. These ports are the major ports in Southeast Asian countries Gateway ports mainly handle country's OD cargo and serve as transshipment centre (Intra-Asia trades) to feeder ports;
- Feeder Ports (10%) – such as Davao, Bangkok, Sabah, these ports have no or only a few direct routes, and they are connected to the international market via transshipment at hub ports or gateway ports;

In recent years, the throughput growth of the ports in the region was concentrated in the gateway ports. Intra-Asia trade led the total port throughput growth (CAGR 2012-2017 of 5.5% vs non- Intra-Asia of 3.8%).

The largest origin and destination for transshipment cargo is Asia (42%), and for Asia transshipment cargo handled in Malacca, 30% to/from Far East Asia, 27% to/from Indochina, 20% to/from Malacca and East Malaysia.

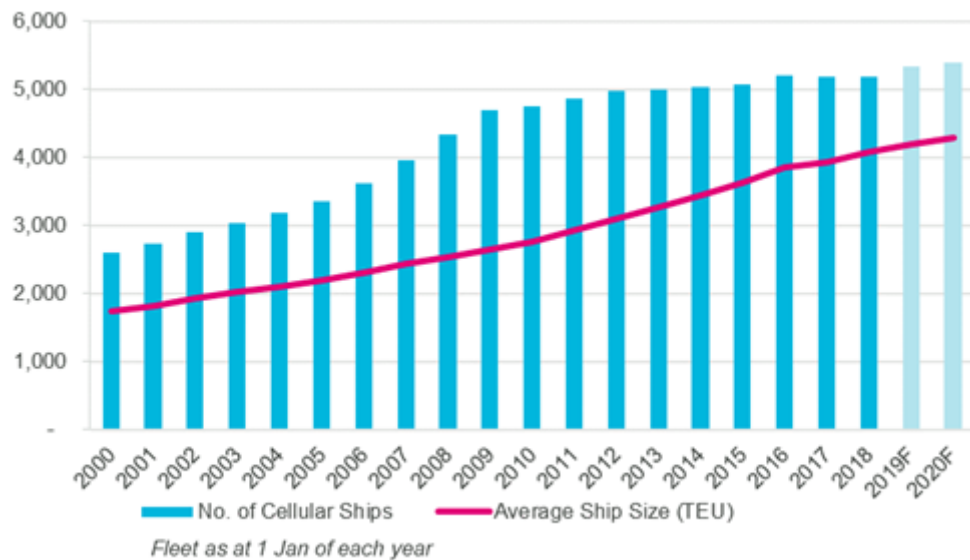
The development of gateway ports may have negative impacts on the transshipment hubs (including Port Klang) in the long term as cargo transits directly between Origins-Destination.

3 Container Shipping Market Development and Implications for Ports

3.1 Vessel Upsizing Trends

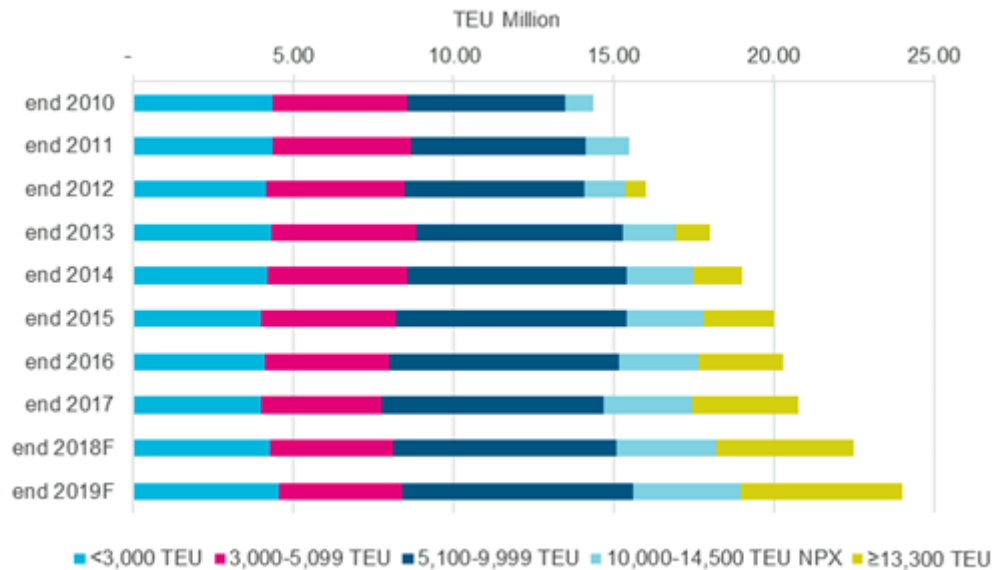
Vessel sizes have been aggressively increasing in recent years: the current average is more than double that in 2000 (+133%) - driven by the large vessel segment (10,000+ TEU vessel) as a result of increasing demand for international trade and a chase for economics of scale.

Figure 3-1 Average Size of Container Vessels, 2000-2020F



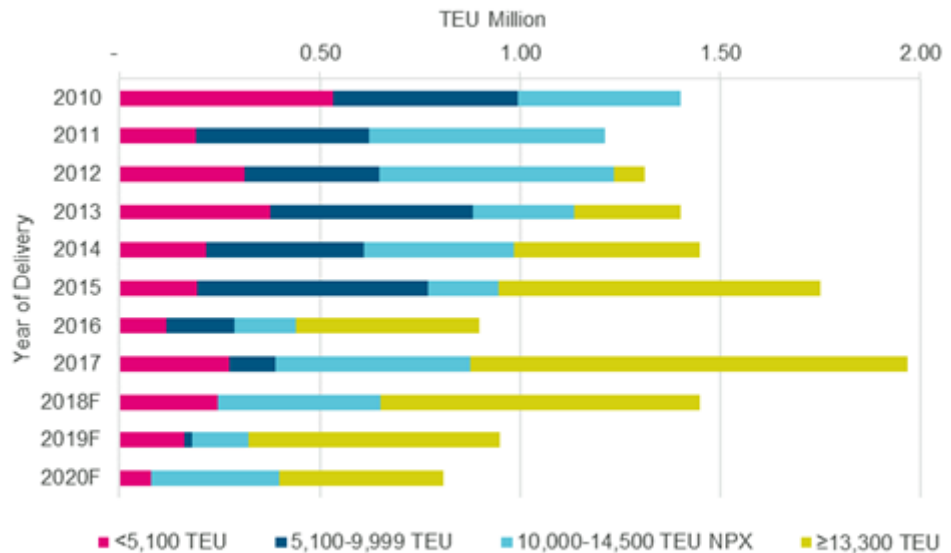
The global fleet structural change is illustrated in **Figure 3-2**:

Figure 3-2 Global Cellular Fleet Structure, 2000 – 2019(forecast)

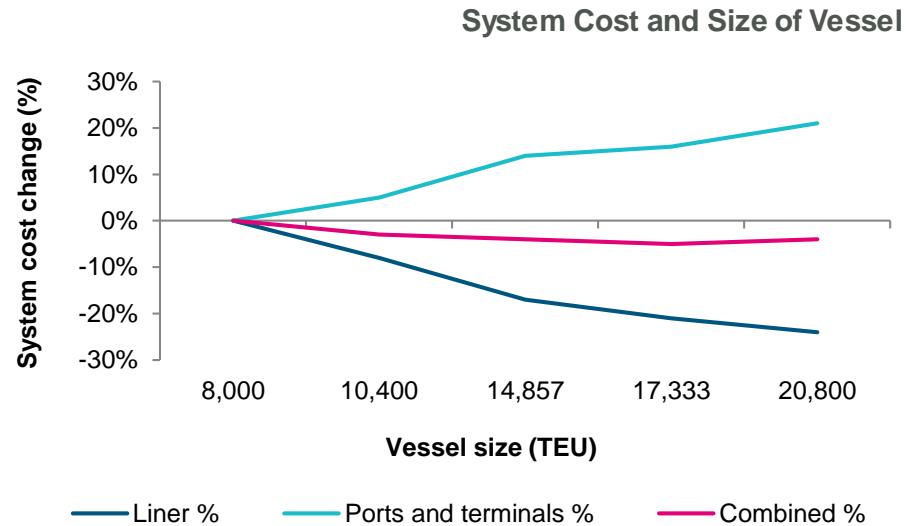


The order book shows delivery concentrated in the large vessels (80-90%) segment for the next few years. The average vessel size is expected to grow continuously by another 5% by end of 2020.

Figure 3-3 Orderbook and Deliveries, 2010-2020F



However, as vessel size grows, the impact of economics of scale will reduce due to decreasing savings in total system cost, i.e., the combined cost on liners and terminals.

Figure 3-4 System Cost and Size of Vessel

Source: BMT consultations

3.2 Industry Consolidation and Shipping Alliances

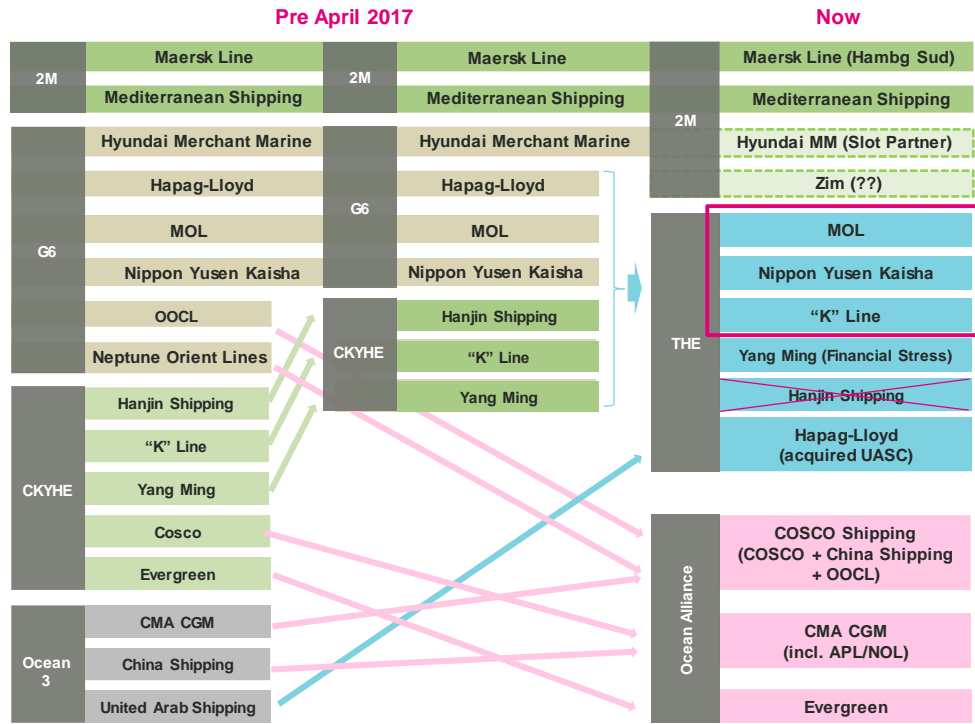
In recent years, under the pressure of operating costs, the shipping market has undergone several major restructurings and mergers. CSAL incorporated HLL, COSCO merged with CSCL, CMA CGM acquired APL, UASC became part of HLL, COSCO acquired OOCL and so forth. These mergers and acquisitions are aiming to absorb more cargo from the container vessels and ports.

The expanded shipping lines after acquisitions have contributed to the growing power of shipping alliances. For example, COSCO and CSCL and CMA and APL has become members of the Ocean Alliance, while HLL and UASC became members of THE Alliance.

On the other hand, due to the increase on cargo volume, the expanded shipping lines are putting more requirements on the terminals they use. Members of the enlarged shipping alliance are incline to use their own alliance's terminals for cargo handling, even within the same port. Hence, this will lead to more demands on inter-terminal transportation (ITT) by coalition members.

Mega alliances are super-large fleets brought together by members of their coalition with aims to achieve greater economic of scale.

Figure 3-5 Changes in Shipping Alliances, pre & post 2017



Source: BMT Data Collection

Since April 2017, two newly formed shipping alliances, the Ocean Alliance, comprising CMA CGM, COSCON, Evergreen and OOCL, and THE Alliance, consisting of Hapag-Lloyd, K Line, MOL, NYK and Yang Ming, has begun to compete with the existing 2M Alliance (Maersk and MSC).

Like the Ocean Alliance, THE Alliance covers all major routes, namely Asia - Europe / North America, Asia - North America (West Coast / East Coast) and Trans-Atlantic routes. At the same time in the Asia - Middle East - Red Sea routes, alliance members also established share positions agreements beyond the old CKYHE and G6 partnership.

Alliance reshuffle and industry consolidation will reshape port of choice and calling frequency. Further restructuring is expected in the future, but the scale is anticipated to be more limited, with the major restructuring substantially complete.

Figure 3-6 New Ship Alliance fleet deployments on Asia-Europe Routes, 2018

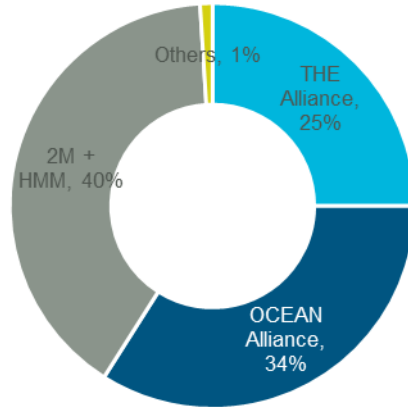
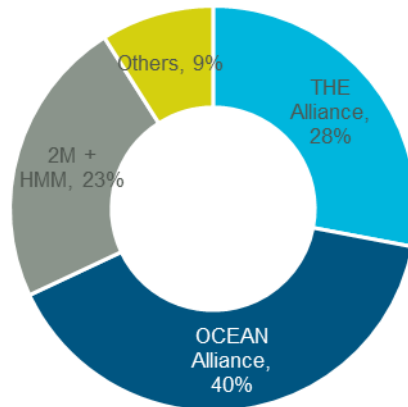


Figure 3-7 New Ship Alliance fleet deployments on Trans-Pacific Routes, 2018



3.3

Alliances Strategy in Southeast Asia

In SE Asia, direct services from the three mega alliances are deployed to Singapore, PTP, Port Klang, Cai Mep, Jakarta and Laem Chabang.

Only Singapore and Cai Mep are receiving direct calls from all three alliances. PTP as the hub for 2M also offers services to North EU/Med and ISC via the Ocean Alliance. Port Klang and Jakarta have services only from Ocean Alliance. Port Klang saw a total of six services (4 FE-EU/Med and 2 FE-WCNA) relocated to Singapore as a result of alliance changes. Laem Chabang has direct services from both the Ocean and THE Alliance.

On east-west trades, only Singapore and Cai Mep are deployed with both FE-EU/Med and TP services. 2M and THE only call at three ports in SE Asia, but with both FE-EU and TP mother vessels deployed to the three ports. Ocean Alliance has the most extensive coverage amongst all alliances in the Southeast Asia with a total coverage of six ports. The only three ports directly deployed with both FE-EU and TP services are Cai Mep, Singapore, and Port Klang.

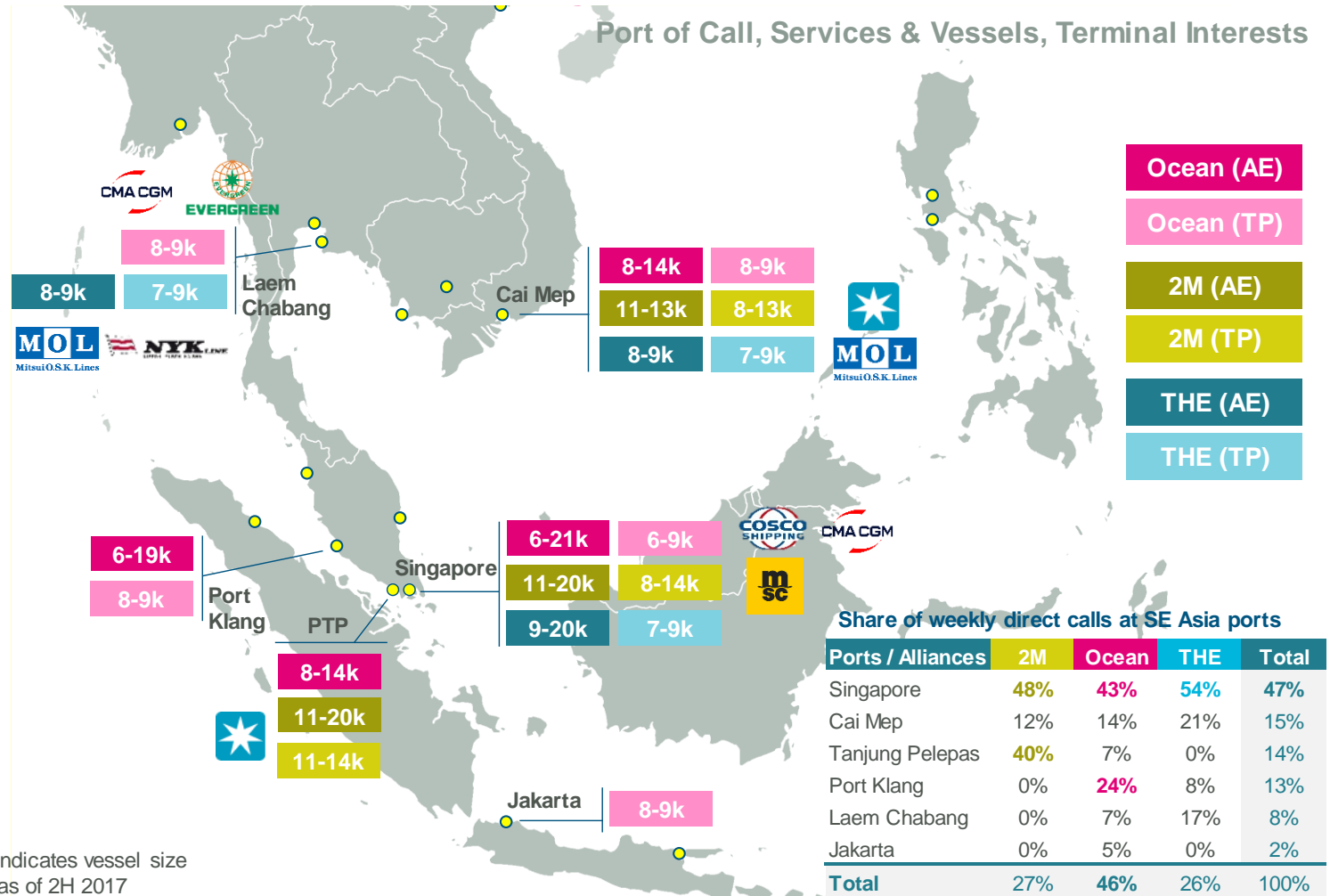
Ocean Alliance uses all three transshipment ports along the Straits of Malacca. 2M hubs in both Singapore and PTP (dual hub), while THE solely hubs in Singapore.

In summary, the three mega alliances will likely to adopt a 2+1 model in SE Asia, i.e. 2 hub ports + 1 gateway port (potential future hub). Ocean will be using Port Klang, Singapore + Cai Mep; 2M for PTP, Singapore + Cai Mep; THE might evolve from the current solely Singapore to Singapore, Cai Mep + Laem Chabang.

Currently THE is the only alliance that does not have any interest in any terminals in the Straits of Malacca. Therefore, the use of Cai Mep as its secondary hub in SE Asia seems a natural intention based on current deployment trend.

The opportunity to attract this alliance to anchor in Westports should be investigated, although THE may not have the scale of operations to justify a dual hub model at present.

Figure 3-8 Shipping Alliance Landscape in Southeast Asia



Another trend observed is that the formation of mega alliances has expanded the direct service coverage of gateway ports (such as Laem Chabang and Jakarta) which traditionally rely on transshipment.

