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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

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The National Port Directions – Volume 1 (Part 1)

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For Sri Lanka Ports Authority

Asian Development Bank

National Port Master Plan – Volume 1

National Port Directions

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Sri Lanka Ports Authority

ADB

Japan Fund for Poverty Reduction

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Preface

National Port Master Plan

On the 30th of November 2016, the Asian Development Bank (ADB) and Maritime & Transport Business Solutions B.V. (MTBS; representing the Consultant) signed the contract for the development of a National Port Master Plan for Sri Lanka (ADB reference 50184-001).

The National Port Master Plan (NPMP) consists of the following reports:

A. Executive Summary
B. The National Port Directions - Volume 1;
C. The Colombo Port Development Plan – Volume 2;
D. The Trincomalee Port Development Plan – Volume 3;
E. Passenger Terminal Concept Report – Volumes 4;
F. Pre-Feasibility Study for deepening JCT Terminal for Operating Larger Container vessels – Volumes 5; and
G. Port Elevated High Way – Volume 6; and
H. Port Reform – Volume 7.

National Port Directions

The National Port Directions report (this report) consist of the following deliveries:

A. Draft National Port Directions; and
B. National Port Directions.

The objective of the NPD is to identify the development needs of the Sri Lankan national ports both in terms of physical infrastructure needs and port governance needs. The needs assessments lead to specific policy measures and development plans. For this purpose, quantitative and qualitative assessments of the current port environment and the future needs are made. This report builds upon several policy documents of the government and SLPA, national development plans, port development plans and studies by different bodies.

Reading Guide

Part A: Description Sri Lankan Ports and Environment

The current situation is important sketch to understand the dynamics in play when assessing the ports. The ports of Colombo, Trincomalee, Hambantota, Galle, Kankesanthurai and Oluvil are the main ports described. The external port environment refers to the national economy and trade and the international competitive setting.

Part B: National Cargo Forecast and Port Directions

The quantitative analysis on the demand analysis for the port sector and the forecast on each of the commodities are described. The Base Case and High Case for containers on transhipment is provided and capacity analyses followed by a gap analysis and the port allocations strategy which leads to the port development needs. The port directions include the observations and recommendations leading to the short or long-term priority projects in each port. The port development plan is displayed for each on the ports under investigation.

Part C: Port Connectivity and Logistics Hubs

This part contains the review for port connectivity. The national road and rail in relationship to the ports are discussed and recommendations provided. Coastal shipping and inland waterways are described and the recommendations for development are described. A large section is assigned to the Logistics hub and corridor development. First, the international perspective is provided and there after the current situation is described. Finally, the reviews of logistics hubs and corridor development are made and recommendations provided.

Part D: Innovation, Technological developments and trade facilitation

Innovation on IT and systems, technological developments such as a port community system are essential improvements for the port sector. Further enhancements on Customs procedures and implementation of trade facilitation for the Logistics hubs and EPZ are important milestones to atrtrackt FDI for the new export strategy. Furthermore, the Navy and the auxiliary functions and the recommendations thereto are described.

Executive Summary

Reading guide summary	Explanation
Government National Export Vision	National Export Strategy and Vision
Strategic Directions on ports	Port Vision and Mission Four Strategies 21 strategic directions & Tasks
International Competitive Position	International trade growth slows down China's role is slowing down India emerging role? Increased vessel sizes and cascading Alliances and consolidation Changing management models in Ports Technical changes in the maritime shipping industry Digitalisation in the port industry International Port Competition
Sri Lanka Ports and their functions	Description of existing ports Current usage on cargo functions, gateway volumes and ship arrivals for the nation Per port: General overview, Hinterland connectivity, cargot traffic and marine traffic
Demand analysis for the port sector	Macro Economic overview, trade and production, Tourism & Cruise Forecast on Commodities: Containers (Gateway and Transhipment), Dry Bulk, Liquid Bulk, LNG, Breakbulk, RoRo. Cargo allocation strategy Gap analysis and Development needs per commodity
Port Development plans and short term priority projects	Port directions Port forecasts Priority projects Development plans
Recommendations on other topics	National Road Connectivity National Rail Connectivity Coastal shipping transportation Inlandwaterways passenger transportation Logistics Hubs – Dry Port – FTZ Colombo – Tricomalee Economic Corridor IT and Port Community systems Warehousing by SLPA Trade Facilitation Customs Navy Auxiliary Functions

Government National Export Vision

The National Export Strategy (NES) document published in December 2017 highlighted that the nations export sector needs to be reshaped and transformed. In alignment with the vision 2025 and the National Trade Policy the NES aims to simulate growth and job creation by improving the ability of firms to export and compete in foreign markets. Current obstacles need to be dissolved and "things need to be done differently" to increase the contribution of trade to economic development according to the document. Economic reforms for a more flexible business environment combined with increasing regional trade opportunities and major transformations in production techniques provide a unique window of opportunity for Sri Lanka to modernise and start a new cycle of export growth.

It was clearly addressed that Sri Lanka should realize its full potential as regional trade hub taking the opportunity to catch up to fast growing Asian export countries. Sri Lanka centrally located on major trade routes between Asia and Europe, Middle East, Bay of Bengal, and Africa is well positioned to participate in global production networks serving large consumers markets. The focus should be at new exports beyond today's exports which rely on a blend of traditional industries of apparel, tea, gems and rubber. To create the new export environment high tariffs, complicated administrative procedures and challenging access to inputs will be addressed to favour growth of high technology and knowledge intensive exports.

The National Vision is there for defined as:

"Sri Lanka – an export hub driven by innovation and investment".

There are four strategic objectives:

1. To have a business-enabling, predictable and transparent policy and regulatory framework that support exports.
2. To strengthen Sri Lankan exporters' market entry and compliance capacities
3. To become an efficient trade and logistics hub to facilitate exports
4. To drive export diversification through innovation and by strengthening emerging export sectors

The following six focus sectors have been identified under the NES and the role of ports has been added:

Focus sector	Type of Industry	Growth trend	Ports involvement
IT-BPM	Services	Mature	High (container traffic)
Wellness / tourism	Services	Emerging	Medium (cruise)
Spices and concentrates	Agriculture	Mature	High (air and shipping traffic)
Boating industry	Manufacturing	Visionary	High (marina's and boat yards)
Processed foods and beverages	Agriculture	Emerging	High (container traffic)
Electrical and electronic components (EEC)	Manufacturing	Visionary	High (container traffic)

The following picture shows the NES strategy schematically.