The current impact of alliance reshuffling results in some winners and losers:

- Hub port – Singapore the gainer (five FE-EU/Med services added); and Port Klang lose out (lost six East-West services)
- Gateway port – Cai Mep and Laem Chabang are the winners; Jakarta launched the first direct services to North America (pendulum to both West Coast and East Coast)

Table 3-1 Asia – Europe and Transpacific Service at TS hubs, 2018

Port	Asia-Europe & Trans-Pacific Services	No. of Call per Week
Port Klang	New Alliance	15
	Old Alliance	20
PTP	New Alliance	16
	Old Alliance	15
Singapore	New Alliance	58
	Old Alliance	54

Table 3-2 Asia – Europe and Transpacific Service at Gateway ports, 2018

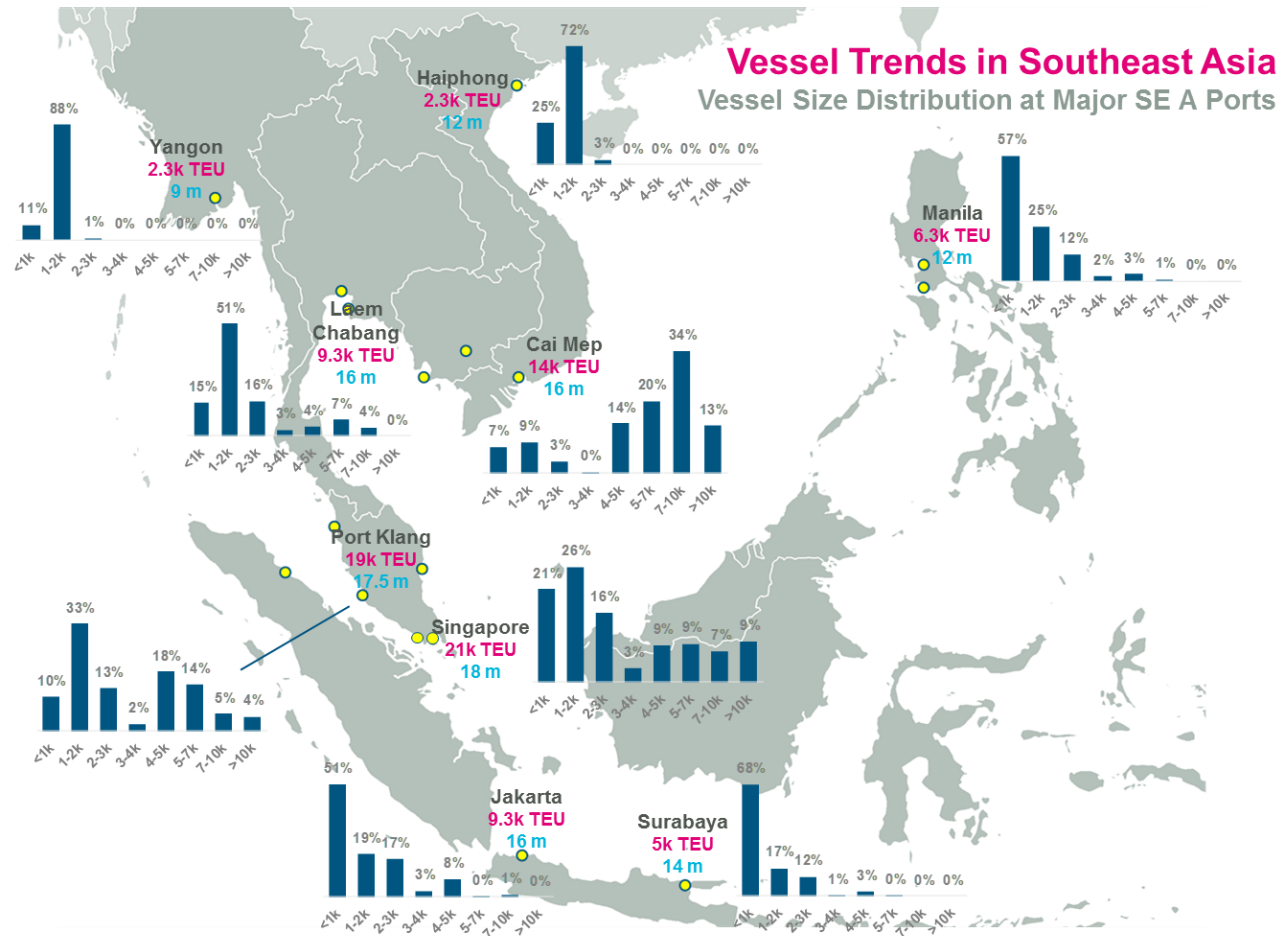
Port	Asia-Europe & Trans-Pacific Services	No. of Call per Week
Laem Chabang	New Alliance	7
	Old Alliance	4
Cai Mep	New Alliance	19
	Old Alliance	16
Jakarta	New Alliance	1
	Old Alliance	0

3.4 Vessel Trends in Southeast Asia

Draft constraints at SE Asian ports are also a key reason for smaller vessel deployment in the regional trade (i.e. the IA trade). Thailand, Philippines, Indonesia and Greater China are the key markets for Intra-Asia trade.

Vessel draft limits at Manila, Bangkok, Haiphong, Ho Chi Minh (city port), Jakarta (berth located west of JICT), some berths at Surabaya, and even Shanghai (Waigaoqiao) are below 12m. Only ships of < 3,000 TEU can call at these ports. Increasing cargo volume attracts the potential use of larger ships, thus ports are developing their new deep sea ports, e.g. Laem Chabang, New Priok, Cai Mep, with water depth >16m.

Figure 3-9 Vessel Size Distribution at Major Southeast Asia Ports



3.5

Implications for Ports

Key implications can be summarised as:

- Larger vessels – increased investment in ports to accommodate the vessels (longer berth, deeper water, more outreach, reinforced structures etc.)
- Liner consolidation and alliance reshuffling – reshape port call selection and frequency
- Shipping lines under extreme cost pressure (the recovery in 3/4Q last year seems short-lived with surging fuel price and continuing overcapacity) – low cost continues to be a key arbiter of carrier choice, with better efficiency required of the terminal operators (speed and flexibility offerings now focussed on cost, consistency and reliability)
- Require higher capacity to handle any major alliance (not only the customer shipping line's volume but also its alliance partners')
- Demands less fragmented terminal capacity
- Increasing ITT (even within a same port, member lines will use their own terminals)
- Increasing volume peaks (workload less evenly distributed)
 - more TEU exchanges per vessel call
 - additional resource (more QCs, internal trucks and manpower)
 - more yard space
 - larger gates

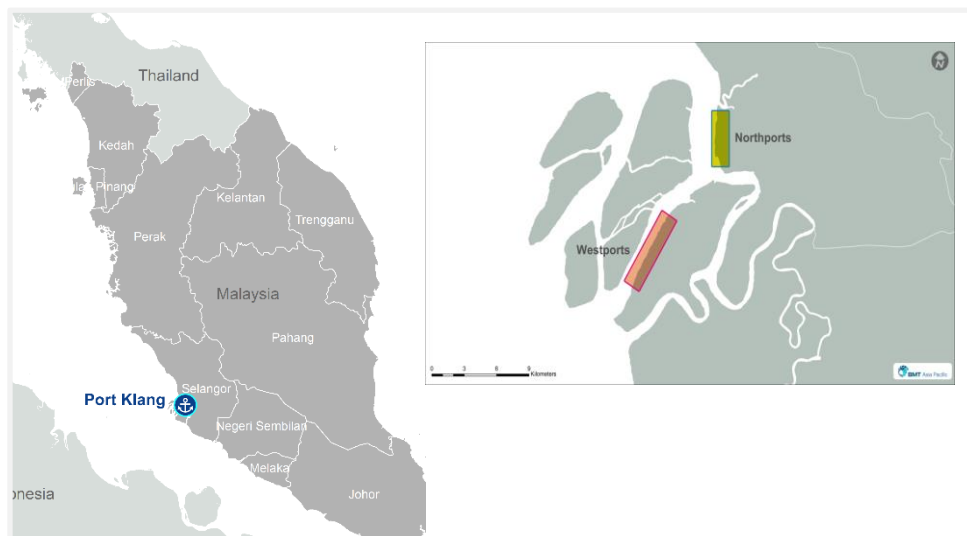
4 Port Infrastructure and Hinterland Connectivity

4.1 Location and Capability

4.1.1 Port Klang

Port Klang is located in Pulau Indah, 50 km west to Kuala Lumpur. Port Klang's container terminals are located at Westports and Northport. The two companies have deep water quays in the Selat Klang Selatan in the range of approximately 15 – 17.5 metres at Westports, and 11 – 17 metres at Northport. The locations of the two container terminals are shown in the following figure.

Figure 4-1 Location of Westports and Northport Terminals



Source: BMT

Both terminal operators have invested heavily in the upgrade of its container handling infrastructure in recent years to cater for the new generation of ultra-large containerships. This investment has been supported by the Port Klang Authority, which completed the dredging of the port's south channel entrance at Pintu Gedong in 2015 from a depth of 16.5 m to 18.5 m to help its operators compete against regional rivals.

4.1.2

Westports Terminals

The facilities at Westports include a total of 20 container berths contiguously connected in a straight line extending approximately 5,800 metres that are dedicated for container handling, including Container Terminal (CT) 9 Phase 2 (~300 m) which is expected to start operations in early 2019.

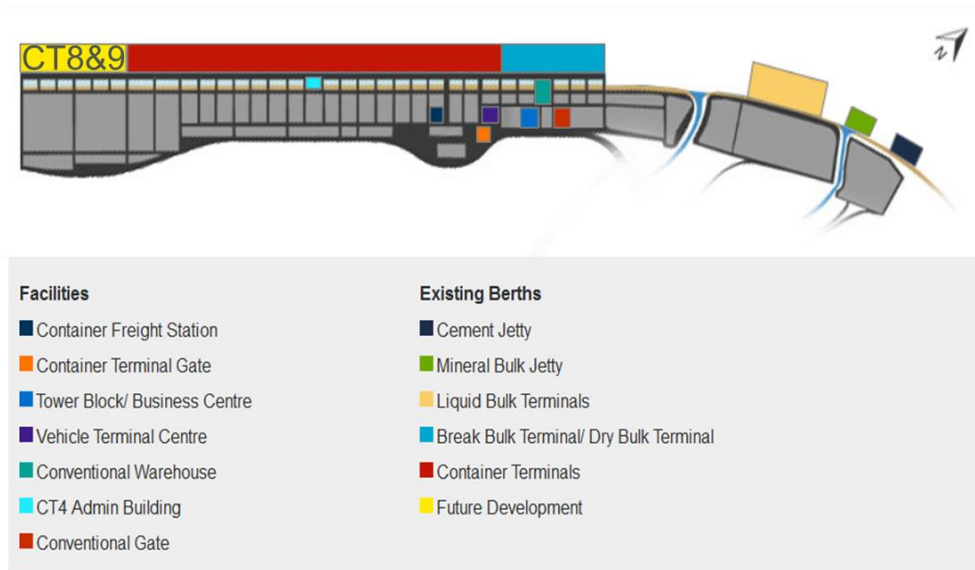
Each terminal offers two berths for mid-sized vessels which can also be alternatively used by one Ultra Large Container Vessels (ULCS). In reality, ships are frequently berthed across the borders of neighbouring terminal units to maximise the use of the pier taking advantage of the long straight continuous quay face.

Table 4-1 summarises the terminal specifications and key handling equipment at the container terminals in Westports.

Table 4-1 Westports Terminal Specifications

Westports	Facilities
Container Berths	20 berths
Container Berth Length	5,800 m (incl. CT9 Phase 2)
Draft	15 - 17.5 m
Capacity	14 million TEUs
Area	187 Ha
Reefer Points	2,428 points
Equipment	67 Quay Cranes 185 RTGs 524 Prime Movers 16 Empty Handling Loaders 10 Reach Stackers

Source: Westports

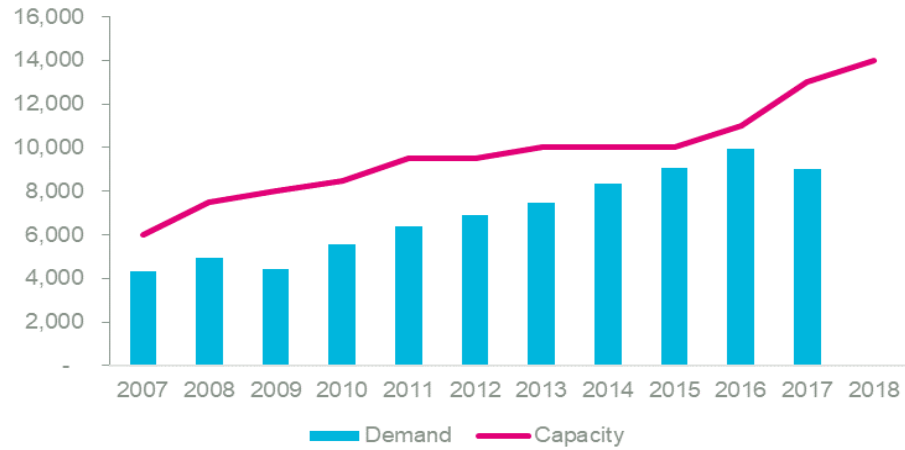
Figure 4-2 Westports Terminal Layout and Expansion Plan

Source: Westports

Container throughput at Westports has been growing at a CAGR of about 8% in the past 10 years. The transshipment volume of Westports has been maintained as the high portion of this traffic, which accounts for about 65% of the port's total volume.

In the previous decade, Westports has been expanding its handling capacity to support strong demand growth. The completion of CT9 (Phase 1) in early 2018 has boosted Westports' capacity to 14 million TEU per year. It will further increase to 15 million TEUs per year with the completion of phase 2 of CT9 by early 2019.

Furthermore, Westports had secured the approval-in-principle from the Government for the further expansion of its container terminal facilities - the scope of this Study.

Figure 4-3 Westports Capacity & Throughput (000 TEU)

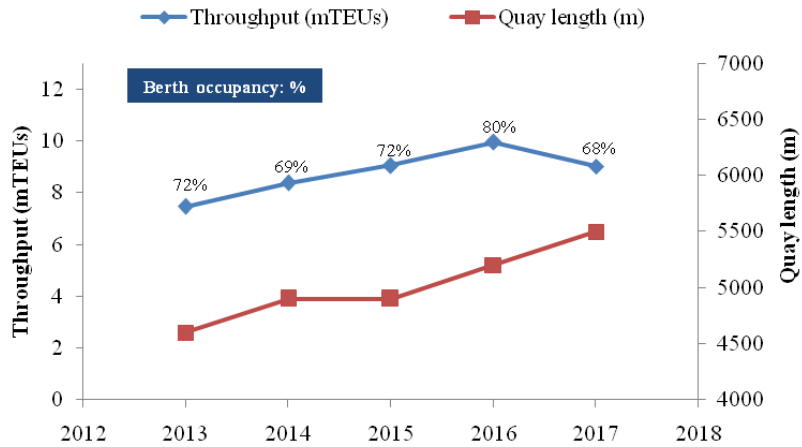
Year	2008	2013	2015	2016	2018
No. of CT in Operations	5	6	7	8	9
Total Capacity (m TEU)	7.5	10	10	11	14

Source: Westports, BMT

In terms of port utilisation, Westports' berth occupancy reached a historical high of 80% in 2016 prior to CT8 being completed. Vessel waiting time deteriorated when berth occupancy rate was high, and congestion issues occurred - with average vessel waiting time of 7.2 hours.

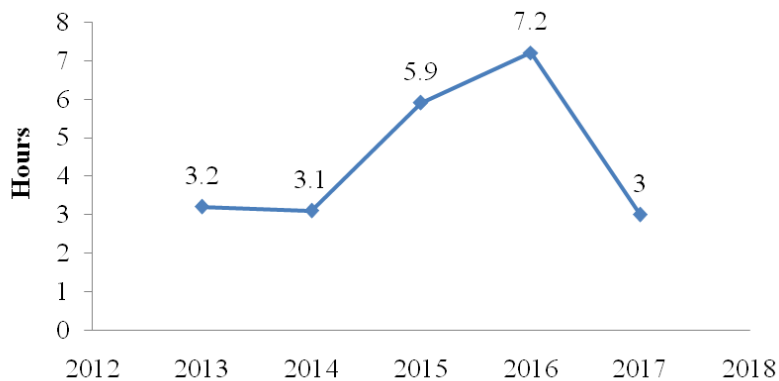
As shown in **Figure 4-5**, vessel waiting time decreased to only 3 hours with the commissioning of CT8 in 2017. It is expected that the vessel waiting time continues to improve in 2018, with the operation of CT9.

Figure 4-4 Throughput, Quay Length and Berth Occupancy of Westports



Source: Westports, BMT

Figure 4-5 Vessel Waiting Time



Source: Westports, BMT

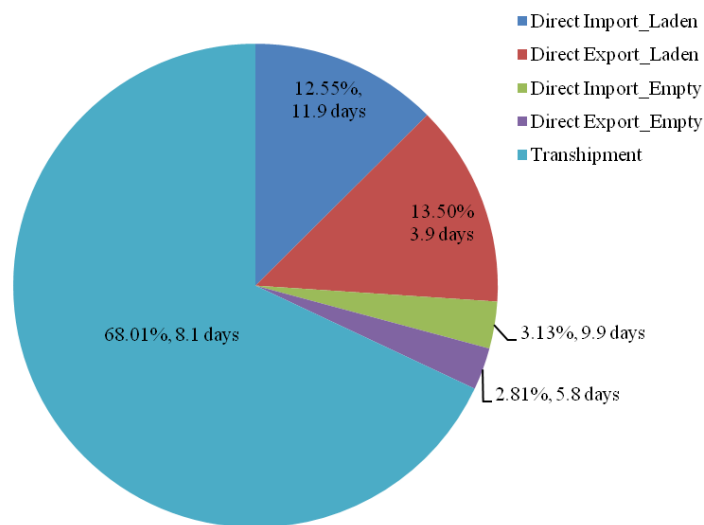
Westports has a total terminal area of 187 hectares and 46,922 container ground slots. The transit time and throughput share of different cargo handled at Westports in 2017 is shown in **Figure 4-6**. The average transit time for cargo is 8 days/box, and 5.25 days/TEU.

According to Westports, the maximum stacking height for laden container is 1 over 5, and the ratio of average to maximum stacking height is around 0.85.

Assuming reserve capacity safety factor is 1.3, the maximum terminal area productivity is 58,000 TEUs/Ha in Westports.

It is expected that for Westports Phase II which focusses on transshipment cargo, the terminal area productivity will be increased (because one transshipment box generates two throughput TEUs).

Figure 4-6 Throughput Share and Transit Time by Cargo Type of Westports (2017)



Source: Westports, BMT

4.1.3

Northport Terminals

Northport features 4 container terminals namely CT1 - CT4 and has a combined quay length of close to 3.3 km and a depth alongside ranging from 11.5 m to 17 m.

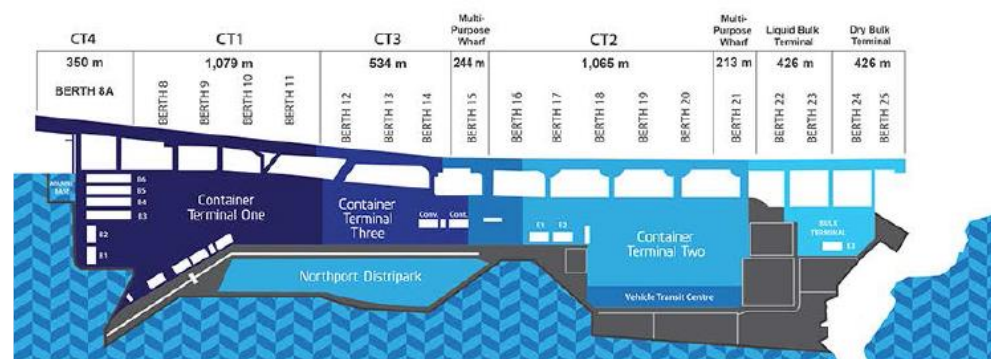
Northport's new wharf infrastructure, Wharf 8A which forms part of the latest container terminal facilities (Container Terminal 4, CT4) provides an additional 350 m to Northport's quay line. With a deep draft of 17 m, CT4 is designed to handle ULCS with capacity up to 20,000 TEUs. Wharf 8A is equipped with 4 new quay cranes with an outreach of 24 across on the vessel.

The quay length of CT4 will be increased to 513 m with a 17m water depth. Upon completion, Northport's capacity will be further increased from 5.6 million TEUs to 6.2 million TEUs.

Table 4-2 Northport Terminal Specifications

Northport	Facilities
Container Berths	13 berths
Container Berth Length	3,300 m
Draft	11 - 17 m
Capacity	5.6 million TEUs
Area	93.4 Ha
Reefer Points	1,111 points
Equipment	32 Quay Cranes 84 RTGs 26 Straddle Carriers 11 High Stackers 252 Trailers 252 Prime Movers

Source: Northport

Figure 4-7 Northport Terminal Layout

Source: Northport

However, even with the launch of the new terminal and other on-going/planned upgrades of the facilities such as the upgrades of container wharf 8 and wharf 9, the conversion for yard handling from straddle carrier to RTG for block H and to RMG for block J, Northport still faces the following constraints.

- Limited capacity – Northport currently does not have a 'land bank' as the existing land has been fully developed.
- Limited channel depth – Alur Pelayaran Utara (North Channel) where a depth of only 11.2m and a width of 300m are offered. In comparison, the South Channel has a depth of 16.5m (PKA increased the depth further to 18.5 meters in 2015) with a width of 500 meters. This forces the ships with a draft of more than 11 meters to use the South Channel and causes an additional 3 hours of travel time for ships from West Asia to North Port.
- The absence of a 'turning basin' for the larger ships as Main Line Operators (MLO) are more likely to use ship container vessels with a length greater than 400 meters and a capacity of 18,000 TEUs for economies of scale. In this case, the waters in front of the berths in Northport do not have a turning basin adequate for the size of ships over 400 meters.
- Insufficient depth alongside – Only CT4 can handle the largest container vessels.

4.2 Hinterland Connectivity

4.2.1 Within Peninsular - Road Connections

Key existing expressways are the North-South Expressway and East-West Link Expressway. The North-South Expressway covers a distance of 900 km, from Bukit Kayu Hitam at the Malaysia-Thai border to Johor Causeway in the south. The East-West Link is about 350 km, extending from Kuala Lumpur-Karak Expressway, crossing through Pahang, turning to northeast at Jabur and arriving at Kuala Terengganu. These, together with the Klang Valley Expressway and the Federal Highway, play a key role in connecting both ports in Port Klang to its hinterland.

Another expressway, the West Coast Expressway (WCE) is currently under construction. It will connect Banting in Selangor to Taiping in Perak. The new expressway will connect the main ports on the west coast including Port Klang, Penang Port and Lumut Port. Port Klang will be able to extend its hinterland and will be better able to attract cargo from the northern area.

Figure 4-8 Road Connections in Peninsular Malaysia

Source: BMT

4.2.2

Within Peninsular - Rail Connections

The existing traffic flow by rail is mainly north - south. The existing rail network stretches to Perlis in the north, Pasir Mas in north Kelantan and Johor Babru in the south and has connections into Port Klang and other key ports. The rail network also links Peninsular Malaysia to Thailand and Singapore.

To strengthen connectivity with the east of the peninsular, East Coast Rail Line (ECRL) connecting Port Klang to Tumpat in Kelantan, via Kuantan Port has been proposed (but its timing is currently under review).

The 668-km electrified rail link will allow the rapid transshipment of freight across the peninsula. Some proponents note that it would allow cargo to bypass Singapore reducing shipping congestion in the Malacca Strait and the South China Sea. However, the takeup of such routing (involving the removal of boxes, shipping by rail, and reloading to ships) is not expected to make this a viable commercial proposition.

Figure 4-9 Rail Connections in Peninsular Malaysia



Source: BMT

4.2.3

Inter Terminal Transport (ITT)

ITT refers to the container movement between Westports and Northport where the first leg delivery of transshipment container is unloaded at one terminal while the connecting vessel is/will be on the berth of the other.

The majority mode of ITT between Westports and Northport is by barge (47%), followed by truck (33%) and rail (20%).

The barge services were started in late 2014, PKA has been promoting the use of barges over landside ITT as it reduces road traffic and cut down on air pollution. Barge rates are more competitive and the time taken for ITT is also lower.

Usually rail transportation is most cost effective for long distance, and the use of rail transportation between the two ports is limited.

4.2.4

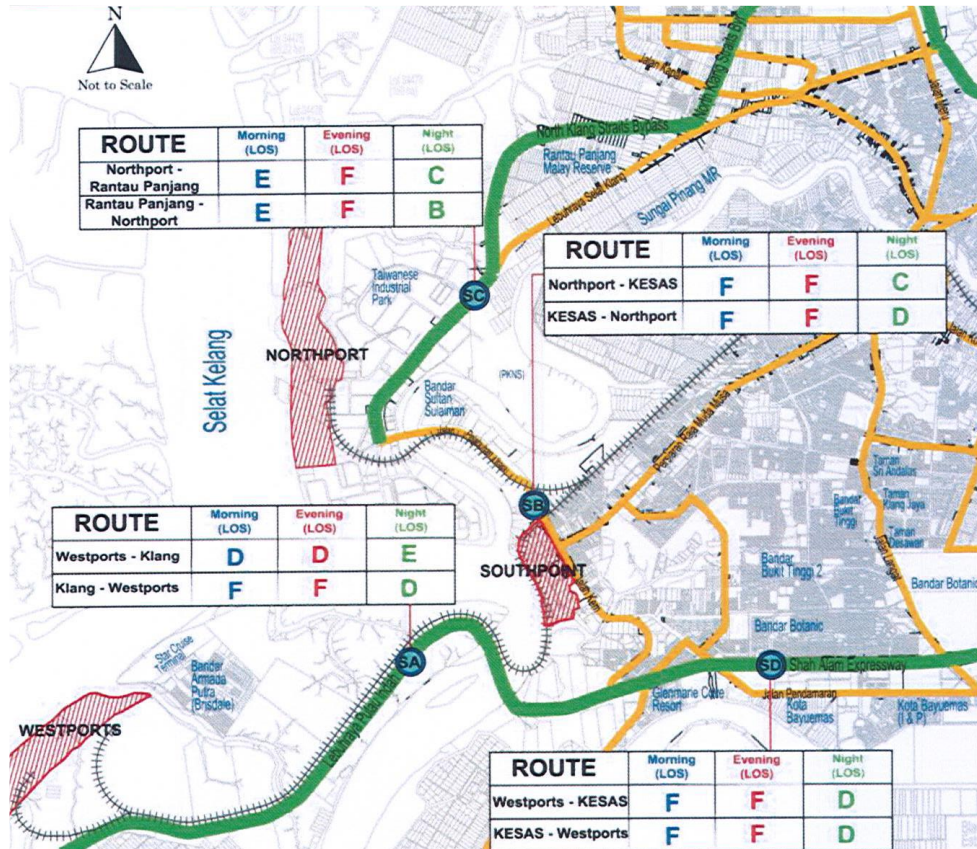
Within Direct Hinterland

According to data provided by PKA, 95% of Westports' direct cargo is transported by road, only 5% by rail. Consequently, the major port access road of Westports including Pulau Indah Expressway were reviewed.

A study of traffic network performance of port access roads was conducted by CME in 2014. The Level Of Service (LOS) of the surveyed roads, in particular Klang to Westports and Westports to KESAS, during most part of the day is mostly "LOS F", which is detrimental to port business. The main contributor of the high traffic volume is heavy vehicles, and containerised cargo comprises a significant percentage of the traffic.

The CME study also reveals that the surveyed road network was in varying degrees of distress requiring urgent reconstruction and rehabilitation. 59% of the roads in poor condition contributed to poor mobility and congestion.

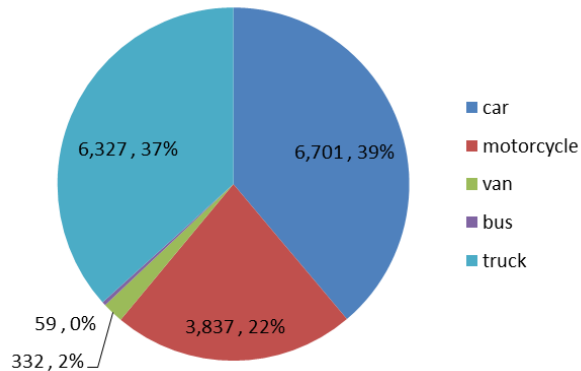
Figure 4-10 LOS of Port Access Roads



Source: CME

Pulau Indah Expressway is the main access road to Westports. According to CME report in 2014, trucks constituted around 37% of road traffic on Pulau Indah Expressway. Currently, Westports handle 2.7 million TEUs of direct traffic, which generate about 7,000 movements daily traffic on Pulau Indah Expressway.

With the expansion of Westports, Pulau Indah Expressway will become more congested, and there is a need for expansion of the Pulau Indah Expressway.

Figure 4-11 Traffic Composition on Pulau Indah Expressway

Source: CME

The daily service volume (DSV) of Pulau Indah Expressway to ensure target LOS in peak hour is estimated based on the survey data from CME report. The results were summarised as follow¹.

Table 4-3 Daily Service Volume to Ensure LOS in Peak Hour

	LOS C	LOS D	LOS E
DSV (vehicles/day)	13,929	18,452	22,619

Source: CME, BMT

In the 2014 traffic study, daily volume was 35,000 vehicles per day and LOS F was observed at peak hour. Based on this study, trucks preferred to use the Expressway during non-peak hours. The maximum DSVs not considering peak hours are shown as follows.

Table 4-4 Maximum Daily Service Volume for Target LOS

	LOS C	LOS D	LOS E
DSV (vehicles/day)	36,214	47,976	58,810

Source: CME, BMT

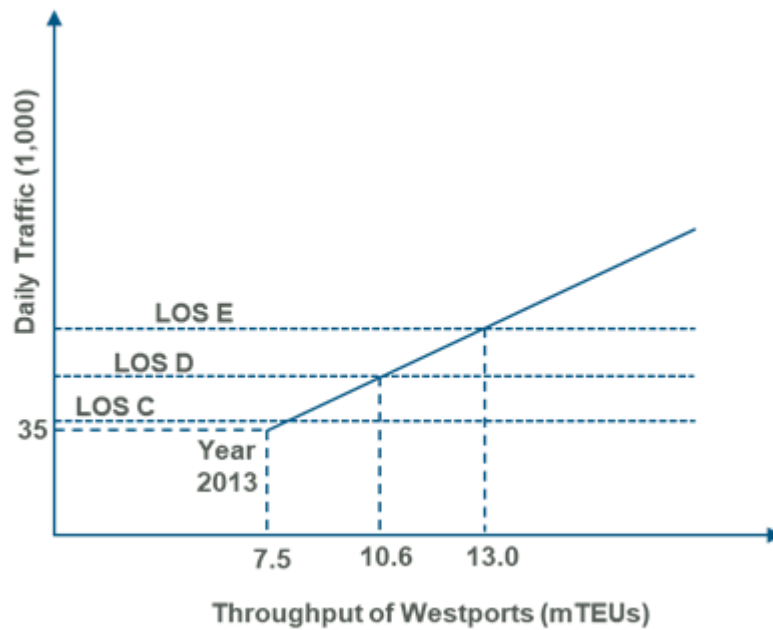
¹ A traffic consultant will be engaged by Westports. The preliminary analysis of daily service volumes serves for reference only.

The majority of traffic of Pulau Indah Expressway was cargo movements and working people to and from Westports. The relationship between capacity of Pulau Indah Expressway against port throughput development is illustrated in **Figure 4-12** below, assuming road traffic increases proportionally to Westports throughputs.

To ensure LOS E (or better), Pulau Indah Expressway should be expanded when Westports' throughput reaches 13 million TEUs.

It is noted that further traffic survey is needed to quantify the exact timing of road expansion and effect of reducing commuting traffic on the road.

Figure 4-12 Capacity of Port Access Road against Port Throughput Development



Source: BMT

5 Port Competitiveness

A review of the competitiveness of the following major ports has been undertaken.

- Port Klang
- Tanjung Pelepas
- Singapore
- Jakarta / Tanjung Priok
- Cai Mep

The details of the assessment are included in **Appendix A** of this report.

5.1 Summary

5.1.1 Port Klang

- Port Klang which is not affiliated with any shipping lines has suffered a major impact from recent alliance reshuffles.
- The advantage of significant direct cargo flows is apparent.
- There is competition within Port Klang, between Northport and Westports, however the markets are becoming increasingly differentiated.
- The challenge of ITT prevails.
- The strong direct cargo volume at Port Klang makes shipping lines call a clear necessity for many lines – and the target model for Westports would be as part of a “**Dual Hub**”, i.e., Port Klang and Singapore or PTP.

5.1.2 Tanjung Pelepas

- PTP's key customers are Maersk and Evergreen. PTP is the primary transshipment hub for Maersk in Southeast Asia while Evergreen has been using both PTP and Port Klang, but may move business from Port Klang to Singapore together with other Ocean Alliance members in the future.
- The average size of ship berth at the port is 4,000 TEU. The average vessel waiting time at PTP is 3 to 4 hours, slightly higher than Singapore, but it is comparable to other important transshipment hubs .
- Maersk switched 10% of its volume to Singapore in 2016.
- PTP is located far from the industrial area of the southeast.

5.1.3

Singapore

- It leads the transshipment business in the region.
- In recent years, Singapore has lost part of its volume to PTP and Port Klang, mainly due to the alliance operations in the region.
- PSA and CMA have established a joint venture terminal CMA CGM - PSA Lion Terminal (CPLT), and jointly operate four PPT berths. The berths commenced operation by the first quarter of 2017.
- PSA-COSCO Terminal, a joint venture of PSA and COSCO has also expanded its terminal at PPT1. With the establishment of the Ocean Alliance (of which COSCO and CMA are the core members), COSCO and PSA have reached an agreement to transfer their berths and operations at PPT1 to PPT3 and PPT4, thus linked with the CMA berths and formed a complete continuous port operation.

5.1.4

Jakarta / Tanjung Priok

- Tanjung Priok is the largest gateway port in Indonesia.
- International import/export containers account for 66% of throughput.
- The terminal utilisation reached its peak in 2012 and 2013 (89%) but declined to 74% in 2015 – a sustainable level. The port has been plagued with bottlenecks and long handling times due to lack of capacity, the expansion of Tanjung Priok may encourage shipping lines to launch more direct ship calls to Jakarta as these issues subside.
- In terms of hinterland and cargo sources, Tanjung Priok's immediate hinterland includes the city of Jakarta and its surrounding industrial areas.

5.1.5

Cai Mep

- Located close to Vietnam's key economic zone, Cai Mep is an important gateway port for cargo to and from Dong Nai and Binh Duong, two of Vietnam's major industrial areas.
- Cai Mep is a deep sea port with 14-20 m water depth alongside. However, due to terminal over-supply, the utilisation of Cai Mep is low (20-25%).
- About 70% of containers are transported inland by barge due to lack of road and rail infrastructure.
- Compared with other ports in southern Vietnam, Cai Mep has better conditions for berthing large vessels (Maersk used to berth 18,000 TEU ship at CMIT), but it is relatively far from the hinterland (75 km from Ho Chi Minh) and the poor road connectivity also makes it less attractive to shippers.

- The Government has been promoting the relocation of ports out of Ho Chi Minh City (HCMC) to Cai Mep-Thi Vai area. However, the actual progress of relocation has been very slow. Many of the HCMC ports are maintaining their operations due to strong cargo demand, and they are still handling the majority of cargo in the southern Vietnam. Most shipping lines are still using HCMC ports instead of Cai Mep as their regional feeder hubs.

6 Port Throughput Forecast

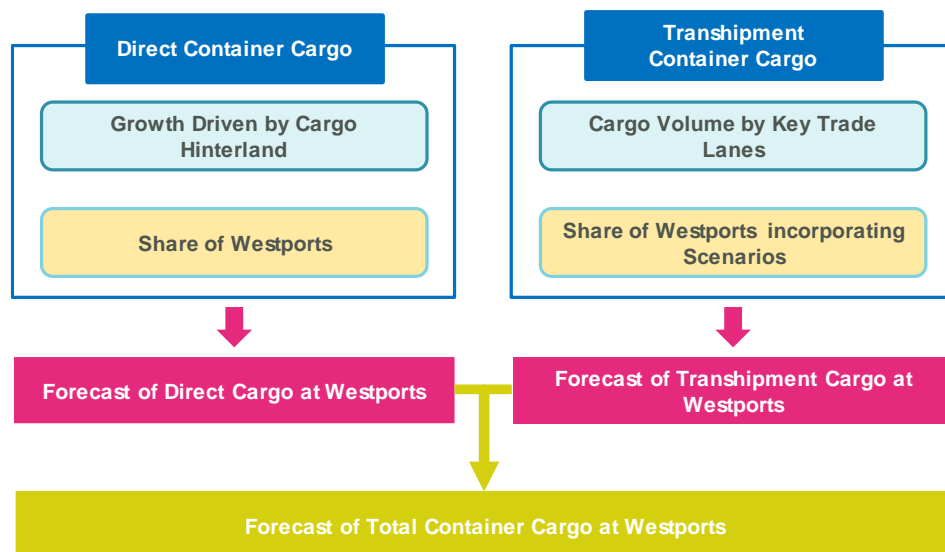
6.1 Approach

Westports direct and transshipment cargo have been forecaste separately due to different impact factors and trends. The forecast is conducted on the basis of a top-down approach: base, high and low scenarios have been developed to reflect the possible ranges in the cargo forecast.

The following are the main considerations for the forecasts:

- Historical throughput data analysis
- Econometric forecast model for cargo base
- Port competitiveness assessment and share of Westports projection

Figure 6-1 Forecast Approach



Source: BMT

6.2

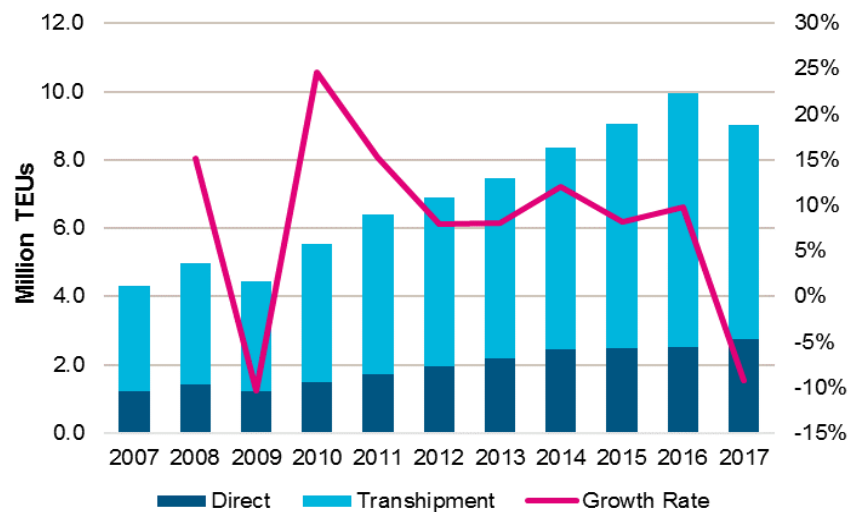
Direct Cargo Forecast

6.2.1

Historical Throughput Review

Westports handled 9.0 million TEUs in 2017, growing at CAGR of 5.5% p.a. since 2012. Direct cargo experienced continuing strong growth during the last five years, with a CAGR of 7.2%.

Figure 6-2 Westports Historical Throughput



Source: BMT

Key Growth Drivers for Direct Cargo are identified as follows:

- Selangor & KL are the economic powerhouse of Malaysia and accounted for about 40% of the national GDP. Economic growth in Selangor & KL has been strong (CAGR of 7.5%-8.5%).
- Increasing number of industrial establishments with value added growth at CAGR of 9.1% for 2010-2015. Over 350 industrial areas/parks are found within the hinterland.
- These industrial areas/parks generate goods for both local consumption and exports, and thus form a solid cargo base for Port Klang.

6.2.2

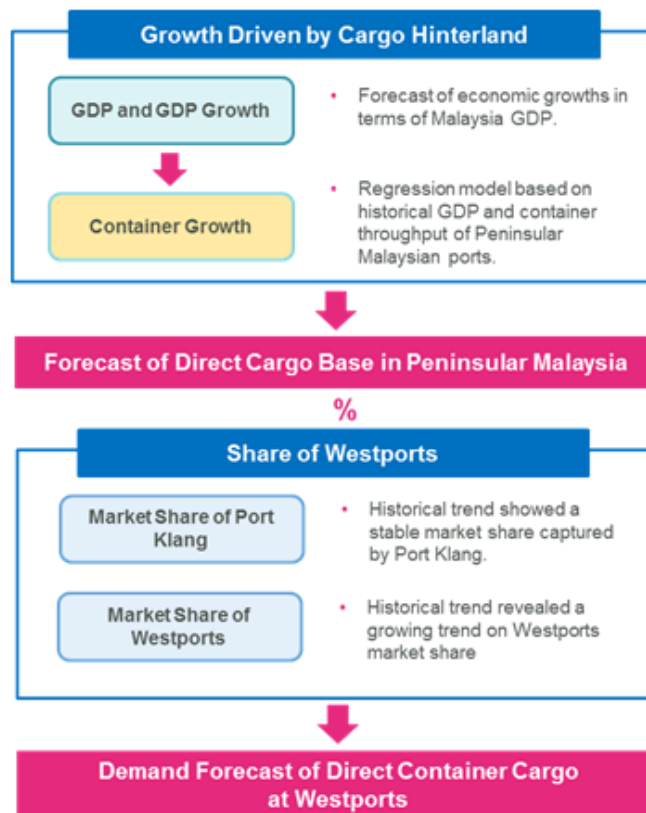
Approach for Direct Cargo Forecast

Demand forecast of container cargo at Westports is determined by two forces, i.e.:

- Growth of direct containerised cargo (“the cargo base”) from the captive hinterland; and
- The market shares of Westports from the cargo base.

These are illustrated in the following figure.

Figure 6-3 Direct Cargo Market Shares of Westports



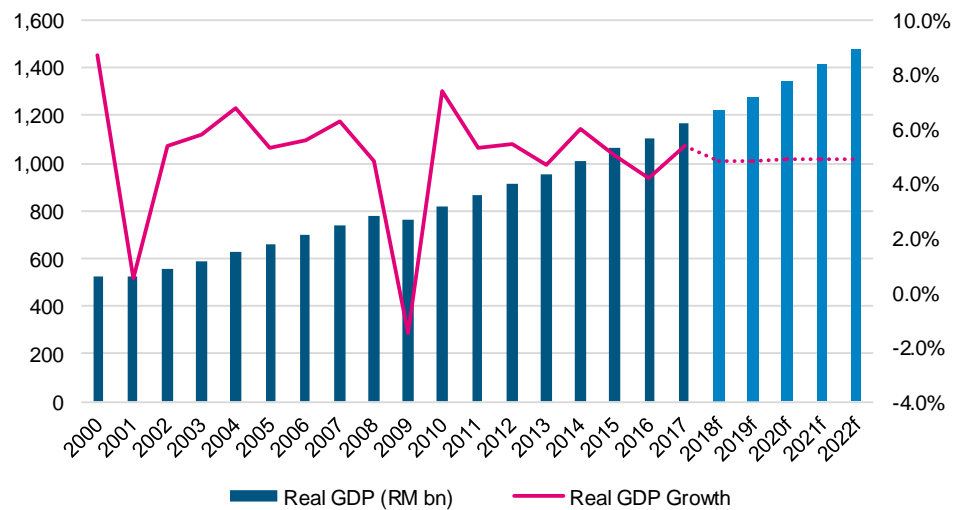
Source: BMT

6.2.3

Forecast of Hinterland Cargo

As the leading gateway of Malaysian cargo, the container traffic of Port Klang is highly correlated to the local economy and its growth.