Source: Sri Lanka National Export strategy

Strategic Directions on Ports

The ports of Sri Lanka play a vital role in the implementation of this strategy. As an island, all what is consumed is imported or exported goes through nations ports. Without proper functioning of the ports, the import of raw materials and the exports of half fabricates, or final products is hampered, and the export strategy may fail. Hence the need for modern and effective ports. This implies creating more efficient ports by upgrading port infrastructure, creating more efficiency by modern handling techniques and reducing the administration paper works by innovative systems. Additionally, the ports should be connected to dry ports which facilitates the newly attracted export processing activities. Most of the focus sectors as mentioned in the NES, translates to the flow of containers through Sri Lankan ports. It therefor that this segment should get prime focus in line with the logistic hub concept and the excellent geographical location Sri Lanka has on the containerized trades. Next to facilitating trade, the ports sector is an area at which new industries can settle. Especially medium to heavy industries are best located near the ports where logistical advantage can be obtained in the supply of raw materials. In this respect ports and their industry play a vital role in the energy consumption of the country both for power stations, refineries, and industry as well as for imports for consumer markets like refined products such as petrol, gasoline and kerosene. Ports also play a vital role for the food consumption/processing in the country and for the construction sectors. With increased wealth of citizens is it also expected that the roro sector of imported cars will boost. Ports have a role in the tourism sector. Many Sri Lankan ports and cities are worthwhile to visit and to start or end wildlife and or cultural excursions. The cruise industry has discovered the island already, but the industry is only at an "early entrance" stage. Marina's and boat yards are common features when the "boating industry" visionary export sector is developed. Finally,

the port of Colombo should improve its status as maritime city attracting maritime businesses to a lively and vibrant City.

A combination of the National Export Strategy and the excellent position as transhipment hub are highlighted in the National Ports Sector Vision.

Ports vision:
"Sri Lanka will have leading ports in the Indian Ocean, Middle East and East African whilst developing the Nation through new networks of efficient logistic corridors to support development of key import and export sectors".

This vision statement emphasises that the transhipment hub position on maritime trades is to be maintained and enhanced. It also encompasses that the ports maritime strategy should focus on facilitating logistics efficiently and innovate through applying new technologies. Further the ports should focus on attracting sustainable investments supporting the nation and the national export strategy. Finally, the strategy is to become an international well recognized maritime centre.

A few elements are highlighted in this vision statement:

- **Transhipment hub** – The ports sector will focus on maintaining leadership in the transhipment business by a world class transhipment hub at Colombo, serving the Middle East, East Africa, India, Pakistan and the Bay of Bengal;.
- **The Logistics Hub** – The steps towards becoming a logistics hub involves identifying strengths, identifying potential markets and business and attracting those utilising the full capacity of SLPA and the government.
- **Sustainable ports** – The ports in Sri Lanka will become sustainable through sustainable investments and introducing "green" concepts in a safe working environment.
- **Maritime Centre** – The port of Colombo is to become a well recognized international maritime centre, offering services to the maritime industry.

Ports Mission statement:
"SLPA facilitates economic opportunities for Sri Lanka by creating a competitive, knowledge-based and industry-accumulated port environment utilising Sri Lanka's strategic advantages in the maritime trade."

This mission statement expresses SLPA's reason of existence by aligning the organisation's mission with that of the nation. SLPA ultimately provides the economic gateways to the country in the form of its ports and is thus subject the nation's greater economic strategy but is also central in the local function for a region.

A few concepts highlighted in this vision and mission statement are:

- **Trade and Economic Opportunities for Sri Lanka** – The ports are the facilitator for the nation's exports and imports in terms of infrastructure, efficient procedures, investment climate and safety and security.
- **Competitive Port** – Sri Lanka should position their ports competitively in relation to other hub ports. The need is there to promote ports and logistics hubs and as a total concept to the outside world. Port competition is mainly focussed on to achieve maximum value and minimal costs for the country. Constant comparison with global leading ports and direct competitiors ensures the organisation is aware of potential improvements.
- **Knowledge Based Port** – Investments in people and technology will ensure sustainable growth.
- **Logistics corridors** – The concept of logistics corridors is applied to facilitate efficient logistics hubs.
- **A role in wealth of the nation** – Each port shall have a function and role to serve the growing wealth of the nation.
- **Accumulated port environment** – Each port will set a growth path for attracting maritime businesses and specifically Port of Colombo is to become a well recognised International Maritime Centre (IMC).

Core Values

The core values whilst striving for the vision and mission are:
"Integrity", "accountability", "reliability", "knowledge-based", "efficiency", "transparency"

Although these words are self-explanatory it will require considerable efforts to achieve these core values. Mind-set needs to be changed and training is required to create similar values at all levels throughout the Port Sector.

Management policies

This reflects the main management policies to achieve the core values.

- Harmonising through IT. Key is to utilise modern technologies to change and harmonize the Port Sector. Digitalisation of processes and the introduction of advanced technologoies create a "smart port".
- Demand oriented. Processes should be demand driven with transparent inputs and outputs.
- Institutional reform. Institutional reform is required to align roles and responsibilities in the sector, to create focus and to create a level playing field.
- Safe, secure and sustainable policies. Ports serve the nation and are the backbone of the Society. Port activities should be safe, secured and contribute to an national sustainable agenda.

Strategies

There are five main strategies derived from these vision and mission statements which encompasses the major components of the port vision and the port mission:

1. Transhipment Hub port strategy
2. Logistics Hub strategy
3. Serving the nation economic growth strategy
4. Sustainable development of ports strategy
5. International Maritime Centre Strategy

Transhipment Hub Strategy "One nation"- "One Hub"

This strategy aims on staying a leader of hubs ports in the Indian Ocean. Port of Colombo ranked 23rd on the global container handling ports in 2016 with a total of 5.7 million TEU handled TEU of which 75% was transhipment cargo. It is the main hub port for transhipment in the Indian Ocean. The geographic position of Port of Colombo near the main East West shipping routes is key in maintaining leadership position. The transhipment in Sri Lanka is focussed at a single Port, Port of Colombo, to benefit from centralization and utilise

the capacities which have been designed for it. Centralisation will provide economies of scale and ensure focused investments. As such the shipping community will be able to act jointly to do want has been done already for many years making Port of Colombo a large transhipment hub. Gateway cargo acts as a corner stone for shipping lines to call at ports and therefore a successful transhipment Hub also should have a significant share on gateway cargo. With ample development space with sufficient water depths and serving the largest consumer markets, the western region, Port of Colombo is to be promoted as National Transhipment port. Multiple ports serving this same transhipment industry would divide the shipping community and will be less efficient for shipping lines which have to serve the western region and like to centralize their operations as much as possible. Although the Port of Colombo has several terminals both in public and private sector, the marketing should be focussed on "One nation" One "Hub". Coordination, cooperation amongst Port Authority, terminals and the port community are required to make the total system efficient and to promote Sri Lanka as a whole and Port of Colombo specifically as transhipment hub. The aim is to focus on "working together" and "act together". With a changing environment in the transhipment business with more competition, larger vessels, and more direct trades, the challenges under this strategy are high.

Logistics Hub Strategy "Becoming an intelligent Logistics Hub"

The Logistics Hub strategy is focussed on creating the business environment to attract logistics to designated areas so-called Dry Ports which have proper connections to the ports. The logistics industry should aim at value added activities in the global production chains. Products can be manufactured and re-exported again. Electrical appliances, household goods, and other consumer market products should be strived for. Through connecting the Ports with these Dry Ports through Corridors an efficient network for the exports and imports is created. Digitalisation of the network will support intelligent logistics. The logistics sector will become attractive through establishment offered trade zones and other trade incentives. Together with trade policies and trade agreements, value added logistics can create Sri Lanka as an export driven nation making efficiently use of the central geographical location in the Indian Ocean and the ample options of connectivity provided by the container line shipping services.

Serving the nation economic growth strategy "Accelerating the economy"

Ports act as "engine" and as a "front-door" for the economic development of the nation. The front-door should be wide open to ensure efficient cargo flows towards the nation and should pave the way to facilitate new exports. Barriers of congestion are to be removed and ports should contribute to the national growth strategy by focussing on specific trades optimising their individual strength and their role in serving the nation as well as the region. The specific trades such as Liquid Bulk, LNG, Dry Bulk, Containers, RoRo each has their characteristics and investments in port infrastructure should well utilised.

Sustainable development of ports strategy "Green and sustainable"

The sustainable component in this strategy comes from the world class ports taking the direction to contribute to a sustainable port environment. The carbon foot print of ports and their facilities is measured and policy is created to (gradually) reduce the emissions and contribute to a cleaner world. The emphasis is to green the port and the port users gradually. In order to understand the effects measurements and monitoring systems should be implemented. It is noteworthy that some private terminals have already taken this direction by implementing electrical RTG as such reducing the emissions.

International Maritime Centre strategy

The Port of Colombo is to become a well recognized as Maritime Centre, a place in which efficient maritime services are provided and which various trade related services and maritime industries are vested. The strategy is to be developed over time. The development of Port City may act as accelerator to this strategy.

Three main "centres" have been identified:

- Centre of trade sectors:
  - Finance / Insurance / Trading & Arbitration
  - Logistics companies
- Centre for port and shipping industries:
  - Shipping and classification societies;
  - Maintenance and Repair
  - Port Technology
  - Bunkering
- Accumulation of supporting industries
  - Education & Training
  - Research & Development
  - Consultancy

Five strategies lead to 21 strategic directions.
The five strategies are displayed in next table with T (Transhipment Hub Port Strategy), L (logistics Hub strategy), N (serving Nation economic growth strategy), S for the Sustainable strategy and C for International Maritime Centre. For each of the strategies the strategic directions are displayed.

There are 21 strategic directions formulated for the port sector based on the five strategies.

T	L	N	S	C	Strategic directions	Strategic tasks
V				V	Leader in Indian Ocean Hub port	Hub port marketing "One Nation", "One Hub" Effective ITT Low handling tariffs Efficient auxiliary functions (like bunkering) Excellent nautical services & safety
		V		V	Improve Colombo as Maritime Centre	Profiling and branding Colombo Port Boosting Ease of Doing Business Creating a vibrant business and living environment Facilitate new business opportunities Provide incentives to attract business Partnership with other IMCs
		V		V	Tourism development	Perform Cruise marketing (incl. home port) Create Cruise terminals with PPP Develop Marina's with PPP
V	V	V	V	V	Supply oriented and timely port development to ensure supply is offered in advance of demand growth	Port Master Planning covering next 30 years with periodic 5 years updates
		V		V	Port investment for primary sectors for the nation and right-fit	Energy sector - Align requirements to port solutions Industry sector – Facilitate existing and new refineries and new industries Fuel supply - Facilitate the growth for fuel supply

T	L	N	S	C	Strategic directions	Strategic tasks
						Food sector – Facilitate grain and fertilisers supply Consumer markets – Facilitate container traffic Construction – Facilitate general cargo and project cargoes Car industry – Facilitate RoRo cargoes
V					New Products and commodities	Facilitate the development of newly traded commodities like Liquid Bulks (LNG and refined), Dry Bulks (Biomass, grains and minerals)
V	V			V	Modernisation of equipment and services	Increase productivity at quays to reduce ship waiting times Invest in new quay and yard equipment Gate automation Workshop systems and support
V	V	V	V	V	Demand oriented	Boost commercial management with focus on PPP
		V			Reform and Self-sustainability	Restructure into business units, commercialize and corporatize (with PPP) Tariff restructuring
V	V			V	Enhance logistics competitiveness	Assign Dry ports with FTZ Modern warehouses and systems
	V			V	Customs efficiencies	Single customs window and risk management
V	V	V		V	Efficiency through digitalisation	Port Community System Digitalisation of information flows, "smart port" technologies Measurements of KPI's and display at dashboards
	V				Serving dry port developments and connectivity	Connect Port with dry ports efficiently through bonded transport
V	V	V		V	PPP	Enhance port environment with PPP to attract world class operators
V	V	V	V	V	Knowledge and education	Ensure education is modern and appropriate for the maritime and port sector, increase women participation
			V		Green port concept	Introduce measurement systems and execute EIAs in early stages of development Prepare carbon footprint and promote emission reduction schemes Facilitate the change in bunkering requirements

T	L	N	S	C	Strategic directions	Strategic tasks
V	V	V	V	V	Safe and secure working environment	Ports will provide safe and secure working environments according to international standards
V	V	V	V	V	Compliance with IMO and SOLAS	Ensure compliance with latest IMO and SOLAS regulations. For example, ISPS, Ballast Waste Management, VGM, and FAL convention
V	V	V		V	Attracting foreign direct investments	Act as landlord for new industrial and logistics areas near ports and along the corridors Participate in trade facilitation legislation Trade policy development Boosting Ease of Doing Business
	V	V		V	Focus on add value and logistics industries	Newly export oriented industry will require new demand from ports in terms of infrastructure and services levels. The port sector will participate in facilitating requirements.
	V			V	Facilitate global production networks	Participate in defining framework of requirements for new industries