GDP and GDP growth in Malaysia have been analysed. The short term real GDP in Malaysia is predicted to grow at 4.7% to 5.3% p.a. according to the IMF forecast. This predicted growth level is consistent with historical trend of a 4.7% CAGR in the past decade.

Figure 6-4 Real GDP and Real GDP Growth in Malaysia, 2000 to 2021

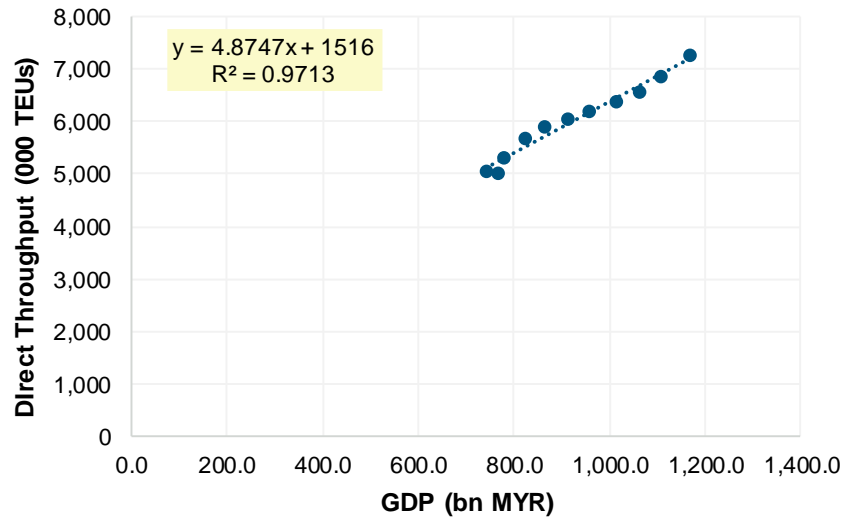
Source: IMF World Economic Outlook.

In the long term, real GDP growth in Malaysia is expected to be around 3.5% to 4.5% p.a., taking reference of the macro-economic forecast of country and city issued by Economist Intelligence Unit (EIU).

As a major contributor to the Malaysian economy, Peninsular Malaysia has consistently accounted for over 80% of national GDP. The GDP growth is also significantly aligned with container throughput. As a result, the container cargo base in Peninsular Malaysia experienced a similar growth of around 4% p.a. in the past decade.

The main container ports located on the Peninsular Malaysia in total handled 7.3 million TEUs of direct cargo in 2017, indicating a CAGR of 3.7% p.a.. In fact, these ports have also constantly accounted for about 90% of the total national traffic.

It is commonly found that GDP is closely related to the container cargo generation. Evidence further shows that the direct container traffic of Peninsular Malaysian ports is highly correlated to real GDP in Malaysia, generating a high R square.

Figure 6-5 Regression of Container Traffic and Real GDP

Source: BMT

With this regression model, the growth of container traffic in Peninsular Malaysia can be forecast based on the predicted GDP and GDP growth. The following table summarises the forecasted direct container cargo in Peninsular Malaysia.

Table 6-1 Forecasts of Direct Container Cargo in Peninsular Malaysia

in million TEUs	2017	2022	2030	2040
Malaysia GDP, in bn MYR	1,168	1,480	2,086	2,900
Direct cargo in P. Malaysia, in mn TEUs	7.3	8.7	11.7	15.7

Source: BMT

6.2.4

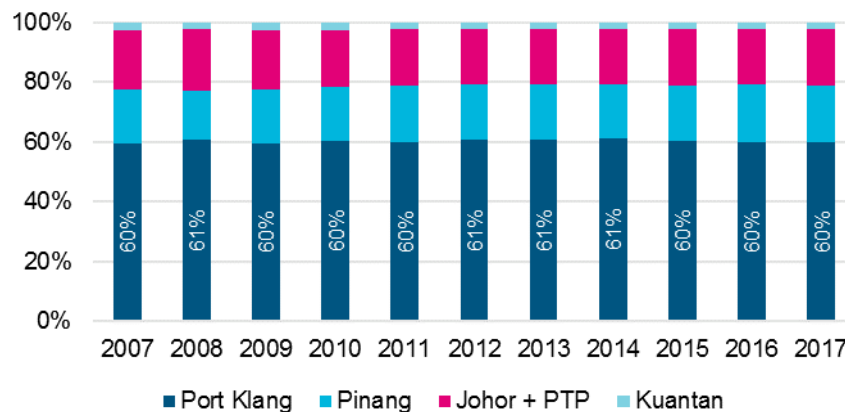
Forecast of Market Share of Westports

Of the key container ports in the Peninsular Malaysia, the hinterland coverage is relatively clear for each port, namely:

- **Port Klang** serves mainly the central region which is the most economically vibrant and populated area in Malaysia. The port also benefits from its proximity to the large manufacturing centre at Klang Valley;
- **Tanjung Pelepas and Johor Port** concentrate more on the southern region where increasing investments are expected;
- **Pulau Pinang** handles cargo generated from / distributed to the northern region and some cargo to / from Thailand;
- **Kuantan** handles partial container cargo in the eastern region, and the rest is mainly shared by Port Klang, PTP and Johor Port.

Historical trends showed that Port Klang, as a whole, maintains a stable share of total direct cargo throughput of Peninsular Malaysia (around 60%). BMT forecast that the share of Port Klang will maintain stable because it's proximity to the core industrial and residential hinterland in Peninsular Malaysia.

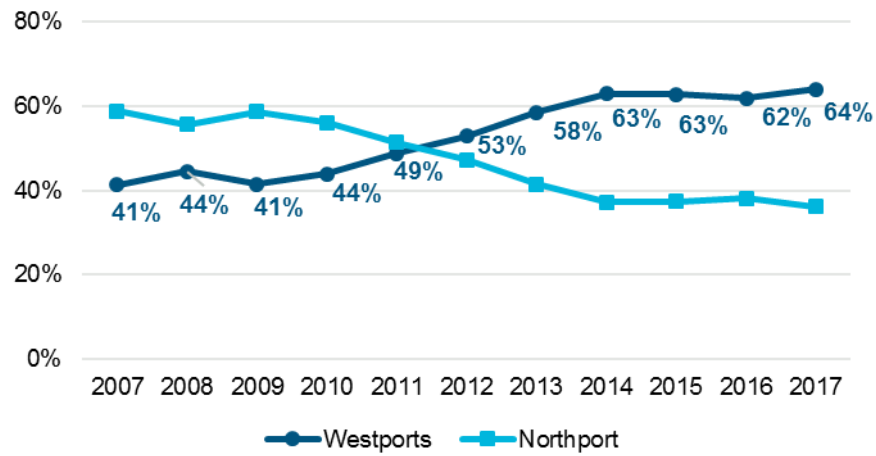
Figure 6-6 Direct Cargo Market Shares of Key P. Malaysia Ports



Source: BMT

At the same time, Westports' share of Port Klang's throughput has been increasing in the previous years.

Figure 6-7 Direct Cargo Market Shares of Westports



Source: BMT

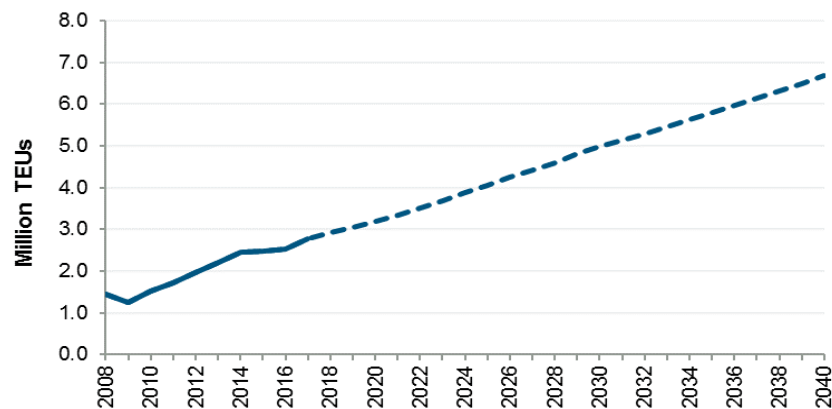
Considering the physical conditions and expansion plan of both Westports and Northport, it is appropriate that the share of Westports will gradually increase to about 70% by 2030.

6.2.5

Forecast Result of Direct Cargo

Combining the projected cargo base and the market shares, the forecasted direct cargo at Westports is summarised in the following figure and table.

Figure 6-8 Direct Cargo Forecast at Westports



Source: BMT

Table 6-2 Forecasted Direct Cargo at Westports

in million TEUs	2017	2022	2030	2040
Direct cargo at Westports	2.8	3.5	5.0	6.7

Source: BMT

Direct cargo forecast results for Westports shows:

- Westports is expected to handle about 3.5 million TEUs of direct cargo by 2022, indicating a growth of 4.9% p.a. in the next five year.
- In the medium to long term, the growth rates of direct cargo are predicted to be about 2.9% to 4.2% p.a., which is expected to generate a total direct cargo of 6.7 million TEUs by 2040.

6.3 Transshipment Cargo Forecast

6.3.1 Review Historical Transshipment Throughput by Trade Lanes

Westports is an ideal port for container transshipment for its preferred location at Malacca Strait creating minimum deviation to the East West and North South trading routes. The transshipment volume at Westports was 6.3 million TEUs in 2017, Transshipment cargo at Westports dropped by 15.6% in 2017, due to:

- Alliance restructuring – switch of CMA’s transshipment business to PSA.
- UASC merged by Hapag-Lloyds, removed its t/s business from Westports.

Asia – ISC / ME and Asia – Europe lanes are two major components of the transshipment volume at Westports, accounting for 24% and 21% respectively, followed by Intra – Asia trade (12%), Asia – Oceania trade (8%) and Transpacific trade (5%), the remaining lanes makes up for 20% of the total transshipment.

Transshipment cargo of different lanes has shown different trends throughout recent years:

- Asia – Indian Sub Continent (ISC) / Middle east (ME) and Asia – Europe trade represents more than half of the transshipment cargo at Westports.
- The restructuring of shipping alliances led to around 40% to 50% drop on t/s volume at Asia/ME/ISC – Europe, Asia – Africa, and Asia/ME/ISC – South America; while lower impact on intra-Asia and transpacific trade.
- Double digit growth (CAGR 12-17) was recorded on Intra – Asia, Asia – Oceania and trades with ISC/ME region.
- Transpacific trade increased tremendously, mainly contributed by growth on export volume from Thailand.

Figure 6-9 Transshipment Cargo Growth by Lane at Westports

Trade Lanes	Share%	CAGR 12-17	CAGR 12-16	GR 16-17
Asia - ISC / ME	34%	9.5%	11.4%	-2.3%
Asia - Europe	21%	1.8%	15.4%	35.9%
Intra - Asia	12%	12.4%	7.1%	20.8%
Asia - Oceania	8%	15.8%	9.3%	35.3%
Asia - N. America	5%	58.6%	92.5%	2.9%
Intra - ISC / ME	4%	12.6%	17.5%	1.5%
Oceania - ISC / ME	4%	16.7%	6.8%	37.6%
Asia - Africa	3%	-18.7%	-7.6%	61.8%
Asia - S. America	3%	15.9%	31.7%	40.6%
ISC / ME - Europe	2%	-14.1%	0.1%	51.5%
Oceania - Europe	1%	5.1%	1.3%	-6.9%
Others	1%	-10.9%	1.4%	46.1%
ISC / ME - N. America	1%	45.1%	40.4%	-0.7%
ISC / ME - S. America	1%	0.1%	17.7%	58.0%

Source: BMT

Trends of Asia – ISC/ME Trade:

- Exporting volume from ISC/ME to Asia grew at CAGR of 18%, while imports from Asia grew marginally at CAGR 1%.
- India is the largest economics for the trades with Asia on this lane.
- Key exporting countries at ISC/ME all recorded significant growth in the last five years. This is due to the rapid industrial developments in this region. It is expected that this demand driver to continue.
- Major countries within ISC observed strong growth on importing volume from Asia; while ME countries suffer loss (slow organic growth and -60% dilution after alliance restructure)

Figure 6-10 Asia – ISC/ME Exporting Containers TS via Westports

Countries	Share %	CAGR 12-17
India	36%	29%
Saudi Arabia	19%	25%
United Arab Emirates	16%	7%
Turkey	8%	26%
Iran	6%	20%
Pakistan	4%	10%
Others	11%	4%
Total Export	100%	18%

Source: BMT

Figure 6-11 Asia – ISC/ME Importing Containers TS via Westports

Countries	Share %	CAGR 12-17
India	38%	20%
Bangladesh	23%	12%
United Arab Emirates	13%	-16%
Pakistan	5%	16%
Saudi Arabia	4%	-19%
Sri Lanka	4%	38%
Others	11%	-6%
Total Import	100%	1%

Source: BMT

Trends of Asia – Europe Trade:

- Exporting volume from Asia to Europe dropped by around -60% due to ship alliance restructure in 2017, while imports from Asia were less affected, decreasing at -13%.
- Historical trend from 2012 to 2016 demonstrates positive growth on most routes, except importing volume at Indonesia.
- It can be observed that Westports have competitive advantage on consolidating containers from China, Indochina Peninsula (e.g. Thailand, Vietnam) while less competitive at other Asian countries such as Indonesia, Philippines, Japan and Korea.

Figure 6-12 Asia – Europe Exporting Containers TS via Westports

Countries	Share %	CAGR 12-16	GR 16-17
China	33%	30%	-58%
Thailand	18%	14%	-59%
Vietnam	17%	14%	-56%
Indonesia	12%	5%	-65%
Singapore	7%	1%	-47%
Others	10%	32%	-59%
Total Export	0%	17%	-58%

Source: BMT

Figure 6-13 Asia – Europe Importing Containers TS via Westports

Countries	Share %	CAGR 12-16	GR 16-17
China	30%	17%	-30%
Indonesia	13%	-12%	2%
Vietnam	13%	27%	-18%
Thailand	12%	7%	-4%
Malaysia	8%	6%	-17%
Singapore	6%	35%	52%
Others	35%	42%	3%
Total Import	0%	12%	-13%

Source: BMT

Trends of Intra – Asia Trade:

- Intra-Asia trade containers that transhipped at Westports grew at CAGR of 12% from 2012 to 2017.
- Major countries using Westports for Intra-Asia transhipment is Malaysia, Indonesia, Thailand and China.
- Volume from China decreased due to the decrease of transhipment volume from China to Myanmar and Malaysia
- Significant growth was recognised at Vietnam, Thailand and Japan, contributed by increment of transhipment volume from Thailand – Malaysia, Japan – Malaysia and Vietnam – Indonesia

Figure 6-14 Intra – Asia Exporting Containers TS via Westports

Countries	Share %	CAGR 12-17
Malaysia	34%	16%
Indonesia	15%	9%
Thailand	12%	20%
China	12%	-1%
Vietnam	7%	34%
Japan	7%	40%
Others	14%	8%
Total Export	100%	12%

Source: BMT

Figure 6-15 Intra – Asia Importing Containers TS via Westports

Countries	Share %	CAGR 12-17
Malaysia	38%	20%
Indonesia	18%	8%
Thailand	14%	11%
China	6%	-2%
Vietnam	5%	11%
Japan	5%	40%
Others	30%	8%
Total Import	100%	12%

Source: BMT

Trends of Asia – Oceania Trade:

- Transshipment volume on this trade lane experienced double digit growth from 2012 to 2017.
- Asia exporting to Oceania increase significantly, with CAGR of 20%.
- Top exporting origins are Thailand, Malaysia and China.
- Asia importing from Oceania increase at 11% p.a., with top destination to China (27%), Korea (17%) and Malaysia (17%)
- Regions with potential growth prospects:
- Regions with high economic growth with less competition
- Less likely to open direct service at Thailand (trade imbalance)

Figure 6-16 Asia – Oceania Exporting Containers TS via Westports

Countries	Share %	CAGR 12-17
Thailand	33%	12%
Malaysia	22%	25%
China	19%	23%
Vietnam	14%	27%
Indonesia	7%	22%
Others	4%	43%
Total Export	100%	20%

Source: BMT

Figure 6-17 Asia – Oceania Importing Containers TS via Westports

Countries	Share %	CAGR 12-17
China	27%	10%
Korea	17%	24%
Malaysia	17%	9%
Vietnam	12%	12%
Indonesia	9%	3%
Thailand	8%	0%
Others	7%	26%
Total Import	100%	11%

Source: BMT

Trends of Transpacific Trade:

- The volume started to build up from 2015
- Export from Thailand to U.S. via Westports grew rapidly (4 times of volume in 2015).
- Malaysia also saw robust growth on volume to U.S. (both export and import above 40%.p.a.), the increment mostly came from Penang.
- Volume from Indonesia dropped by 60% in 2017 due to the opening of direct transpacific service.

Figure 6-18 Asia – N.America Exporting Containers TS via Westports

Countries	Share %	CAGR 14-17
Thailand	40%	102%
Malaysia	26%	45%
Indonesia	24%	6%
Others	10%	-39%
Total Export	100%	20%

Source: BMT

Figure 6-19 Asia – N.America Importing Containers TS via Westports

Countries	Share %	CAGR 14-17
Indonesia	22%	2%
China	19%	25%
Malaysia	16%	40%
Thailand	15%	10%
Vietnam	9%	-13%
Others	18%	55%
Total Import	100%	17%

Source: BMT

6.3.2

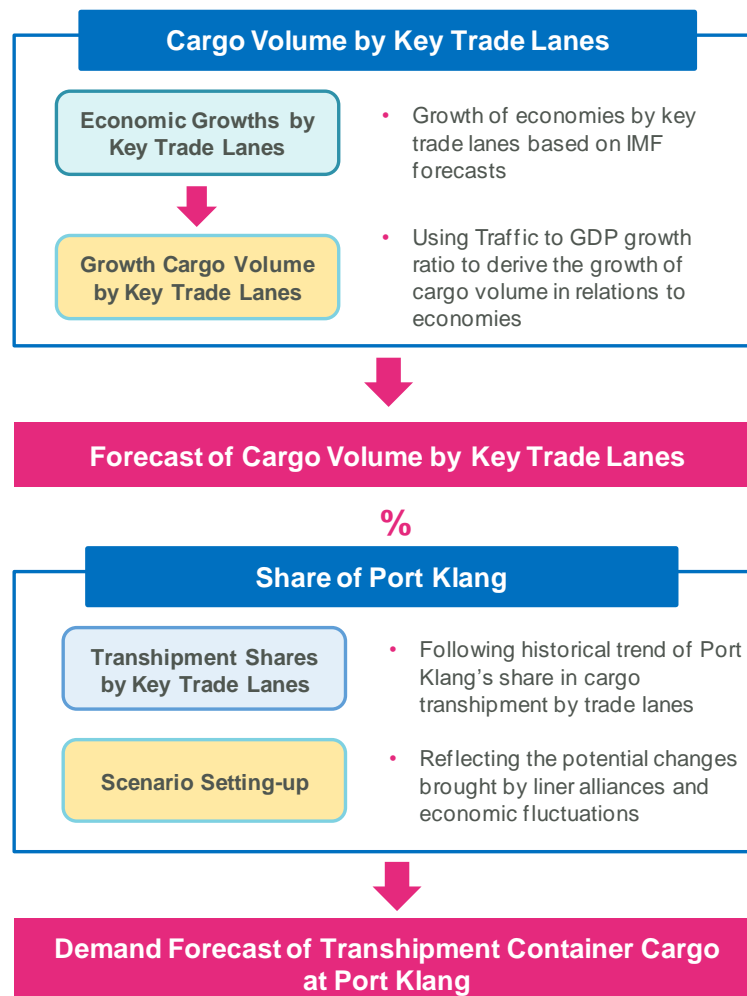
Approach for Transshipment Cargo Forecast

The amount of transshipment cargo at Westports is largely reliant on the cooperation of port operators and shipping lines. The transshipment cargo forecast is conducted based on historical transshipment volume and trends at Westports by key trade lanes and the further consultations and verifications with major shipping lines.

Following aspects are investigated to predict the transshipment demand for each key trade lanes.