International Competitive Position

The conclusion is that the transhipment market is becoming a more competitive market than in the past. Port developments in the end-feeder markets would allow for larger ships and once volumes arise more **direct lines** are likely to populate the services. Meanwhile **competition on the major hubs** in South East Asia also increases though expansion plans at Singapore, Port Klang and Tanjung Pelepas (Together they plan an additional 38.5 MTEU capacity). Finally, **additional competition within the South Asia Hub** through green field port projects at the Indian coast line like Vizhinjam and Colachel (together 11.4 M TEU planned capacity) will offer competition in future. Uncertainty about Hambantota's role as potential transhipment port is also a policy issue.
Luckily the feeder markets are expected to grow so the entire market is still growing. Transhipment hubs can only survive when they offer timely port development for sufficient water depths and quay lengths for the Ultra Large Container Vessels. Port of Colombo, with ample space in South Port for development, is positioned well to take up the challenge to maintain the leadership in the India Ocean. It will however not be won on infrastructure alone, also port efficiency improvements and innovation are key for offering the best services against the lowest prices, required to maintain leadership in the footloose transhipment market. Sri Lanka can stay ahead of the market by timely port development and efficiency improvements driven by innovation and technological improvements and reducing administrative hurdles.

The international position of ports is changing due to the following external maritime trends:

1. International trade growth slows down
2. China's role is slowing down
3. India emerging role?
4. Increased vessel sizes and cascading
5. Alliances and consolidation
6. Changing management models in Ports
7. Technical changes in the maritime shipping industry

8. Digitalisation in the port industry
9. International Port Competition

The international trade slows down

After strongly rebounding from the 2008 Recession, international trade has grown at a sluggish pace that further deteriorated in 2015 according to statistics from WTO. The world trade volumes remained low at a growth of 2.6% (similar to 2015) and expected to rise by 3.6% in 2016.

Per UNCTAD, a substantial part of the drop in international trade was due to nominal factors, principally the fall in the price of commodities and the overall appreciation of the United States dollar. Weaker demand also played a role, especially in East Asia and in other parts of the developing world. Although the largest decline occurred in commodity sectors, the value of trade also contracted in all manufacturing and agricultural sectors. Declines in the value of trade were also observed in the service sectors. The trade collapse of 2015 affected all geographic regions. In general, trade flows of developing countries registered a sharper downtrend relative to the last trade collapse of 2009. South–South trade performance was also weak, largely driven by lower East Asian imports. In terms of export performance, countries in East Asia generally fared relatively better.

The role of China in feeding maritime trades is slowing down

In particular, China emerging role in international trade cooled down due to slower GDP growth of 6.9% compared to double digits' growth over several years between 1990 and 2010. The centralised economy is slowly focussing more on internal development rather than export focussed resulting in less seaborn trade. China's role in global merchandise trade had become rather dominant with a share in world imports from 1% in 1980s to 10% in 2014 and to 12% share in world exports. The shift in trade flows to/from the East Asia has resulted in the emergence of mega scale ports in Asia. In 2015 9 out of the top 10 ports were from Asia compared to only 4 in 1980. The World Bank outlook for the East Asia and Pacific region is projected to grow at 6.2 % in 2017, and at a slightly lower 6.1 % on average in 2018-19, in line with previous forecasts. A gradual slowdown in China is offsetting a continued modest pickup in the rest of the region, led by a rebound in commodity exporters and a gradual recovery in Thailand. Growth in commodity importers excluding China is projected to remain robust, as stronger exports will offset the negative effects of eventual policy tightening on domestic demand. Downside risks are mainly external. They include heightened policy uncertainty and increased protectionism in key advanced economies, and the risk of an abrupt tightening of global financing conditions. A sharp slowdown in China is a low probability risk, but it would have major negative consequences for the main East West trades on which Sri Lanka performs considerable transhipment volumes today.

India's emerging role is at the door step

The Indian Port strategy is to bring manufacturing areas closer to ports as it has been estimated that India can save upto USD 28 billion in infrastructure investment and another USD 3.3 billion in transportation costs if 50% of overall trade moves closer to ports by 2020. The Indian government plans to develop 10 coastal economic regions as part of plans to revive the country's Sagarmala (string of ports) project. The zones would be converted into manufacturing hubs, supported by port modernisation projects, and could span 300–500 km of the coastline. The government is also looking to develop the inland waterway sector as an alternative to road and rail routes to transport goods to the nation's ports and hopes to attract private investment in the sector.

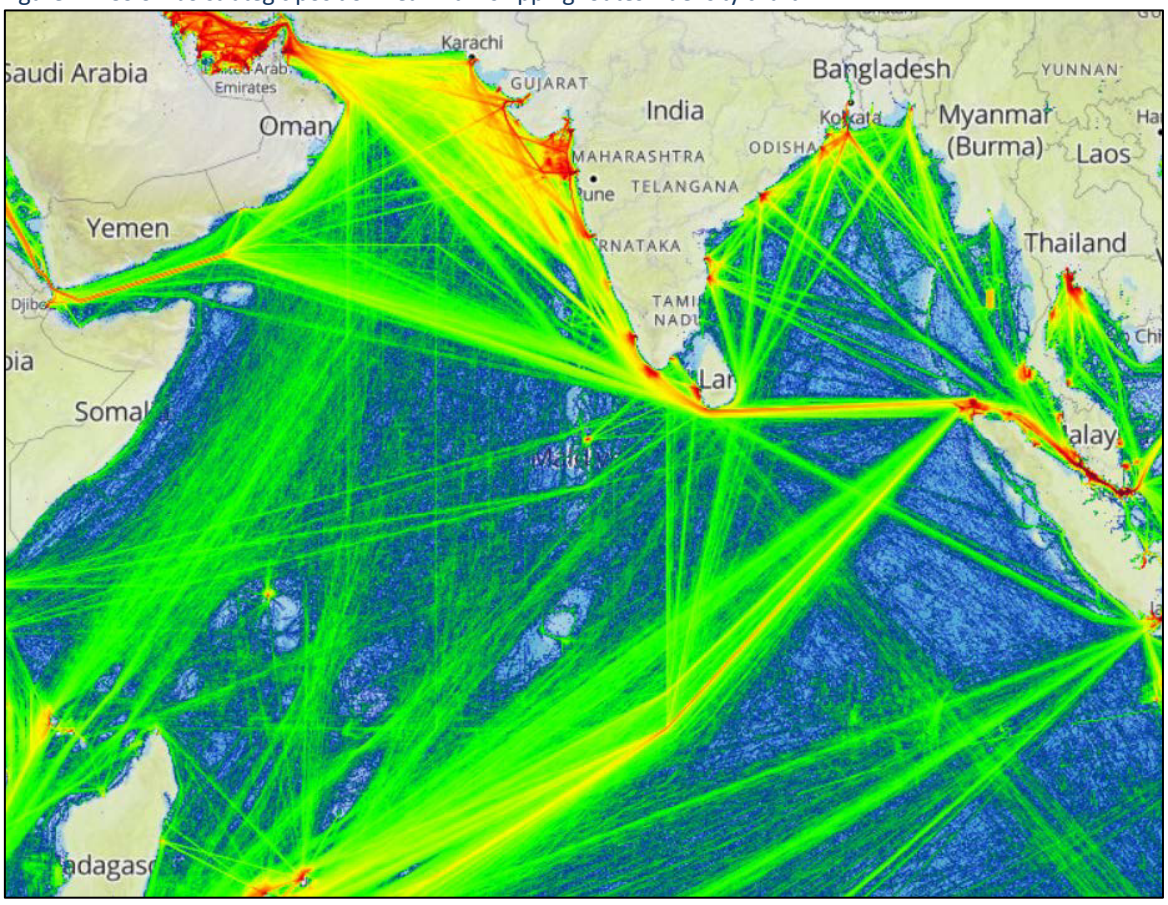
The strategy includes upgrading and expansions of ports with 39 million TEU roughly equally divided for East, West and Southern regions. The conclusion is that India is strongly preparing the port and transport sector to facilitate export growth through new developed industrial zones closer to ports. With respect to coastal shiping the abolishment of cabotage legislation may attract foreign shipowners performing on domestic transhipment

around indian coast. Due to the existing infrastructure issues and long haul distances to existing production sites it will take time before India's economy becomes a leading economic exporter like China is today.

International Shipping and Transhipment

Transhipment of containers is a core activity at the port of Colombo. Transhipment cargo amounts to approximately 75.0% of all containers handled. In 2015, the port handled about 5.1 M TEU. The transhipment volume of approximately 3.8 M TEU is mainly captured due to the strategic position of the port, proximate to the main East-West Shipping lanes and close to feeder destinations along the Indian coastline and Bay of Bengal. It has adequate water depth and container facilities to handle the largest vessels in the global container trades.

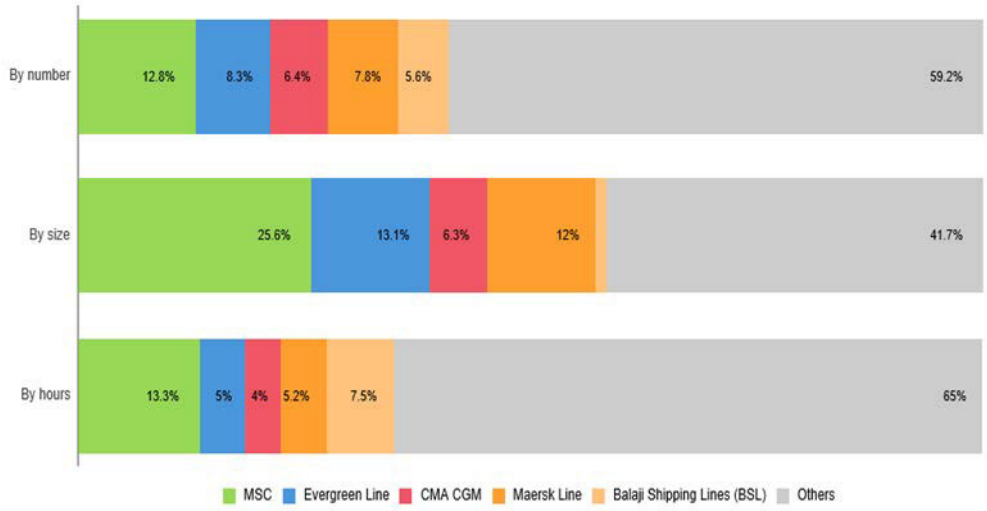
Figure 1-1 Colombo strategic position near main shipping routes – density chart



Colombo is used both for transhipment of containers from mother vessel to mother vessel (relay activities), and for transhipment from mother vessel to smaller feeder vessels. The latter is the traditional transhipment case. In this case, a hub-and-spoke system is applied, with feeder vessels distributing containers to destinations with insufficient draft, such as destinations on the East and West coasts of India, the Maldives, Bangladesh, Myanmar, and Pakistan. The relay business has increased considerably in the recent past. Main regions, such as the Middle East, East Africa, and the Indian West coast are served when the main westbound services, originating from South East Asia or the Far East, relay their cargo to the eastbound services originating from the US East Coast, Europe, and Middle East. It should however be noted that transhipment trade is "foot-loose". This means that the activity of transhipment can be moved to other ports should the shipping line wishes to concentrate its transhipment somewhere else along the shipping chains. At the same time the tariffs for transhipment handling are low compared to gateway cargo handling simple because of this competitive