- Overall growth of each key trade lane.
- Westport’s share of total volume for each key trade lane, considering:
 - Competition among regional ports.
 - Shipping lines’ future positioning and strategies

Figure 6-20 Forecasting Steps for Transshipment Container Cargo



Source: BMT

6.3.3

Westports Transshipment Growth vs. Global Trade Growth

To find the relationship between Westports transshipment volume and global trade volume, Westports / Trade Growth Rate Ratio is introduced.

Table 6-3 compares the CAGR at Westports (2012-2016) versus CAGR of global trade (2012-2016) for each trade lane (to remove impact of alliances restructure).

Table 6-3 Westports Transshipment Growth vs. Global Trade Growth

Trade Lanes	Share %	WSP CAGR (12-16)	World Trade CAGR (12-16)	WSP /Trade GR Ratio
Intra Asia	12%	10.4%	5.4%	1.9
Asia Oceania	8%	11.3%	4.7%	2.4
Trans pacific*	5%	18.8%	5.7%	3.3
Asia Europe	21%	14.3%	3.0%	4.7
Asia Africa	3%	-1.8%	2.1%	-0.9
Asia S.America	3%	15.9%	2.6%	6.1
ME/ISC - Others	8%	15.4%	4.3%	3.6
ME/ISC - Europe	2%	-0.9%	5.2%	-0.2
ME/ISC - N. Amercia	1%	25.5%	6.4%	4.0
ME/ISC - Asia	34%	12.7%	4.3%	2.9
Other trades	3%	3.6%	4.3%	0.8

Source: BMT

It can be observed that growth of Westports' Intra-Asia and Asia-Oceania trade is about twice of the speed of global trade. And emerging markets for Westports to capture are: Asia – Oceania, Transpacific and ISC trades. Despite volume loss in 2017, Westports still has a have competitive advantage on Asia – Europe routes.

6.3.4

Forecast of Global Transshipment Volume by Trade Lanes

Economic development is the driving force of container trade growth. The relations of traffic and economic growth are interpreted as an indicator known as Traffic to GDP Growth Ratio. This indicator represents a multiplier effect that for 1% GDP growth what percent of container traffic growth can be triggered.

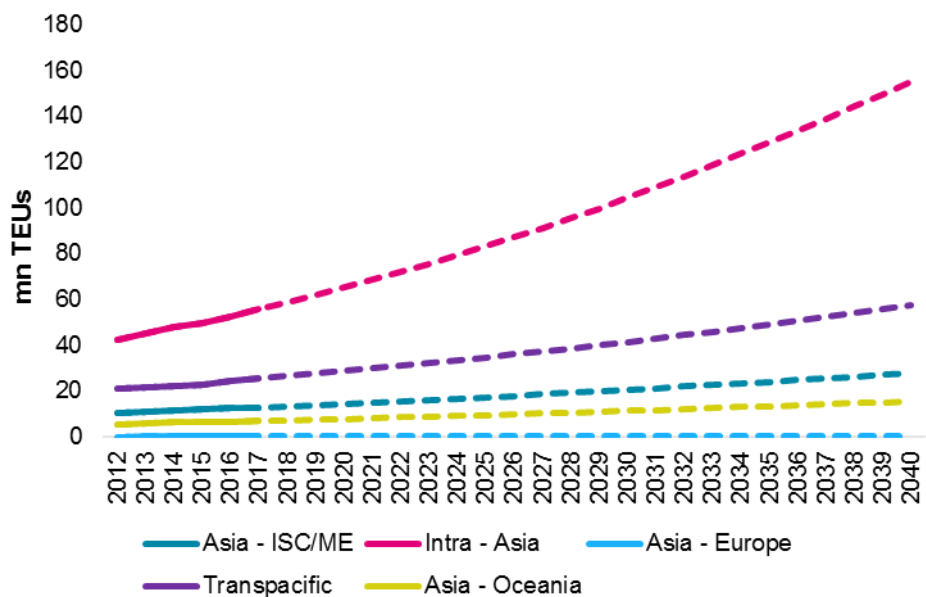
Real GDP and traffic growths of the key trade lanes were reviewed and projected separately reflecting areas of Asia, ISC/ME, Europe, etc.

Table 6-4 Trade Volume growth vs GDP growth by lane

	Trade Volume Growth Rate (2012-2017)	Real GDP Growth Rate (2012-2017)	TEU/GDP GR Ratio
Intra Asia	5.7%	5.5%	1.0
Asia Oceania	4.4%	5.2%	0.8
Trans pacific	4.2%	3.7%	1.1
Asia Europe	3.4%	3.3%	1.0
Asia Africa	2.4%	5.2%	0.5
Asia S.America	2.6%	5.0%	0.5
Others	4.4%	5.8%	0.8

Source: BMT

Global trade lane volumes are projected separately, shown in **Figure 6-21**. The world container trade volume is expected to grow at 4.2% per annum in the next five years, 3.4% – 4.0% in the long run.

Figure 6-21 Global Trade Lane Volume Projection

Source: BMT

6.3.5

Regional Port Competition

The transshipment volume at Westports is determined by the regional competitive landscape. Key competitors for Westports may be identified as:

- TS hubs at Malacca strait
 - Singapore
 - PTP
- Emerging regional TS ports:
 - Colombo
 - Cai Mep
- Traditional gateway ports:
 - Laem Chabang
 - Jakarta

Figure 6-22 Regional Competitors of Westports



Source: BMT

Table 6-5 Westports Competitors at Each Key Trade Lane

Ports	ISC/ME – Asia	Asia – Europe	Intra – Asia	Transpacific
Singapore	✓	✓	✓	✓✓
PTP	✓	✓	✓	✓✓
Colombo	✓			
Laem Chabang		✓		✓
Jakarta				✓
Cai Mep				✓✓

Source: BMT

6.3.6

Growth Rate of Westports Transshipment Throughput by Trade Lane

As transshipment cargo are largely dependent on the competitiveness of transshipment hubs, different competition scenarios are setup based on consultation with key shipping lines:

- According to consultation results, in the short term the landscape for Malacca T/S hubs will not change.
- As alliances grows, bigger carriers cannot rely on only one hub in SEA.
- ISC/ME – Asia and intra-Asia (most promising lanes) services prefer Westports because of its cost advantage.
- Threats from traditional gateway ports (e.g. Jakarta, Laem Chabang) will dilute T/S volumes from Malacca strait hubs.

Table 6-6 Key Assumptions for Forecasting Scenarios

Scenario	Assumptions
Base	<ul style="list-style-type: none"> • Current landscape remains • Westports able to maintain its current level of competitiveness in Malacca strait
High	<ul style="list-style-type: none"> • Gain competitiveness based on supply-driven strategy • Potential volume gain from Ocean Alliance (member commitment) / ONE (secondary hub)
Low	<ul style="list-style-type: none"> • T/S volume divert to major gateway ports in the region

Source: BMT

Figure 6-23 Forecasting Scenarios for Transshipment of Different Lanes

Scenario	Asia – ISC/ME	Intra-Asia	Asia – Europe	Transpacific	Asia – Oceania
Base	<ul style="list-style-type: none"> Cargo base growth (5.0%–5.5%) due to strong economic and industrial growth in ISC/ME. Competitive advantage of WSP is high for this trade. A little impacted by alliance restructure (-2.3% drop in 2017) Short term growth 8.7%; long term growth 5.5% 	<ul style="list-style-type: none"> Cargo base growth (3.7%–4.0%) due to growth in intra-Asia trades. Competitive advantage of WSP is moderate for this trade. Minimum impacts by alliance restructure Short term growth 9.4%; long term growth 5.9% 	<ul style="list-style-type: none"> Cargo base growth (3.4%–3.7%) due to moderate growth in Asia-Europe trades. Severely impacted by alliance restructure (-36% in 2017) Short term growth 3.6%; long term growth 2.5% 	<ul style="list-style-type: none"> Cargo base growth (3.6%–4.4%) due to moderate growth in transpacific trades. Advantage in absorbing Thailand and Malaysian's TS cargo Minimum impacts by alliance restructure Short term growth 10.0%; long term growth 5.6% 	<ul style="list-style-type: none"> Cargo base growth (3.9%–4.3%) due to moderate growth in Asia-Oceania trades. Competitive advantage of WSP is high for this trade. Westports' growth is about twice of the speed of global trade Minimum impacts by alliance restructure Short term growth 9.0%; long term growth 5.2%
High	<ul style="list-style-type: none"> Gain competitiveness based on supply-driven strategy Potential shift of t/s volume from PTP after 2025 Short term growth 9.9%; long term growth 6.5% 	<ul style="list-style-type: none"> Gain competitiveness based on supply-driven strategy Potential shift of t/s volume from PTP after 2025 Short term growth 10.6%; long term growth 6.9% 	<ul style="list-style-type: none"> Gain competitiveness based on supply-driven strategy Potential shift of t/s volume from PTP after 2025 Short term growth 4.7%; long term growth 3.5% 	<ul style="list-style-type: none"> Gain competitiveness based on supply-driven strategy Potential shift of t/s volume from PTP after 2025 Short term growth 11.2%; long term growth 6.6% 	<ul style="list-style-type: none"> Gain competitiveness based on supply-driven strategy Potential shift of t/s volume from PTP after 2025 Short term growth 10.1%; long term growth 6.2%
Low	<ul style="list-style-type: none"> Losing t/s volume due to development of regional gateway port, i.e. Colombo Short term growth 8.3%; long term growth 4.6% 	<ul style="list-style-type: none"> Losing t/s volume due to development of regional gateway ports (e.g. Leam Chabang, Jakarta) in the region Short term growth 8.6%; long term growth 4.8% 	<ul style="list-style-type: none"> Losing t/s volume to other t/s hubs, i.e. Singapore, PTP. Losing t/s volume to Leam Chabang Short term growth 2.8%; long term growth 1.5% 	<ul style="list-style-type: none"> Losing t/s volume to other t/s hubs, i.e. Singapore, PTP. Losing t/s volume due to Jakarta Short term growth 9.6%; long term growth 4.8% 	<ul style="list-style-type: none"> Losing t/s volume to other t/s hubs, i.e. Singapore, PTP. Short term growth 8.6%; long term growth 4.3%

Source: BMT

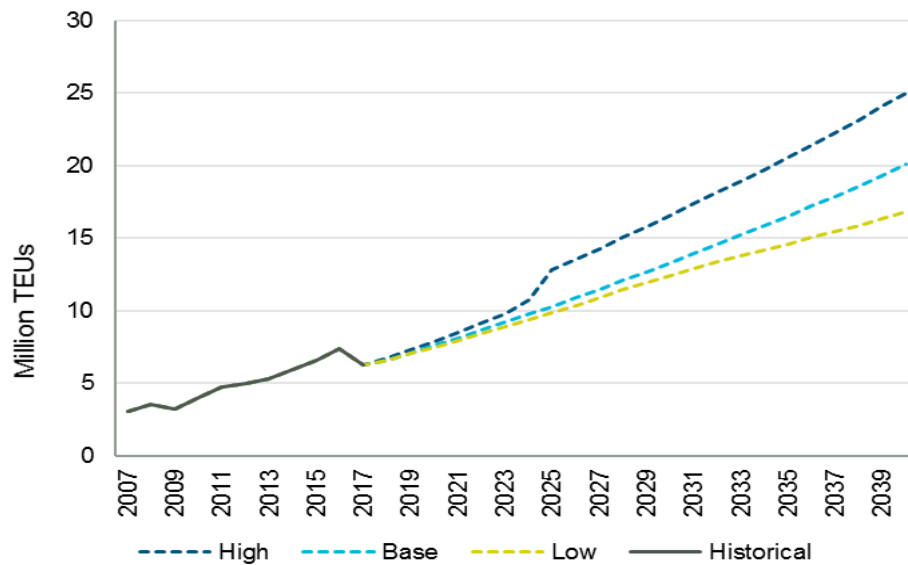
6.3.7

Forecast Result of Transshipment Cargo

Transshipment cargo forecast results for Westports identify:

- Under base scenario, Westports is expected to handle about 8.7 million TEUs of transshipment cargo by 2022 (CAGR 6.7%); and 20.1 million TEUs by 2040 (CAGR 4.8%);
- Under high scenario, Westports is expected to handle about 9.1 million TEUs of transshipment cargo by 2022 (CAGR 7.9%); and 25.0 million TEUs by 2040 (CAGR 5.8%);
- Under low scenario, Westports is expected to handle about 8.5 million TEUs of transshipment cargo by 2022 (CAGR 6.2%); and 16.8 million TEUs by 2040 (CAGR 3.9%).

Figure 6-24 Transshipment Cargo Forecast at Westports



Source: BMT

6.3.8

Total Throughput Forecast Results

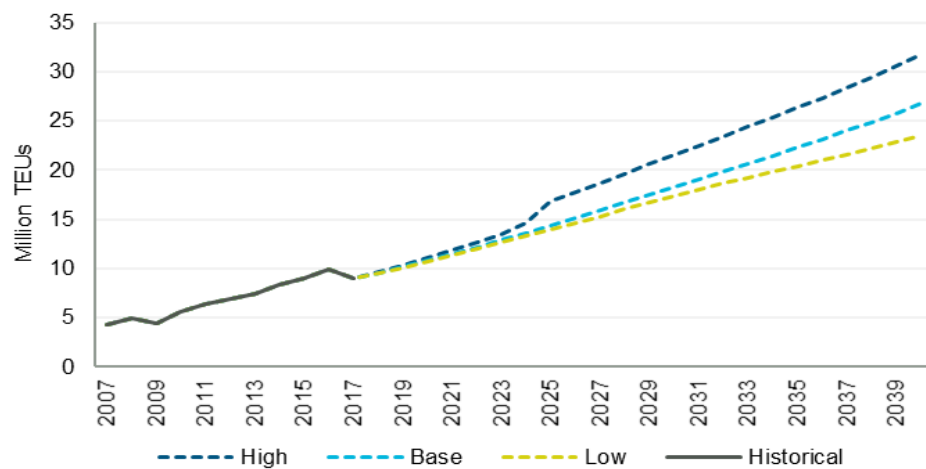
It is expected that the total throughput of Westports will grow to 26.8 million TEUs in 2040 in the Base Scenario, at an annual growth rate of 4.8%, but with the average annual growth slowing in the long run. Transshipment cargo has a faster growth than direct cargo.

In the High scenario, the total throughput forecast in 2040 is 31.7 million TEUs, at an annual growth rate of 5.6%. In the Low scenario, the total throughput forecast in 2040 is 23.5 million TEUs, at an annual growth rate of 4.2%.

Table 6-7 Forecast Results for Container Throughput, 2018 – 2040

(Million TEUs)	2018	2022	2030	2040	CAGR 17-40
High Scenario	9.6	12.6	21.6	31.7	5.6%
<i>Direct</i>	2.9	3.5	5.0	6.7	3.9%
<i>T/S</i>	6.7	9.1	16.6	25.0	6.2%
Base Scenario	9.5	12.2	18.3	26.8	4.8%
<i>Direct</i>	2.9	3.5	5.0	6.7	3.9%
<i>T/S</i>	6.6	8.7	13.3	20.1	5.2%
Low Scenario	9.5	12.0	17.4	23.5	4.2%
<i>Direct</i>	2.9	3.5	5.0	6.7	3.9%
<i>T/S</i>	6.6	8.5	12.5	16.8	4.4%

Source: BMT

Figure 6-25 Container Throughput Forecast at Westports

Source: BMT

6.4 Vessel Traffic Forecast

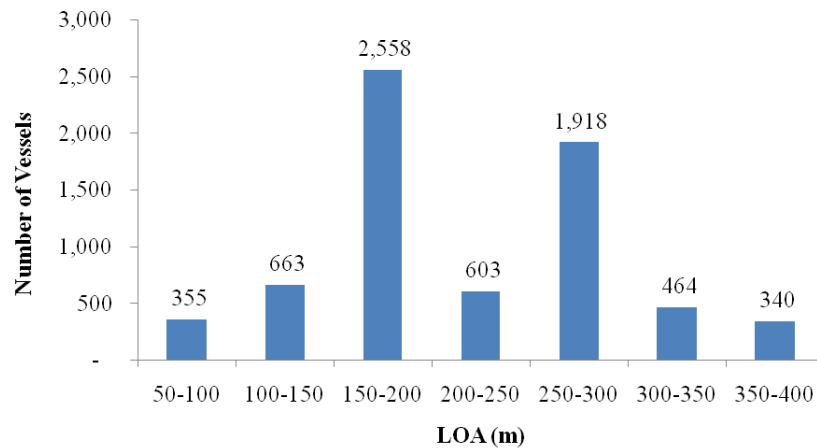
6.4.1 Existing Vessel Traffic

There were 7,049 container vessel calls at Westports in 2017. Analysis of vessel calls show that the following vessel groups dominate the throughput:

- LOA 150~200
- LOA 250~300

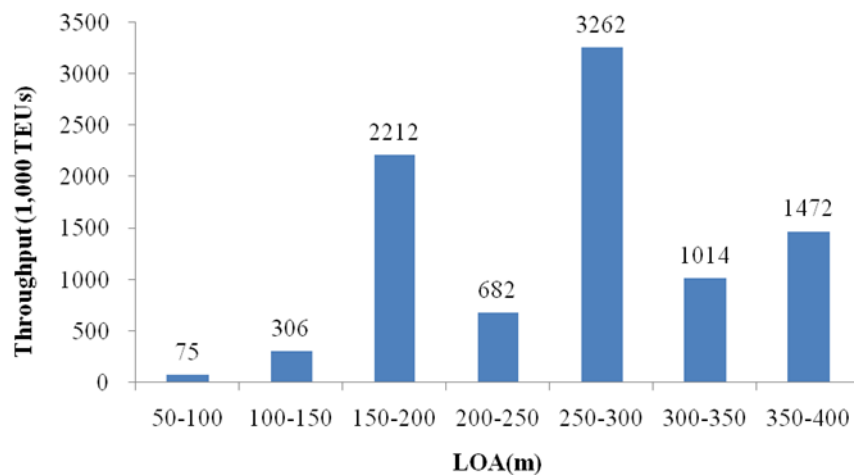
Vessels with LOA longer than 250m carry more than 60% of container cargo to Westports.

Figure 6-26 Vessel Calls by LOA in Westports, 2017



Source: BMT

Figure 6-27 TEU exchange by Vessel Size in Westports, 2017



Source: BMT

6.4.2

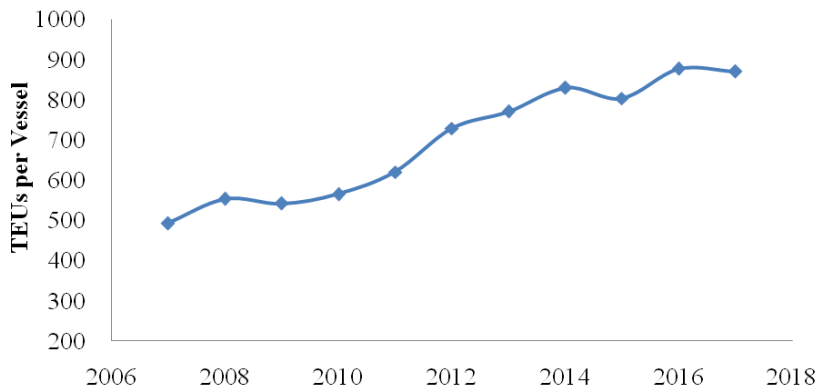
Trend of Vessel Size

Vessel sizes gradually increased over the previous decade. The average throughput per vessel increased from around 700 TEUs per vessel in 2007 to around 1,300 TEUs per vessel in 2017 (as shown in **Figure 6-28**). This is due to the increase calling of long haul vessels.

However, it is forecast that the percentage of transshipment cargo only increase moderately (as shown in **Figure 6-29**). The share of transshipment cargo is forecast to increase from 69% in 2017 to 75% in 2040.

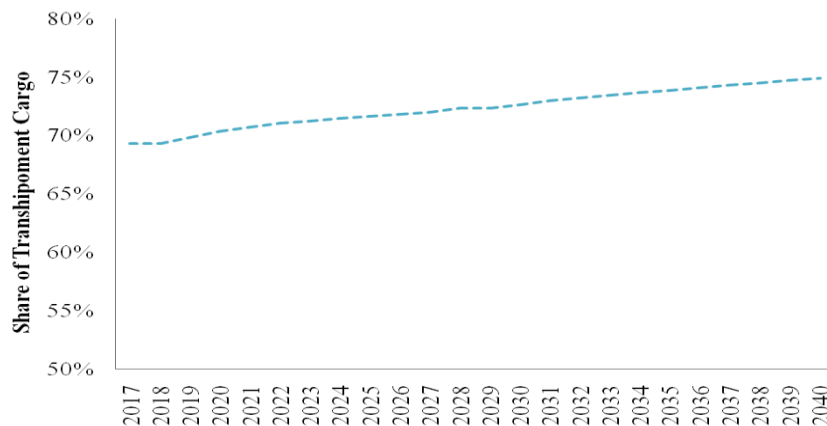
With the above consideration it is appropriate to assume that the overall vessel size will increase by about 10% in the long run.