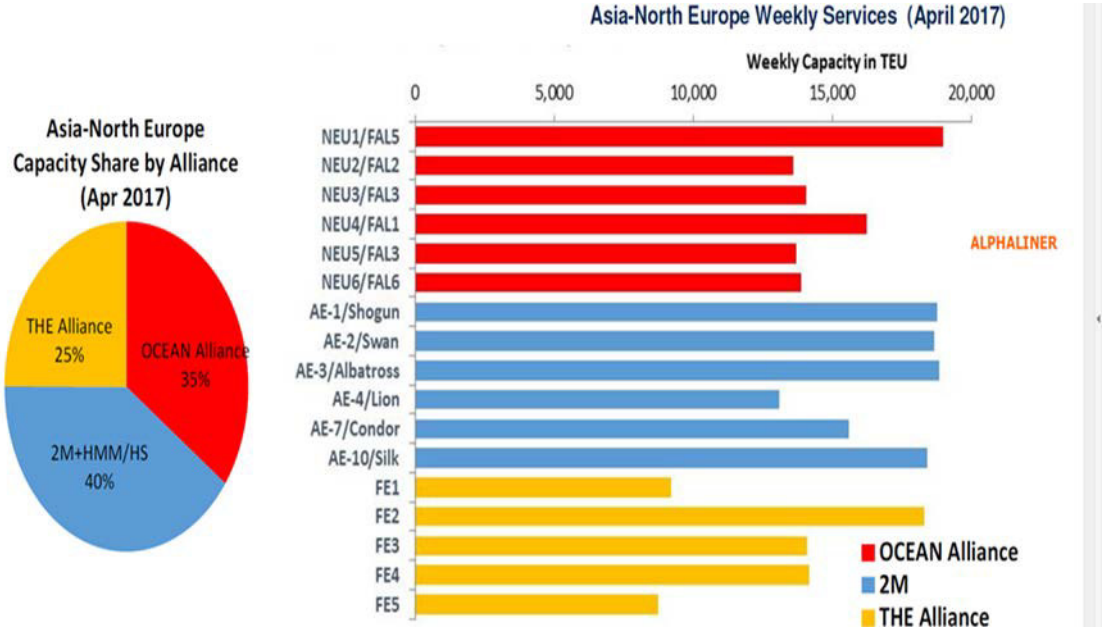
edge. This also stresses that the efficiency of handling and other service elements play a role in the competitive profile of a transhipment port.

Out of the 17 East-West Services Colombo only receives 3 of the main services performed by the Ultra Large Container Vessels.



Source: Alphaliner

MSC is the largest operator in Port of Colombo by number of calls and by average sizes.The three main East West services are the NEU6, AE-1 and the FE5 displayed in the picture below.

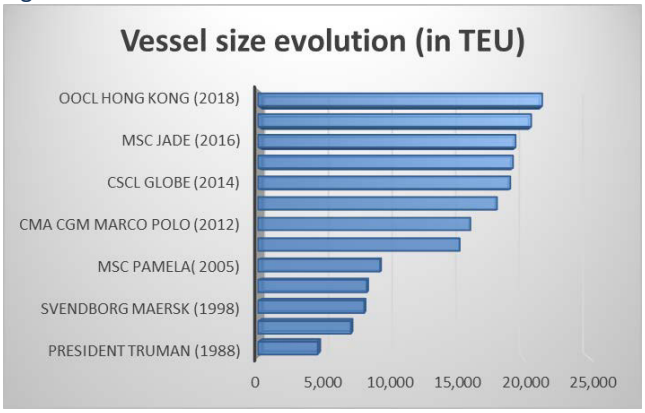


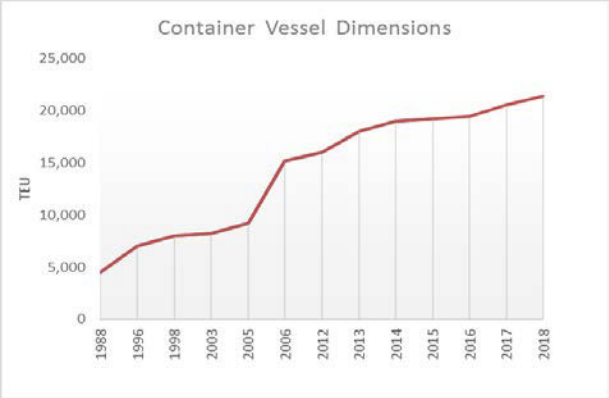
Vessel sizes continue to increase rapidly

The trend towards larger vessels sizes is caused by the cost focus of shipping lines. They maximise economies of scale and reduce unit costs through applying larger vessels. The fact that growth of the global economy has been limited contributed to lower demands and lower freight rates. This again urged shipping lines to excel in ordering larger units to save fuel through technological improvements and to further reduce unit costs. Larger vessels also have implications for the port design as larger depths are required and bigger and more cranes are needed to maintain a competitive level of efficiency. Also, the stacking area and the hinterland connections faces new challenges as huge quantities have to be moved in short time frames.

The typical large container vessel increased from 3,000 TEU in 1980 to the "EMMA MAERSK" of 15,000 TEU in 2006, the MAERSK McKinney MØLLER of 18,000 TEU vessels (Triple E-class) in 2013, and in 2017 the vessel MAERSK MADRID of 20,568 TEU. The latter is part of the new Triple E – II-class which have a dimension of 400m*58m*16.5m (LOA, Width, Draught) and are especially designed for the Far East - North Europe trade. The largest vessel today is OOCL Hong Kong with 21,400 TEU and a dimension of 400m*58.8m*16m.

Figure 1-2 Vessel size evolution





The cascading trend (the newest, largest vessels replace the current vessels on the main trade lanes, the vessels being replaced will in turn replace smaller vessels on other trade lanes), also impacts the Sri Lankan ports. The Indian West coast has seen massive improvements in vessel sizes as more direct trades became feasible due to available ships. The vessel size increased from 3,000 TEU to 4,000 TEU towards 7,000 TEU. In Colombo vessel sizes also increased rapidly. The port accommodates the world largest vessels in South Port upto 22,000 TEU and has noted increased feeder vessel sizes as well.

Alliances and consolidation are changing the power scene on the shipping lines

The East-West container routes, including the North Europe and the Mediterranean - Far East trades, are dominated by the so-called East-West Alliances. Several years ago, there were more than six alliances including the New World Alliance and the Grand Alliance. Presently there three major alliances left, their carriers are (short names, in alphabetical order), all visualised here below:

Thus, effective July 2017, the now 10-carrier Alliances scene (instead of 16 in 2014) will look as follows:

- 2M+ Hyundai, Maersk Line, MSC
- Ocean Alliance CMA CGM/APL, COSCON, Evergreen, OOCL
- THE Alliance Hapag-Lloyd/UASC, Hanjin*, Yang Ming and ONE ("K" Line, MOL, NYK)

** Hanjin Shipping went into financial default at 31st of August 2016.*

ONE ("K" Line, MOL, NYK) starts operations by April 2018.

Next to the 10 Alliance members on the East West trades there still exist four shipping lines outside the alliances namely; Hamburg Süd (acquired by Maersk), PIL, Wan Hai and ZIM.

The consequence of the mergers is that more combined services are offered, generally speaking leading to less services with larger vessels. Also, the port bargaining power changes due to the alliances becoming larger and fewer. Finally, there is a stronger relationship between the shipping lines and the global port operators than in the past. Many shipping lines have (through their parent) a tie with a network of terminals. For example, the AP Møller group owns APM Terminals and Maersk Line, CMA CGM owns Terminal Link, and

COSCO owns Cosco Pacific as terminal group. Next to these shipping line terminal operators there are independent terminal operators such as for example PSA, DP World, Eurogate and ICTSI.

For Sri Lankan ports the consolidation of shipping lines is important as each alliance like to concentrate its shipping network at selective terminals, in order to optimise their network costs. Whenever feasible, the alliance members will focus on terminals calls at members of their own network of port operators.

Changing management models in Ports

Globally the trend towards more specialisation of cargo handling, combined with larger vessels, and capital constraints at Port Authorities, have changed the land scape for port authorities to allow more private involvement in cargo operations. The trend supports the general perspective that private companies are better equipped and more efficiently organised. Meanwhile large labour forces in traditional ports have been restructured to address the change towards privatisation. Generally, speaking this trend has continued since the 1990s and resulted into a move from central led and operated port authorities in a "service port concept" to a "landlord model" in which a split was made between regulation, facilitation of trades and the operational function of cargo handling.

This is illustrated in next graphics.

Port management model	Private Sector	Regulation	Infra	Super-structure	Equipment	Labour	Nautical services
0. Public service port (as is)	Zero	Public	Public	Public	Public	Public	Public
1. Landlord + private terminal	Medium	Public	Public	Private	Private	Private	Public or private

The main advantage of landlord models compared to service ports is that the State often has no influence on the day to day operations or regulations. The landlord port authority acts as landowner (mandated by the state) and as regulator through a port act (mandated by the state). Another advantage of landlord models is that private investors can develop and operate specialised terminals under concession contracts. In this way the industry specialists become active in the port and the Port Authority has the ability to own and create the land, set the port regulations and national tariff on marine services and perform the auxiliary functions when they are not outsourced to private sector as well.

Moreover, Government controlled Port Authorities have moved into corporatisation and even privatisation as well. In the latter, often the Government shareholding is still majority, but the Port Authority has become a company under the state companies acts.

Technical changes in the maritime shipping industry

Through conventions of the International Maritime Organisation and SOLAS several important changes are faced by the shipping industry such as:

1. Ballast water management
2. Emission reduction
3. Verified Weight Measurements

Ballast water management

IMO's Ballast Water Management will come into force in September 2017. This convention enjoys the accession of 52 parties and involvement of 35 percent of the global merchant shipping tonnage. It requires all ships of 400 gross tonnage and above (including all existing vessels except floating platform, FSUs and FPSOs) to possess International Ballast Water Management Certificate (IBWMC). The time consumed in terms of ballasting and deballasting are considered as unproductive times for ships.

Emission reduction

IMO's regulation Annex VI for reduction of air pollution (including SOx, NOx, Particulate Matter, and Green House Gases) is another influential trend that has the potential to develop restrictions and incur huge costs in the industry.

Verified Weight Measurements

The International Maritime Organization (IMO) has amended the SOLAS (Safety of Life at Sea) convention under regulation 2 of chapter VI which mandates the declaration of the Verified Gross Mass (VGM) of a packed container before loading on board vessels within a prescribed cut-off date / time to the shipping line and / or port terminal authorities. Effective 1st July 2016, the regulation stipulates the use of two approved methods to declare the VGM for each container by the shipper or his representative. The first is through weighing the box including content or alternatively the content is weighted and the tarra of the container is added. This regulation has increased the demand for weighing points in the port and terminals.

Digitalisation in the port industry

Digitalisation in the port industry is the upcoming trend. Many ports in the world have implemented either Electronic Data Exchange **(EDI)** for transfer of point to point communication. The FAL convention makes it mandatory by 2018 to implement digital communication between ships and port authorities under the **FAL convention**. Several ports have implemented a **Port Community system** which allows EDI communication in a single window between multiple parties simultaneously and sharing data amongst parties. Samples are Port of Singapore, South Korea, The Netherlands and so on.

The next focus is to increase digitalisation across the supply chain. Port Authorities like Port of Rotterdam develop the SMART port concept in with port users are connected through SMART applications on mobiles phones, tablets etc through the use of **Internet of things**. Related this are the latest developments around **Blockchains.** The latter reflects keeping data on the cargo in a secured chain to which allows full control on status, quality information and payments along the chain.

Additional information on Port Community Systems is displayed in a separate chapter.

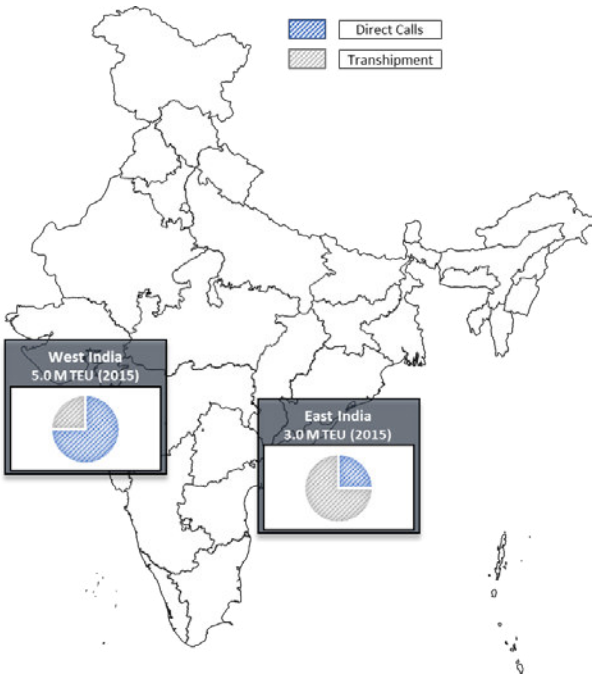
International Port Competition

Sri Lanka is an important regional maritime hub, due to its strategic position near the East-West trade routes. Currently, Sri Lanka – through the port of Colombo – mainly serves as a hub for cargo destined for other nations in the Indian Sub-Continent. However, several recent and planned developments put pressure on Sri Lanka as a maritime hub. The table below provides an overview of Sri Lanka's key strengths, weaknesses, opportunities, and threats concerning its competitiveness as a maritime hub.