Figure 6-28 Container Moves per Vessel in Westports, 2017



Source: BMT

Figure 6-29 Forecast of Transshipment Cargo in Westports



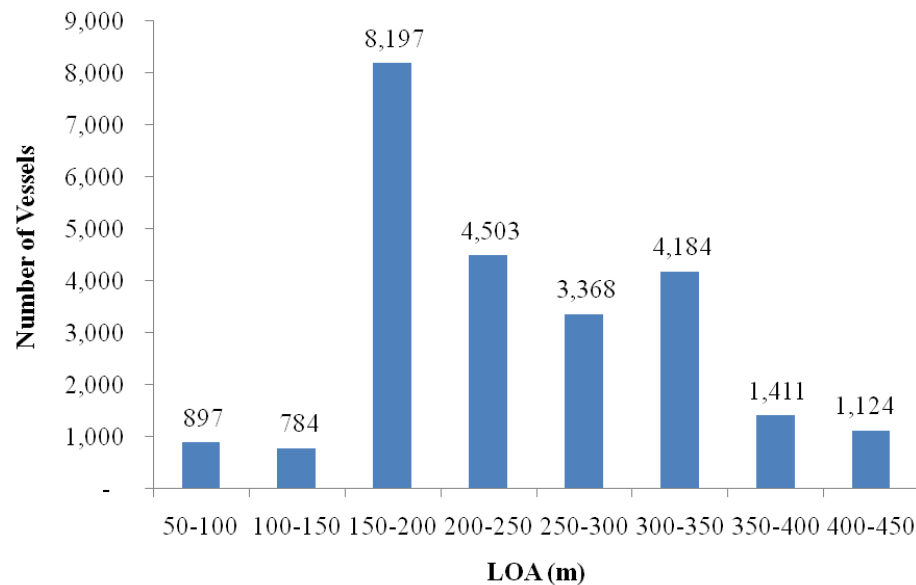
Source: BMT

6.4.3

Vessel Traffic for Westports after Expansion (17 TEUs)

With the expansion option of approximately 17M TEUs², the total capacity of Westports will become 32M TEUs. With 32M TEUs, the total number of vessel calls is forecast to be approximately 24,500 per year. Mega vessels with LOA over 400 meters will be increased to around 1,100 per year.

Figure 6-30 Total Vessel Traffic Forecast for Westports with Expansion (Calls per Year)



Source: BMT

6.4.4

Vessel Traffic for Phase II (17 TEUs)

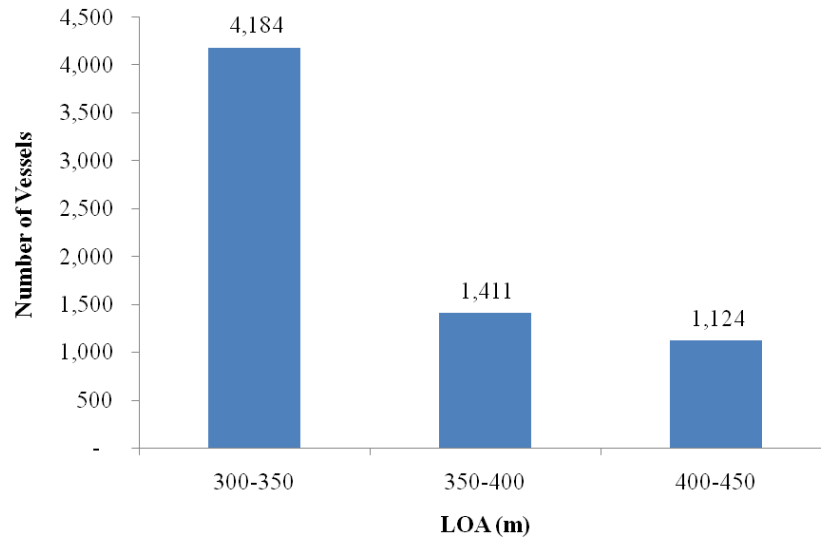
Considering productivity and service level, it is best to use the new Phase II to accommodate larger vessels.

The vessels with LOA < 250m vessels account for about 15 million TEUs, which is the same of Phase I capacity.

It is forecast that there will be 6,700 vessels per year handled in Phase II. Considering a seasonality factor of 1.3, there expects to be up to 24 vessels per day. With 17 berths in Phase II, there expects to be around 1.4 vessels to be handled in each berth every day.

The distribution of vessel sizes is shown in the figure below.

² The layout plan is discussed in the second part of the report.

Figure 6-31 Traffic Forecast for Westports Phase II (Calls per Year)

Source: BMT

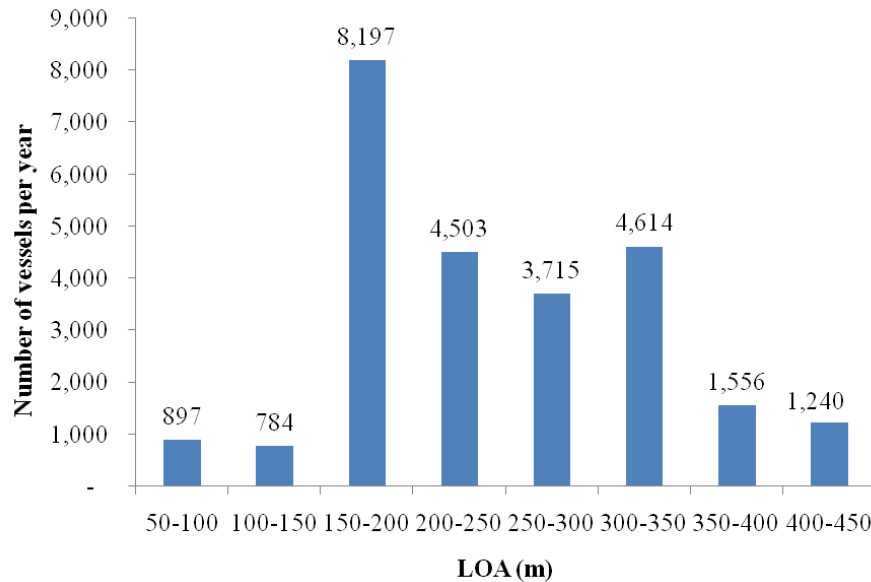
6.4.5

Vessel Traffic in South Channel

Due to the depth (11.2m) issue of North Channel, ships with a draft of more than 11 m need to use the South Channel. The capacity of Northports is expected to increase to 7.2 million TEUs with equipment upgrades. It is assumed that 30% of vessel traffic of Northport will be using South Channel in the future.

The total vessel traffic in South Channel is obtained by combining Westports and Northport traffic. It is forecast that there will be around 1,000 vessels from Northport using South Channel.

The total vessel traffic in South Channel will be 25,500 per year. Considering a seasonality factor of 1.3, there expects to be 90.8 vessels per day. The distribution of vessel sizes is shown in **Figure 6-32**.

Figure 6-32 Traffic Forecast for South Channel (Calls per Year)

Source: BMT

It is expected that the majority of the traffic will be within the main channel. There expects to be totally 91 vessels per day using South Channel, among which 81 vessels will be approaching in and out the main channel.

The vessel forecast will serve as the input for the MTRA (Marine Traffic Risk Assessment) in the next stage.

7 Westports Operation Planning and Equipment Requirement

7.1 Introduction

Container terminal operation process involves two key operations (Figure 7-1):

- Ship-to-shore operation
 - Loading and discharging from vessel to shore
 - Equipment: Quay Crane (QC)
- Yard operations
 - Movement / Storage in yard area
 - Equipment: RTG

This Section determines the key operational requirements for Westports Phase II. The following operational requirements need to be calculated, which serves as the basis for the layout planning in the next stage:

- Quay length
- Terminal area

Figure 7-1 Main Operation Flows of Container Terminals



Source: BMT

7.2 Productivity Evaluation of Westports

Operational requirements for future expansion should be based on the productivity standards in Westports, namely, quay productivity and terminal area productivity. It is noted that the productivity standards are generally affected by the demand patterns, trade characteristics and mix, and vessel services at Westports - which to a large extent, cannot be easily determined by the port.

7.2.1 Quay Productivity of Westports

For container terminals, berth utilisation and productivity are interrelated. Usually, berth utilisation cannot be too high, otherwise the average waiting time of container vessels may be very long.

Quay productivity of Westports in recent years has been evaluated. Assuming maximum berth occupancy to be 90% (a high level but which is achievable for long linear quay with multiple berths), then maximum quay productivity varies between 2,030 to 2,309 TEUs/meter in recent five years.

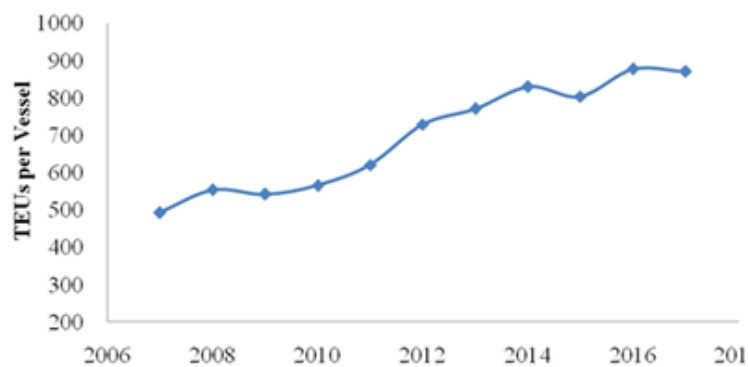
Table 7-1 Maximum Quay Productivity (TEUs/M)

2013	2014	2015	2016	2017
2,030	2,228	2,309	2,153	2,171

Source: BMT

It is expected that TEUs exchange per vessel will continue to increase moderately in the future. Therefore, quay productivity expects to increase accordingly. With above considerations, quay productivity of 2,500 TEUs/meter is appropriate for future planning.

Figure 7-2 Container Moves per Vessel, 2017



Source: BMT

7.2.2

Terminal Area Productivity of Westports

As discussed in **Section 4.1.2**, currently terminal area of Westports is 187 hectares, with 46,922 ground slots.

Terminal area productivity depends on factors like dwell time, mix of transshipment and direct cargo, and trade-off between land cost and operational efficiency.

Planning parameters for Phase II are determined with both Westports productivities and industrial standards for similar ports and summarised in below:

- Max stacking height (laden): 1 over 5
- Max stacking height (empty): 1 over 6
- Ratio of average to max height: 0.85
- Reserve capacity safety factor: 1.3

One other factor for the requirements of terminal area is the ratio of transshipment cargo. A smaller land area per throughput TEU is needed for transshipment cargo than that for direct cargo because one transshipment box generates two throughput TEUs.

Terminal productivity standards are calculated under two assumptions of transshipment ratio:

- Assuming new terminals doing 90% of transshipment, terminal area productivity is 68,000 TEUs/Ha.
- Assuming new terminals doing 70% of transshipment, terminal area productivity is 59,000 TEUs/Ha.

7.3

Planning of Berth Size

Optimal planning of berth scales affects the efficiency in berth utilisation.

Analysis of vessel calls (**Figures 6-26 & 6-27**) show that the following vessel groups dominate the throughput in Westports:

- LOA 150~200
- LOA 250~300

After expansion, most of small vessels are better to be accommodated by existing terminals, while expanded terminals should provide flexibility in accommodating big vessels.

Therefore, a 600-meter terminal (two 300-meter berth) lacks of flexibility in accommodate two big vessels, giving that vessel sizes expect to increase moderately in the long term. With increasing vessel size, it is appropriate for planning of 400m berths in the future, which is also the industrial standards for new container terminal.

7.4 Requirements of Quay Length and Terminal Area

The operational standards are obtained for planning of Westports Phase II.

Quay productivity: 2,500 TEUs/meter

Terminal area productivity:

- 68,000 TEUs/Ha @ 90% transshipment
- 59,000 TEUs/Ha @ 70% transshipment

The operational standards are translated into quay length and terminal area requirements for the layout plan development in the next stage.

Table 7-2 Quay Length and Terminal Area Requirement for 1 Million TEUs Capacity

Additional Capacity (million)	Berth	Quay Length (m)	Yard Area (ha)
1 million @ 90% TS	1	400	14.7
1 million @ 70% TS			16.9

Source: BMT

7.5 General Requirements of Equipment

7.5.1 Review of Westports Equipment

Container terminal equipment at Westports from 2013 to 2017 are reviewed and shown in the Figure below.

Table 7-3 Terminal Equipment, 2013 – 2017

	2017	2016	2015	2014	2013
Total Berth Length (m)	5,200	4,900	4,600	4,600	4,300
QCs	64	55	52	52	45
RTGs	185	163	160	157	115
Tractors	524	459	459	383	332
Reach Stackers	11	10	11	11	11

Source: BMT

According to the current equipment deployment, the following planning criteria are established

Quay Cranes:

- Interval per QC: 80 m
- QC per ha: 0.35
- QC per Berth (400m): 5

RTGs:

- QC: RTG ratio: 1:3
- RTG per Berth (400m): 15

Tractor:

- QC: Tractor ratio: 1: 8.4
- Tractor per Berth (400m): 42

7.5.2**Equipment Requirements**

Based on results from layout option design in Stage 3 – Layout Optimisation and Conceptual Design (with capacity of 17 million TEUs), 5 phases were proposed:

- Phase 1: 4 berths
- Phase 2: 3 berths
- Phase 3: 4 berths
- Phase 4: 4 berths
- Phase 5: 2 berths

Note: this phasing is subject to development and presented here as a preliminary basis for review of the CT growth.

Quay productivity of 2,500 TEUs/meter is set for future planning, therefore productivity per berth (400 m) is 1 million TEU. Equipment for future development are shown in Table 7-4.

Table 7-4 Additional Equipment Required

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Capacity (mn TEUS)	4.0	3.0	4.0	4.0	2.0
QCs	20	15	20	20	10
RTGs	60	45	60	60	30
Tractors	168	126	168	168	84

Source: BMT

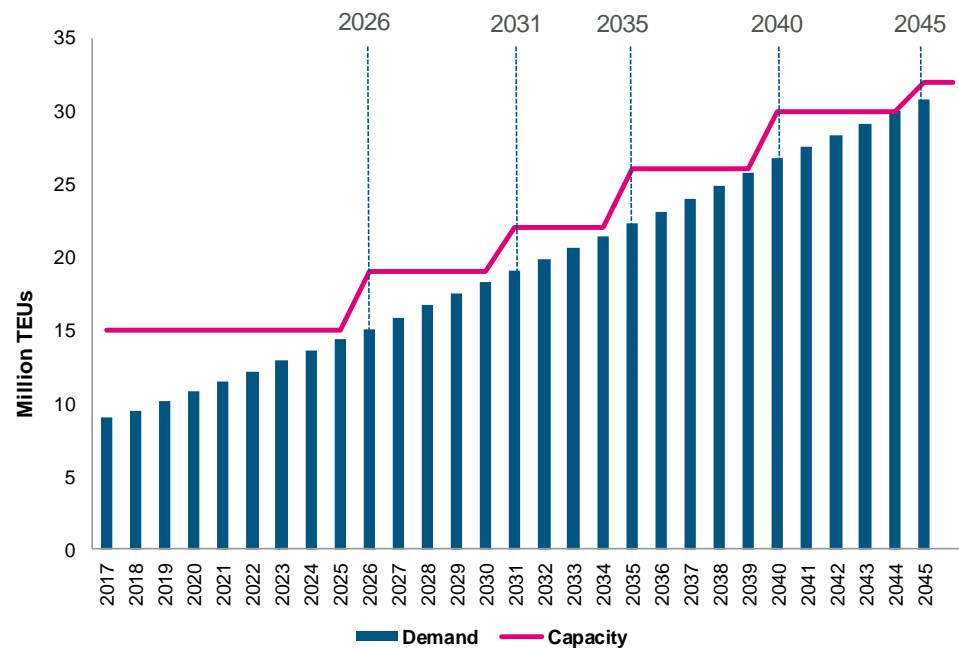
7.6 Phasing Plan³

The timing of additional phases needs to be determined considering the following issues:

- To maximise the utilisation of initial phase;
- To take into account the physical or technical constraints of the sites for expansion.

The proposed capacity planning of Westports is shown in **Figure 7-3**. A new phase is proposed when the demand is approaching existing capacity.

Figure 7-3 Capacity Planning of Westports



Source: BMT

In the phasing plan, Phase 1 is planned to be completed in the year of 2026, which increases the capacity to 19 million TEUs. Phase 2 is introduced by the year of 2031, which increases the capacity to 22 million TEUs. Phase 3 is expected to commence in 2035, which increases the capacity to 26 million TEUs. Phase 4 is introduced by 2040 with overall capacity at 30 million and covers the demand up to 2044, Phase 5 will be introduced in 2045.

³ It is noting that the phasing plan is subject to change when the layout plan is changed in the later stage.

8 Westports Business Plan and Strategies

8.1 Feeder Market Potential

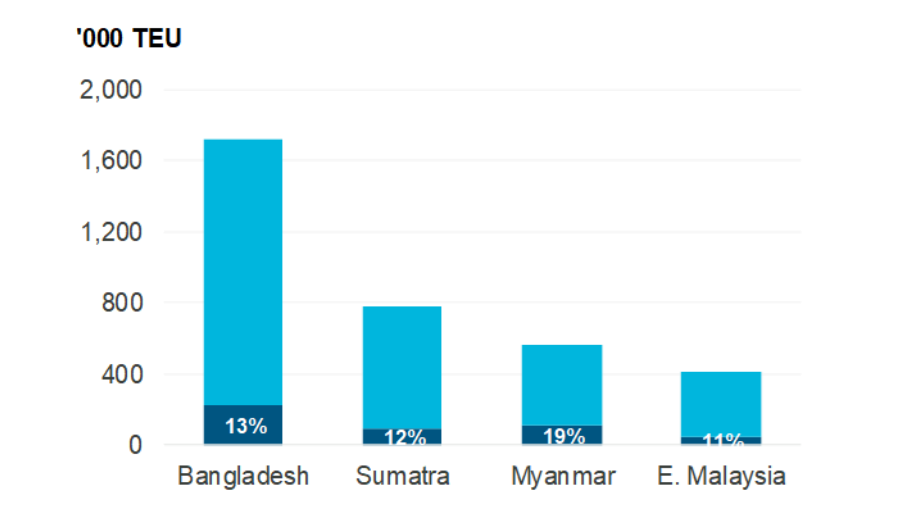
Markets where Westports is best positioned (compared to PTP and Singapore) include Peninsular Cost Coast, Sumatra, Upper Bay of Bengal and East Malaysia. Currently they are not yet well tapped with less than 15% of cargo tranship at Westports:

- Peninsular West Coast (incl. Penang and Southern Thailand) – 50% of its transhipment cargo use Northport, 50% use Westports
- Sumatra – 0.8 million TEU of potential volume (currently 13% of this tranship at Westports)
- Upper Bay of Bengal – potential 2.3 million TEU (currently 14%)
- New markets – post Cabotage liberalisation: East Malaysia, potential 0.4M TEU (currently 11%)

Figure 8-1 Feeder Market for Westports



Source: BMT

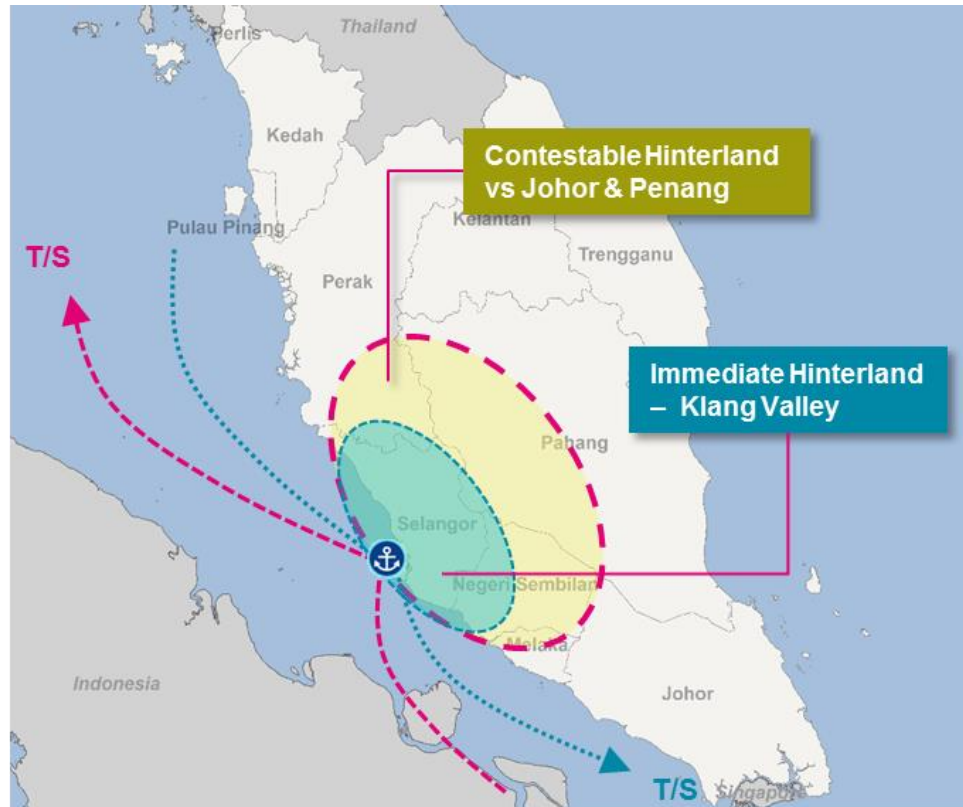
Figure 8-2 Potential and Current Volume at Westports

Source: BMT

8.2

Contestable Hinterland

- Expand the catchment area of Westports – to cover the contestable areas, including Melaka, Muar, Batu Pahat, etc. This could be achieved by working with lines on intermodal trades and trucking to target the contestable areas.
- Integrate with the hinterland – due to the fact that the convergence of industrial activities and port operations is the most cost effective and reliable option. It is crucial for Westports to be ultimately perceived as **the Port** of the hinterland.
- Further utilise / develop Port Klang Free Zone (PKFZ) – as BMW and Volkswagn are moving to PTP from Singapore; and PTP is looking to develop Free Zone Phase 2 & 3, it is beneficial for Westports to develop its Free Zone to attract more shippers.

Figure 8-3 Contestable Hinterland for Westports

Source: BMT

8.3 Shipping Lines

Provide dedicated berth / terminal model (engaging shipping lines in terminal development), which could be developed via:

- JV / equity offering
- VTA (volume commitment for discounted tariff, dedicated berthing, berth on arrival, prioritised berthing etc.)

Shipping lines perspectives

- Evergreen (EMC) commitment with PTP expires in 2025 – currently due to EMC operations in PTP, COSCO and OOCL also send vessels to PTP vs only EMC in the past before the OCEAN alliance
- Growing operations of THE (medium term and forward), requiring a second hub in the region
- Further industry consolidation

Other perspectives

- Storage centre for empty containers
- Dangerous cargo

8.4 Marketing & Promotion

A dedicated team could be established to take up a promotional role for Westports. The team should work in join forces with relevant Government arms in promoting the use of the port:

- Target the market potential, such as the feeder market and hinterland coverage as mentioned earlier
- Influence port choice – cost, quality of services (reliability, security), lead time, customs, tax rebates and connectivity
- Raise the profile of Westports among potential users
- In addition to gaining additional cargo, give carriers and shippers confidence that Westports is a thriving port with a clear development strategy supported by the Government

JV companies with shipping lines for feeder, trucking, intermodal services to secure and enhance hinterland coverage locally and regionally.

Figure 8-4 Marketing Strategy



Source: BMT

9 Conclusion

9.1 Summary of Findings

To re-cap the key findings of the study:

9.1.1 Hinterland Economy

Gateway cargoes are directly linked to the economic development of the local hinterland. The hinterland of Westports covers an immediate hinterland (KL and Selangor) and secondary hinterland (Negeri Sembilan, Pahang and Perak).

Selangor and KL are the economic powerhouses of Malaysia and accounted for about 40% of the national GDP. Economic growth in Selangor and KL has been strong (CAGR of 7.5%-8.5%). Strong manufacturing industry and growing agricultural products are also potential drivers for container shipping. Increasing number of establishments with value added growth a CAGR of 9.1% for 2010-2015. There are a number of growth drivers which define future hinterland growth

- Strong regional and national economic growth create demand manufactured goods and container shipping.
- The hinterland is featured under different policies and economic corridors, receiving prioritised Government support.
- The core industries within the hinterland are focussed industries at the national level. Relevant facilitation, promotion and incentives are provided to maintain sustainable growth.
- New government to add renewed growth momentum
- Restoring oil price also to benefit the 2nd largest oil exporter in SE Asia.

9.1.2 Regional Port Market

Southeast Asia, and the Malacca Straits, is at the crossroads of the world's east-west and north-south trade routes. It's at the heart of global shipping with vast amount of cargo movement, supported by three types of regional ports:

- Hub ports (53%) – Singapore, PTP and Klang Port. Many major intercontinental and intra-Asia services call at these three hubs.
- Gateway ports (37%) – such as Leam Chabang, Jakarta, Manila, etc. These ports are the major ports in Southeast Asian countries Gateway ports mainly handle country's OD cargo and serve as transshipment centre (Intra-Asia trades) to feeder ports.
- Feeder Ports (10%) – such as Davao, Bangkok, Sabah, these ports have no or only a few direct routes, and they are connected to the international market via transshipment at hub ports or gateway ports.

In recent years, the throughput growth of the ports in the region was concentrated in the gateway ports. Intra-Asia trade led the total port throughput growth (CAGR 2012-2017 of 5.5% vs non- Intra-Asia of 3.8%).

The largest origin and destination for transshipment cargo is Asia (42%), and for Asia transshipment cargo handled in Malacca, 30% to/from Far East Asia, 27% to/from Indochina, 20% to/from Malacca and East Malaysia.

The development of gateway ports may have negative impacts on the transshipment hubs (including Port Klang) in the long term as cargo transits directly between Origins-Destination.

9.1.3

Container Shipping Market Development and Implications for Ports

- Larger vessels – increased investment in ports to accommodate the vessels (longer berth, deeper water, more outreach, reinforced structures etc.)
- Liner consolidation and alliance reshuffling – reshape port call selection and frequency
- Shipping lines under extreme cost pressure (the recovery in 3/4Q last year seems short-lived with surging fuel price and continuing overcapacity) – low cost continues to be a key arbiter of carrier choice, with better efficiency required of the terminal operators (speed and flexibility offerings now focussed on cost, consistency and reliability)
- Require higher capacity to handle any major alliance (not only the customer shipping line's volume but also its alliance partners')
- Demands less fragmented terminal capacity
- Increasing ITT (even within a same port, member lines will use their own terminals)
- Increasing volume peaks (workload less evenly distributed)
 - more TEU exchanges per vessel call
 - additional resource (more QCs, internal trucks and manpower)
 - more yard space
 - larger gates

9.1.4

Port Infrastructure and Hinterland Connectivity

In the previous decade, Westports has been expanding its handling capacity to support strong demand growth. The completion of CT9 (Phase 1) in early 2018 has boosted Westports' capacity to 14 million TEU per year. It will further increase to 15 million TEUs per year with the completion of phase 2 of CT9 by early 2019.

95% of Westports' direct cargo is transported by road, only 5% by rail. Study reveals that the Level Of Service (LOS) of the major port access road of Westports including Pulau Indah Expressway, during most part of the day is at a level detrimental to the port's business. The main contributor of the high traffic volume is heavy vehicles, and containerised cargo comprises a significant percentage of the traffic

9.1.5 Port Throughput Forecast

The throughput of Westports is expected to grow to 26.8 million TEUs in 2040 in the Base Scenario, at an annual growth rate of 4.8%, but with the average annual growth slowing in the long run. Transshipment cargo has a faster growth than direct cargo.

9.1.6 Westports Operation Planning and Equipment Requirement

5 phases were proposed – Phase 1 is planned to be completed in the year of 2026, which increases the capacity to 19 million TEUs. Phase 2 is introduced by the year of 2031, which increases the capacity to 22 million TEUs. Phase 3 is expected to commence in 2035, which increases the capacity to 26 million TEUs. Phase 4 is introduced by 2040 with overall capacity at 30 million and covers the demand up to 2044, Phase 5 will be introduced in 2045.

9.1.7 Westports Business Plan and Strategies

Markets where Westports is best positioned (compared to PTP and Singapore) include Peninsular Cost Coast, Sumatra, Upper Bay of Bengal and East Malaysia. Currently they are not yet well tapped with less than 15% of cargo tranship at Westports. Key business strategies were recommended including:

- Expand the catchment area of Westports by working with lines on intermodal trades and trucking to target the contestable areas
- Integrate with the hinterland to be ultimately perceived as the Port of the hinterland.
- Further utilise / develop Port Klang Free Zone (PKFZ)
- Provide dedicated berth / terminal model (engaging shipping lines in terminal development), which could be developed via JV / equity offering or VTA (volume commitment for discounted tariff, dedicated berthing, berth on arrival, prioritised berthing etc.)
- A dedicated team could be established to take up a promotional role for Westports. The team should work in join forces with relevant Government arms in promoting the use of the port.

JV companies with shipping lines for feeder, trucking, intermodal services to secure and enhance hinterland coverage locally and regionally.

Appendix A - Port Competitiveness

Introduction

A review of the competitiveness of the following major ports has been undertaken.

- Port Klang
- Tanjung Pelepas
- Singapore
- Jakarta / Tanjung Priok
- Cai Mep

The results of this assessment will serve as a reference to determine the share of the cargo the ports can obtain in the developing market, and will also be used to develop strategies to maximise the potential of Westports.

Port Klang

Port Operation and Facilities

As noted previously, Port Klang is the most important gateway port in Malaysia and it is also one of the major hubs in the Straits of Malacca. In 2017, the port handled almost 12 million TEUs.

The import and export volume of Port Klang is relatively balanced, and the proportion of transshipment volume is in a range of about 60% - 70%. Compared with Singapore and PTP, Port Klang has a relatively high proportion of Intra-Asia trade: more than half.

Westports is currently the key port of Port Klang. Westports Holdings was listed in 2013. Its major shareholders are local private investment companies and Hutchison Group (HPH) who owns 24% of shares through South Port Investment Holdings Limited.

The transshipment ratio of Westports is relatively high at over 65%. In terms of operations, the productivity of Westports is also high, the Quay Crane (QC) rate is about 28 moves per hour, which is slightly higher than that of Singapore.

Northport is located closer to its hinterland, compared with Westports. Direct cargo accounted for more than half of its throughput. Wan Hai, one of the largest Intra-Asia liners, is its main customer. However, the port conditions of Northport are relatively poor, and the depth along the berth is about 11.5 m to 17 m. The current approach channel is only 11.2 m deep and 300 m wide, which is insufficient to berth large ships.

Due to these conditions, more than 95% of the ships at Northport are below 5,000 TEU, and its throughput share in Port Klang has dropped from 42% in 2006 to about 25% in 2017.

Table A-1 Port Klang Throughput and Specifications

Port Throughput	10,946,000 TEU (2014)
	11,887,000 TEU (2015)
	13,210,000 TEU (2016)
	11,978,000 TEU (2017)
Transshipment Ratio (%)	60-70%
Container Handling Tariff	RM 265/TEU (OD) RM 161/TEU (TS)
Container Terminals	Westports, Northport
Westports	
Shareholders	Pembinaan Redzai Sdn Bhd (42%)、 HPH (24%)
Concession	60 years from July 1994
Quay (m)	5,800
No. of QCs	67
Draft (m)	15 - 17.5
Total area (Ha)	187
No. of RTGs	185
Rail	No port rail link
Capacity (TEU)	14 million

Table A-1 Port Klang Throughput and Specifications (cont')

Northport	
Shareholders	NCB Holdings (MMC 84%)
Concession	30 years from November 2013
Quay (m)	3,300
No. of QCs	32
Draft (m)	11 - 17
Total area (Ha)	93.4
No. of RTGs	84
Rail	No port rail link
Capacity (TEU)	5.6 million

Source: BMT analysis

Competitiveness Analysis

Port Klang which is not affiliated with any shipping lines has suffered a major impact from recent alliance reshuffles. The alliance restructure started in April 2017 has caused loss of transshipment volume, especially in Westports. CMA, the largest customer (which contributed about 35% of Westports' volume), transferred some of its businesses to Singapore. Another important customer, UASC, which accounted about 10% volume in 2016, also shifted some of its operations to Singapore as UASC has merged with Hapag-Lloyd making it part of THE Alliance. It is expected that the transshipment volume will continue to slow down in 2018.

However, compared with Singapore and PTP, Port Klang benefits from direct cargoes generated within a robust industrial hinterland: of the Klang Valley and Western Malaysia which will generate a steady increase in direct cargoes, in part mitigating current transshipment challenges.

There is competition within Port Klang, between Northport and Westports, however the markets are becoming increasingly differentiated – Northport cannot berth large vessels due to the physical constraints. In response to this its owner MMC seeks to develop a third port project in Pulau Carey, while Westports is planning to develop CT10-19 in Pulau Indah.

The Westports expansion plan has been approved in principle by the Authority, the first phase of the construction may start between 2019 and 2024. Thus, Westports will be in a more advantageous position as “first mover”; any future third port project may be set aside indefinitely.

The challenge of ITT prevails due to the restrictions of Northport channel, exclusive use of terminals by some of the shipping lines, and poor conditions of road facilities, etc. The expansion of Westports shall also need government support on road construction to link port facilities.

As noted, most of the transshipment cargo in Southeast Asia is handled through ports along the Malacca Straits, and the volumes involved (and desire for flexibility) encourage lines to adopt two transshipment hubs. The strong direct cargo volume at Port Klang makes shipping lines call a clear necessity for many lines – and the target model for Westports would be as part of a “Dual Hub”, i.e., Port Klang and Singapore or PTP. It is observed that the Ocean Alliance has begun to adopt this model.

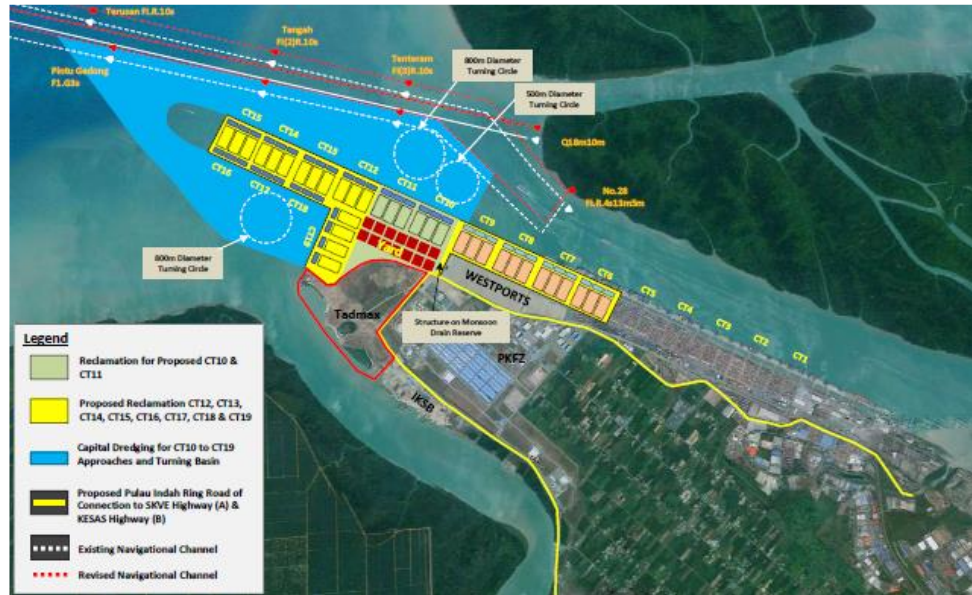
Future Development

Westports’ long-term planning blueprint includes the development of CT10 to CT19. It is planned to build 30 berths and provide additional capacity of almost 20 million TEUs.

The project costs are estimated (ongoing analysis) at about RM10 billion. It is expected to be funded through long-term loan and issuing bonds, etc. The first phase of construction is expected to take place between 2019 and 2024.

Taking into account the land side, wind and tides conditions in Pulau Indah, initial comments on the proposed expansion include:

- The expansion starting from CT10 to the south requires land reclamation
- The existing channel needs to be moved outwards (in northeast direction) to provide sufficient turning basin for large vessels calling at the new terminals.
- The expansion may cause more pressure on the current congested roads around the island and the internal road connections. Hence, relevant road expansion plans urgently require government approval.

Figure A-1 Westports Planning Blueprint

Source: Westports

Tanjung Pelepas

Port Operation and Facilities

The Port of Tanjung Pelepas (PTP) is located at the southern tip of peninsular Malaysia, and adjacent to the Port of Singapore. Situated on the eastern side of the mouth of the Pulai River in South-West Johor, PTP is easily accessible from the Straits of Malacca.

The port has developed an effective feeder network to main regional ports. Local cargo movement to major industrial estates is accessible through the second Malaysia-Singapore expressway and the north-south highway. PTP is also connected to the national rail network passing through Peninsular Malaysia from Singapore to Southern Thailand.

PTP is a naturally sheltered deep water port and has no tidal restrictions. It currently offers 14 berths totalling 5,040 metres of deep-water piers for containers. The annual handling capacity of PTP is about 10.5 million TEUs.

Table A-2 PTP Throughput and Specifications

Port Throughput	8,232,113 TEU (2014)
	8,798,747 TEU (2015)
	8,028,983 TEU (2016)
	8,260,610 TEU (2017)
Transshipment Ratio (%)	94%
Import-Export Ratio (Laden)	25:75
Container Handling Tariff	RM230/TEU (OD) RM200/TEU (TS)
Container Terminals	PTP
Key Shipping Lines / Customers	Maersk (incl. MCC), Evergreen, MSC
PTP	
Shareholders	MMC (70%), APMT (30%)
Concession	60 years from 1995
Throughput (2017)	8,260,610 TEU
Quay (m)	5,040
No. of QCs	57
Draft (m)	15-19
Total area (Ha)	180
No. of RTGs	200
Rail	31.5 km of railway link to Southern Thailand
Capacity (TEU)	10,500,000

Source: BMT analysis

Competitiveness Analysis

PTP's key customers are Maersk and Evergreen. Since 2000, Maersk moved its transshipment hub from Singapore to PTP, and its wholly-owned subsidiary, MCC, has launched a southeast transshipment service in Singapore cooperating with Maersk's main ocean route. After negotiation between PTP and Evergreen in 2001, Evergreen also transferred part of its Malacca Strait transshipment service to PTP. With the establishment of 2M, MSC also joined Maersk to include PTP in its route operations. PTP is the primary transshipment hub for Maersk in Southeast Asia, while MSC uses both Singapore and PTP (dual hub).

Evergreen has been using both PTP and Port Klang but it may potentially move the business from Port Klang to Singapore together with other Ocean Alliance members in the future.

In terms of operations, the water depth of Berths 7-14 are 17 meters (able to berth ships of 22,000 TEU in maximum), and the depth of Berth 1-6 are 15 meters (for 9,000 TEU ships in max.). According to the plan, Berths 7-14 will be dredged to 19 meters. At present, the water depth of the access channel is 15 meters. The maximum ship size that can enter and leave the port at full load is 10,000 TEU, in the absence of tides.

The average size of ship berth at the port is 4,000 TEU, and the average handling volume per call is 1,800 TEU. The largest single loading/unloading capacity to date is nearly 5,000 TEU. 20% of ship called exceed 300 meters in length (LOA). The average vessel waiting time at PTP is 3 to 4 hours, slightly higher than Singapore, but it is comparable to other important transshipment hubs such as Busan and Kaohsiung.

The yard has sufficient capacity (46% utilisation), and the average detention time for transshipment (5.8 days) is also lower than that of Westports. Due to recent land, equipment, and labour issues, the QC rate has dropped from 28 moves/hour to 24 moves/hour. It is noted that Maersk switched 10% of its volume to Singapore in 2016.

PTP is located far from the industrial area of the southeast. Cargo from the east and southeast of the hinterland is mainly transported to and from Johor via Pasir Gudang, or trucked to Singapore, or transported by barge via Pasir Gudang to Singapore. The hinterland of PTP mainly consists of western Johor, and the port's free trade zone.

Future Development

PTP and the Johor Port Authority plan to expand the port with 3 berths capable of accommodating 20,000 TEU ships in 2018. This will further expand the quay length to 6,600 m. Free trade and industrial zones will be built near the port.

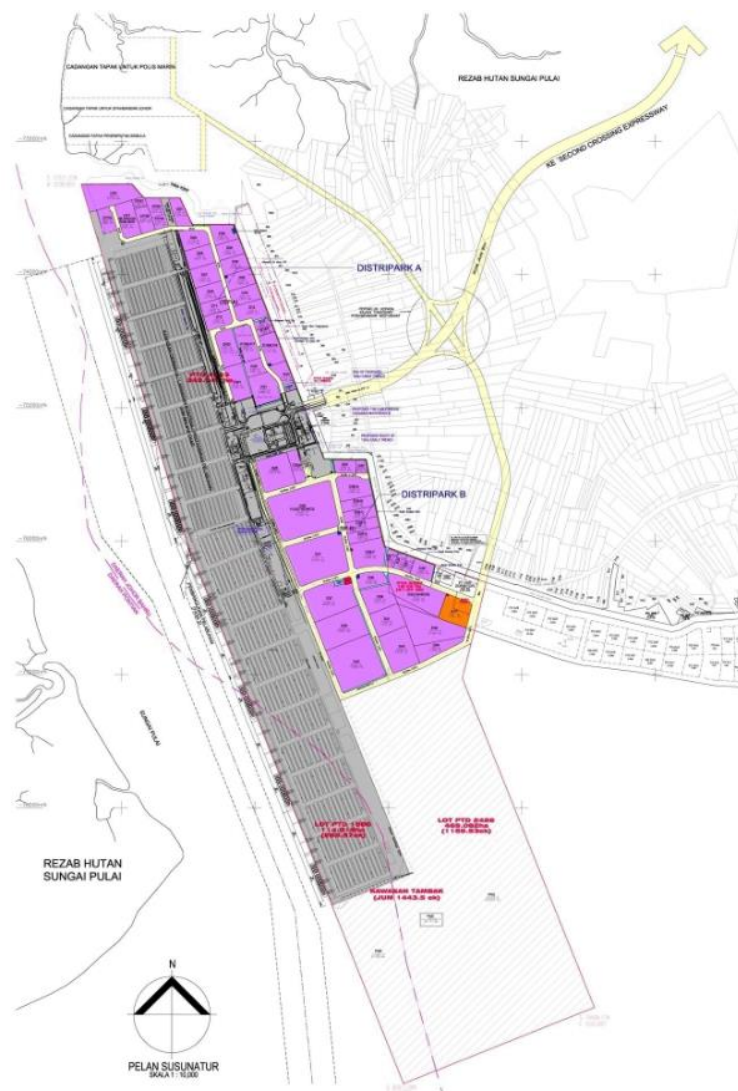
PTP is currently upgrading the equipment – replace existing QCs, RTGs and other equipment. It will invest RM 1 billion to boost the capacity from the current 10.5 million TEU to 13.5 million TEU per year. This is expected to be completed by 2020.

PTP started dredging and widening the approach channel, since April 2017, as part of this, the channel will be dredged from 16-17 m to 18 m.

In addition to these upgrades, MMC plans to invest RM600 million (US\$135 million) to build a new container berth by 2020, which will further increase the port capacity to 15 million TEU.

Subsequently, the third phase of development will be carried out. Phase 3A and 3B consist of 6 berths and the new quay length will be 3,000 m long. Following this PTP's capacity will be increased to 22.2 million TEU by 2030.

Figure A-2 Tanjung Pelepas Terminal Layout and Future Plan



Source: PTP

Singapore

Port Operation and Facilities

The Port of Singapore is strategically located at the junction of major trade routes at the eastern end of the Straits of Malacca.

Its positioning and development has made Singapore the largest transshipment hub in the world for containers, oil and LNG. More than 80% of container throughput is transshipment.

Table A-3 Port of Singapore Throughput and Specifications

Port Throughput	33,869,000 TEU (2014)
	30,922,000 TEU (2015)
	30,904,000 TEU (2016)
	33,667,000 TEU (2017)
Transshipment Ratio	80%
Container Handling Tariff	USD45-55/TEU (TS)
Container Terminals	Pasir Panjang Terminal (PSA/MSC), PSA-COSCO Terminal, Pasir Panjang Terminal (PSA/CMA-CGM), Pasir Panjang Terminal (PSA), Keppel (PSA-PIL), Keppel Terminal, Brani Terminal, Tanjong Pagar
Key Shipping Lines / Customers	All key shipping lines
Pasir Panjang Terminal (PSA/MSC)	
Shareholders	PSA, TIL/MSC
2016 Throughput (TEU)	5,795,000
Capacity (TEU)	5,980,000
PSA-COSCO Terminal	
Shareholders	PSA (51%), COSCO (49%)
2016 Throughput (TEU)	1,809,000
Capacity (TEU)	2,000,000
Pasir Panjang Terminal (PSA/CMA-CGM)	
Shareholders	PSA, CMA-CGM
2016 Throughput (TEU)	878,000
Capacity (TEU)	1,000,000

Table A-3 Port of Singapore Throughput and Specifications (cont')

Pasir Panjang Terminal (PSA)	
Shareholders	PSA
2016 Throughput (TEU)	9,000,000
Capacity (TEU)	12,500,000
Keppel (PSA-PIL)	
Shareholders	PSA (51%), Pacific International Lines (49%)
2016 Throughput (TEU)	520,000
Capacity (TEU)	1,000,000
Keppel Terminal	
Shareholders	PSA
2016 Throughput (TEU)	5,258,000
Capacity (TEU)	8,400,000
Brani Terminal	
Shareholders	PSA
2016 Throughput (TEU)	4,430,000
Capacity (TEU)	6,500,000
Tanjong Pagar	
Shareholders	PSA
2016 Throughput (TEU)	2,900,000
Capacity (TEU)	6,000,000
Total Capacity (TEU)	43,380,000

Source: BMT analysis

Competitiveness Analysis

Singapore enjoys an ideal location, situated at the convergence of major trade lanes at the east end of the Strait of Malacca, and in proximity to South East Asian countries. It leads the transshipment business in the region, and is not only the pre-eminent transshipment hub of Southeast Asia, but also a premier global shipping and financial centre.

In recent years, Singapore has lost part of its volume to PTP and Port Klang. This is mainly due to the alliance operations in the region: for example, the Ocean Three Alliance, formerly headed by the CMA, used Port Klang Port as a transshipment hub, while its members China Shipping (CSCL, now merged with COSCO) and UASC also operates Port Klang as its base in Southeast Asia.

However, in 2016, the Singaporean government sold the shipping company APL to CMA. Shortly afterwards, PSA and CMA have established a joint venture terminal CMA CGM - PSA Lion Terminal (CPLT), and jointly operate four PPT berths. Two berths commenced operation in 2016, while two others also started operations in the first quarter of 2017.

PSA-COSCO Terminal, a joint venture of PSA and COSCO has also expanded its terminal at PPT1. With the establishment of the Ocean Alliance (of which COSCO and CMA are the core members), COSCO and PSA have reached an agreement to transfer their berths and operations at PPT1 to PPT3 and PPT4, thus linked with the CMA berths and formed a complete continuous port operation.

Future Development

With the port leases for the city terminals at Tanjong Pagar, Brani and Keppel due to expire in 2027, and Pasir Panjang's lease running until 2040, Singapore is strategically shifting towards concentrating terminal operations around its future Tuas port hub. The Tuas port project is planned to gradually consolidate container operations from 2021, more than doubling the port's current throughput to 65 million TEUs, in the long term.

Pasir Panjang Terminals (PPT)

- Pasir Panjang West – over 7,000 metres of container terminals PPT-1, PPT-2 and PPT-3 as well as a ro-ro terminal
- Pasir Panjang East – more than 5,500 metres of container pier
- PPT's total capacity is expected to reach 32 million TEUs p.a.

COSCO-PSA Terminal Pte Ltd (CPT)

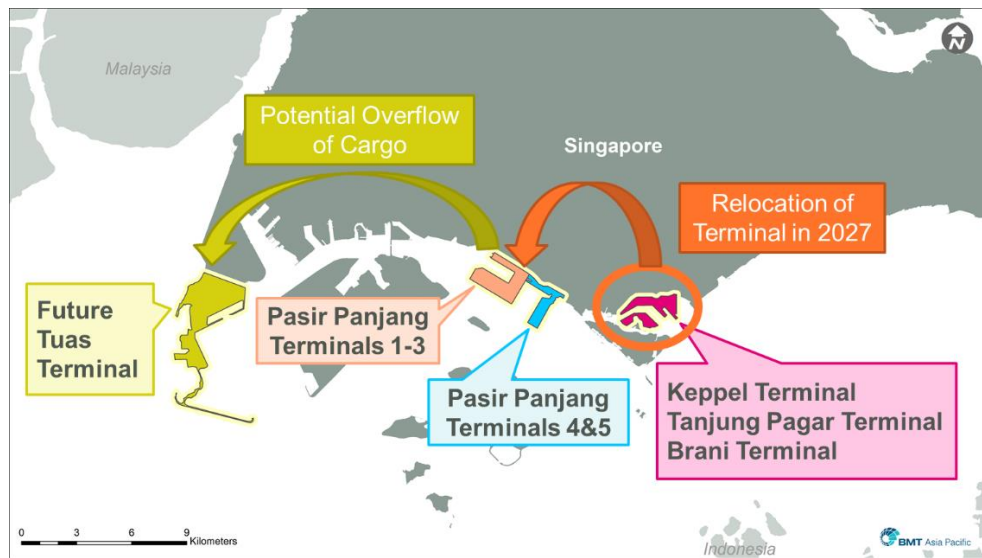
- Replacement of the original two berths in CPT located at PPT-1 with three new and larger berths at PPT-5.
- The first two berths commenced operations on 1 January 2017, with an annual handling capacity of 2 million TEUs.
- The third berth commenced operations on 1 January 2018, boosting capacity at CPT to 3 million TEUs a year.

Tuas Port

- The 21 deep-water berths under Phase One will provide a design capacity of 20 million TEU per annum.
- The entire project will eventually have a capacity of up to 65 million TEUs.
- Singapore port’s capacity will be expanded to 97 million TEUs by 2040.

The future planning of Singapore container terminals is summarised in **Figure 5-3** - the exact phasing of capacity expected to be aligned to future demand.

Figure A-3 Future Planning of Singapore Container Terminals



Container Capacity, Mil TEU		2016	2017	2020	2027	2030	2040
1) City Terminals	Tanjung Pagar Terminal	18	18	18	18	0	0
	Keppel Terminal						
	Brani Terminal						
2) Pasir Panjang	PPT 1	22	32	32	32	32	32
	PPT 2						
	PPT 3						
	PPT 5						
3) Tuas	Tuas	0	0	20	20	45	65
Total Capacity		40	50	70	70	77	97

Source: BMT based on MPA Singapore

Jakarta / Tanjung Priok

Port Operation and Facilities

Tanjung Priok is located in the northwest of Java Island in the central part of Indonesia, adjacent to the Java Sea.

Tanjung Priok has a total of five container terminals, namely, JICT, KOJA, NPCT1, PT.MTI (009) and Terminal Convensional. Among them, JICT, KOJA and the newly-built NPCT1 mainly handle international trade.

Table A-4 Port of Jakarta Throughput and Specifications

Port Throughput	5,710,000 TEU (2014)
	5,201,000 TEU (2015)
	5,510,000 TEU (2016)
	6,070,000 TEU (2017)
Transshipment Ratio	<5%
Import-Export Ratio (Laden)	60:40
Container Handling Tariff	US\$83/TEU (OD)
	US\$30/TEU (TS)
Container Terminals	(International) JICT, KOJA, NPCT1
Key Shipping Lines / Customers	All key shipping lines
JICT	
Shareholders	IPC (Pelindo II) 51%; HPH 49%
Concession	Till 2039
2016 Throughput (TEU)	2,144,000
Quay (m)	1,640 / 2,153
No. of QCs	16 / 19
Draft (m)	11-14
Total area (Ha)	46
No. of RTGs	63
Rail	Nil
Capacity (TEU)	2,800,000

Table A-4 Port of Jakarta Throughput and Specifications (cont')

KOJA	
Shareholders	IPC (Pelindo II) 54.9%; HPH 45.1%
Concession	Till 2039
2016 Throughput (TEU)	826,000
Quay (m)	650
No. of QCs	7
Draft (m)	13
Total area (Ha)	22
No. of RTGs	25
Rail	Nil
Capacity (TEU)	1,000,000
NPCT1	
Shareholders	IPC (51%); Mitsui & PSA & NYK (49%)
Concession	Till 2041
2016 Throughput (TEU)	65,000
Quay (m)	850
No. of QCs	8
Draft (m)	16
Total area (Ha)	32
No. of RTGs	20
Rail	Nil
Capacity (TEU)	1,500,000

Source: BMT analysis

Competitiveness Analysis

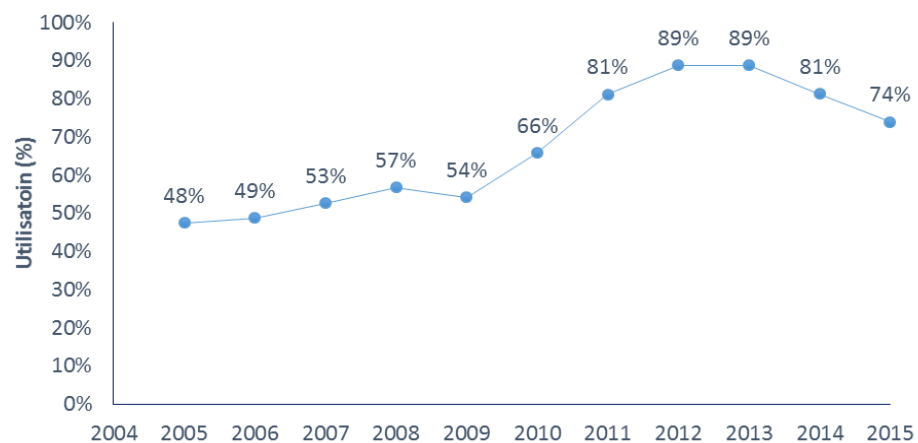
Tanjung Priok is the largest gateway port in Indonesia. It serves a large and steadily growing cargo hinterland of West Java. It also handles a large number of cargoes from other islands including Kalimantan, Indonesia's Eastern Provinces, and Sumatra).

80% of international import/export containers in Jakarta are handled at JICT, KOJA and NPCT1. International import/export containers account for 66% of the overall port's throughput.

It is estimated that the ratio of pure international throughput, domestic throughput, and international and domestic transshipment volume is approximately 66%: 22%: 12%.

The terminal utilisation reached its peak in 2012 and 2013 (89%), but declined to 74% in 2015 – a sustainable level. The port has been plagued with bottlenecks and long handling times due to lack of capacity, the expansion of Tanjung Priok may encourage shipping lines to launch more direct ship calls to Jakarta as these issues subside.

Figure A-4 Tanjung Priok Port Utilisation (2004-2015)



Source: IPC, BMT

The tariff structure for international cargo of all Indonesian ports is stipulated by the Indonesian Ministry of Transportation. The rate level is first formulated by the port operators and the Port Authority, and then approved by the Ministry of Transportation. In the past 10 years, JICT's port tariff have been raised three times and lowered once to cope with the impact of inflation and rising operating costs. At present, the container tariffs are approximately US\$83/TEU (direct) and US\$30/TEU (transshipment).

In terms of hinterland and cargo sources, Tanjung Priok's immediate hinterland includes the city of Jakarta and its surrounding industrial areas. Most of the cargo (about 50%) come from eastern Jakarta where major industrial parks (such as the Cikarang and Karawang industrial zone) are clustered.

Figure A-5 Container Cargo Distribution in the Hinterland of Tanjung Priok



Source: IPC, BMT

Future Development

The New Priok Terminal (also known as Kalibaru) in Tanjung Priok is an on-going extension project, which will increase the total capacity of Tanjung Priok by 12.5 million TEU. The construction of port is scheduled by two phases:

- Phase 1 (1st phase): New Priok Container Terminal One (NPCT1) is the first phase of New Priok development and has commenced its operation in 2016. The annual capacity of NPCT1 is 1.5 million TEU. Together with the international terminals JICT and KOJA, the total handling capacity of the Tanjung Priok is 5.5 million TEU/year. Phase 1 (2nd phase): includes the development of two container terminals (CT2 & CT3) and two liquid bulk terminals (PT1 & PT2), which will add 3 million TEU/year and 10 million m³ of annual capacity respectively to New Priok. This phase will be implemented in 2018-2019.
- Phase 2: CT4, CT5, CT6 and CT7 will be developed which will increase the capacity by 8 million TEU/year. Phase 2 is expected to be implemented in 2019-2020. Upon completion, the overall container and liquid bulk design capacity of New Priok will reach 12.5 million TEUs/year and 10 million m³/year respectively.

Figure A-6 New Priok Terminal Development

Source: IPC

Cai Mep

Port Operation and Facilities

The Cai Mep port cluster is located in Ba Ria-Vung Tau province, 80 km southeast of Ho Chi Minh City.

It comprises eight container terminals, i.e., Tan Cang - Cai Mep International Terminal (TCIT), Cai Mep International Terminal (CMIT), Tan Cang – Cai Mep Thi Vai Terminal (TCTT), Saigon International Terminals Vietnam (SITV), SP-PSA, Tan Cang - Cai Mep Container Terminal (TCCT), SSIT and Germalink. Only TCIT, CMIT and TCTT are in operation, the others have no services currently.

Table A-5 Cai Mep Port Throughput and Specifications

Port Throughput	1,326,000 TEU (2014)
	1,804,000 TEU (2015)
	1,988,000 TEU (2016)
	2,440,000 TEU (2017)
Transshipment Ratio	<3%
Import-Export Ratio (Laden)	40:60
Container Handling Tariff	USD30-40/TEU (OD)
	USD20/TEU (TS)
Container Terminals	(Operating)
	TCIT, CMIT, TCTT
Key Shipping Lines / Customers	All key shipping lines
TCIT	
Shareholders	Hanjin, MOL, Wan Hai, Saigon Newport
2016 Throughput (TEU)	1,112,000
Quay (m)	890
No. of QCs	9
Draft (m)	16.8
Total area (Ha)	34
No. of RTGs	20
Rail	Nil
Capacity (TEU)	1,650,000
CMIT	
Shareholders	Vinalines, Saigon Port, APM Terminals
2016 Throughput (TEU)	652,000
Quay (m)	600
No. of QCs	6
Draft (m)	16.5
Total area (Ha)	48
No. of RTGs	13
Rail	Nil
Capacity (TEU)	1,100,000

Table A-5 Cai Mep Port Throughput and Specifications (cont')

TCTT	
Shareholders	Saigon Newport
2016 Throughput (TEU)	225,000
Quay (m)	600
No. of QCs	7
Draft (m)	15
Total area (Ha)	48
No. of RTGs	15
Rail	Nil
Capacity (TEU)	1,000,000

Source: BMT analysis

Competitiveness Analysis

Located close to Vietnam's key economic zone, Cai Mep is an important gateway port for cargo to and from Dong Nai and Binh Duong, two of Vietnam's major industrial areas.

Cai Mep is a deep sea port with 14-20 m water depth alongside. However, due to terminal over-supply, the utilisation of Cai Mep is low (20-25%).

About 70% of containers are transported inland by barge due to lack of road and rail infrastructure.

Compared with other ports in southern Vietnam, Cai Mep has better conditions for berthing large vessels (Maersk used to berth 18,000 TEU ship at CMIT), but it is relatively far from the hinterland (75 km from Ho Chi Minh) and the poor road connectivity also makes it less attractive to shippers.

The Government has been promoting the relocation of ports out of Ho Chi Minh City (HCMC) to Cai Mep-Thi Vai area, because of the need to accommodate larger vessels, and to ease traffic congestion in the city. However, the actual progress of relocation has been very slow. Many of the HCMC ports are maintaining their operations due to strong cargo demand, and they are still handling the majority of cargo in the southern Vietnam. Most shipping lines are still using HCMC ports instead of Cai Mep as their regional feeder hubs.

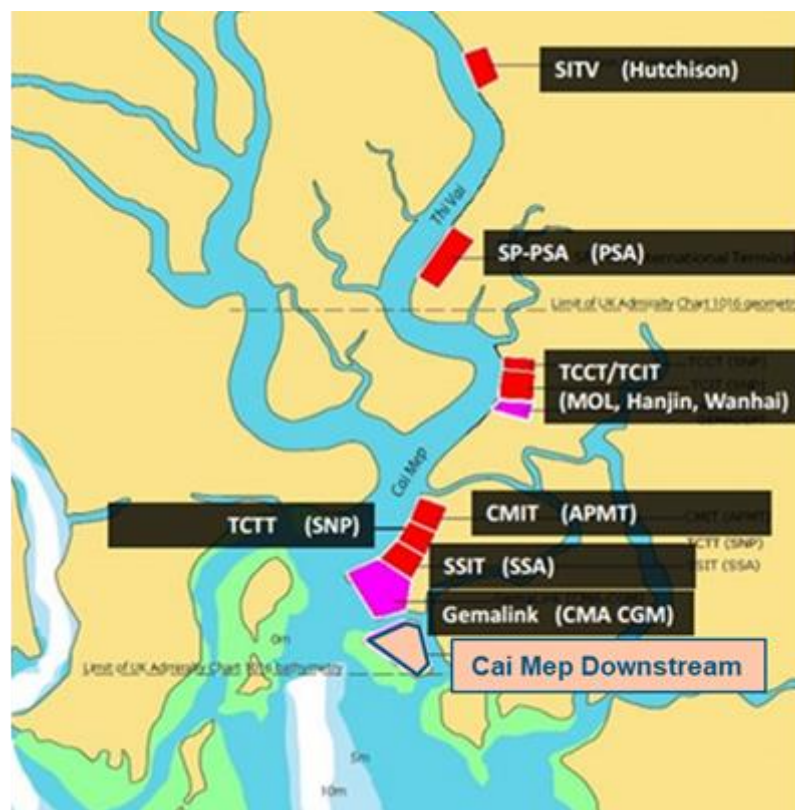
Future Development

The Ba Ria-Vung Tau province targets to become an international cargo transshipment centre, which encourages investment in seaports and logistics.

Cai Mep Downstream Project includes a deep-water port and a logistics centre:

- With deep draft of 17.5 m alongside, the port will be able to berth vessels of 200,000 DWT (18,000 TEU). The port will offer a total of 7 berths including 5 container/general cargo berths and 2 barge berths. The designed capacity of the port is 2.1 million TEU/year.
- The logistics centre, covering an area of 900 ha, is planned to handle 3 billion TEU of cargo by 2030.

Figure A-7 Location of Cai Mep Downstream Port



Source: TCIT, BMT