Strengths • Geographically strategic situation near the main East – West trade routes • Strategically situated to serve countries in the Indian Sub-Continent • Substantial water depths near the coastline • Transhipment tariffs at Colombo are competitive compared to other regional hub ports	**Weaknesses** • Broad maritime sector and related services are less developed than competitors, such as Singapore
Opportunities • Rapid growth of demand in Indian Sub-Continent countries • FDI on maritime silk route • Consolidation point for draft limited ports in Bay of Bengal • Attract new industries through FDI	**Threats** • Development of deep-water ports in India and Bangladesh • Development of transhipment hubs in South East Asia and the Middle East • Improvement of Maritime Policies in India

The three identified threats are further discussed below.

Development of Ports in India and Bangladesh.
India and Bangladesh are Sri Lanka's main transhipment destinations, as their ports traditionally have not been able to accommodate mainline vessels due to lagging port infrastructure. However, ports in India and Bangladesh are slowly being developed, posing a threat to Sri Lanka's position as regional hub.



In 2015, total containerized throughput in Indian ports amounted to approximately 8.0 M TEU, of which 5.0 M TEU was handled at Western Indian ports.

With the development of Jawaharlal Nehru Port (JNP; also known as Nhava Sheva), which handled approximately 4.5 M TEU in 2014-2015, and the second largest port, Mundra (1.75 M TEU), the dependence of Western Indian states on transhipment has substantially declined. Consequently, the share of transhipped containers handled at Western Indian ports dwindled to 25% in 2015.

Currently, East India and Bangladesh are still dependent on transhipment, as adequate deep-water port infrastructure is lacking. However, with several port projects planned in India and Bangladesh, transhipment potential for the Indian Sub-Continent may further deteriorate. Inter alia, the following Greenfield deep-water port projects have been identified:

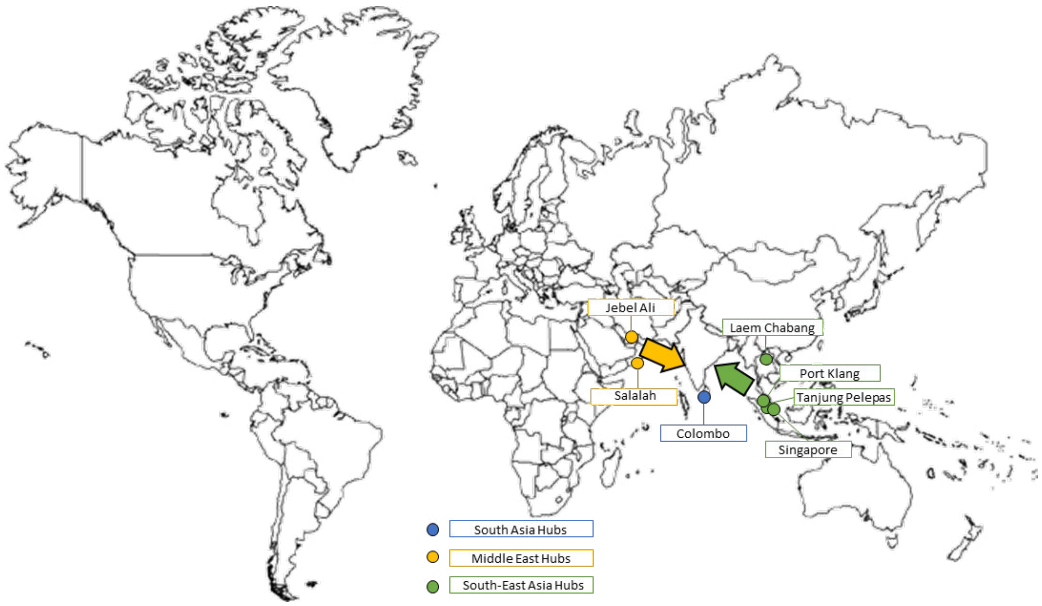
- India
  - Colachel / Enayam port

- Vizhinjam port
- Bangladesh
  - Sonadia port
  - Payra port

Development of Regional Transhipment Hubs

Sri Lanka's competitive field for serving the Indian Sub-Continent has developed substantially over the last decade. The figure below provides an overview of Sri Lanka's competitive field; the following can be observed:

- Broadly speaking, there are 3 hub port groups in the region; the Middle East hub group, consisting of Jebel Ali and Salalah; the South Asia hub group, consisting of Colombo; and the South-East Asia hub group, consisting of Singapore, Tanjung Pelepas, Port Klang, and Laem Chabang.
- Due to the strong development of the Middle Eastern hub ports, Sri Lanka's market share for transhipment to Western Indian ports has declined.
- For East India's market share, Sri Lanka mainly competes with Southeast Asian ports, such as Singapore, Tanjung Pelepas, and Laem Chabang. Currently, Sri Lanka is the most dominant player for serving the East Indian market. However, several large-scale development plans, such as Singapore's new Tuas Terminal project, may put further pressure on Sri Lanka's Transhipment ambitions.



The table below presents the throughputs of the hub ports depicted above, as well as the ports' compound annual growth rates for the period from 2011 to 2015.

Table 1-1 Competitive Container Hub Ports

Port	Unit	2011	2012	2013	2014	2015	CAGR (%)
Middle East hub ports							
Jebel Ali	M TEU	13.0	13.3	13.6	15.3	15.6	4.66%
Salalah	M TEU	3.1	3.6	3.3	3.0	2.6	(4.30%)
Khalifa	M TEU	-	0.8	0.9	1.1	1.5	n/a
South Asia Hubs							

Colombo	M TEU	4.3	4.2	4.3	4.9	5.2	4.87%
South East Asia Hubs							
Singapore	M TEU	29.9	31.6	32.2	33.9	31.0	0.91%
Port Klang	M TEU	9.6	10.0	10.4	11.0	11.9	5.52%
Tanjung Pelepas	M TEU	7.5	7.5	7.4	8.2	9.1	4.95%
Laem Chabang	M TEU	5.7	5.9	6.0	6.6	6.8	4.51%

Subsequently, the table below presents several identified expansion plans for Colombo's current competing hub ports, as well as plans for Greenfield ports aimed at handling transhipment cargoes to Colombo's main feeder markets.

Table 1-2 Competitive Container Hub Port Development Plans

Port	Unit	Current Capacity	Future Capacity	Capacity Increase
Middle East Hub Ports				
Jebel Ali	M TEU	19.0	22.1	3.1
Salalah	M TEU	5.0	7.5	2.5
Khalifa	M TEU	2.5	15.0	12.5
South Asia Hub Ports				
Vizhinjam	M TEU	-	3.4	3.4
Colachel	M TEU	-	8.0	8.0
South East Asia Hubs				
Singapore	M TEU	35.0	65.0	30.0
Port Klang	M TEU	16.6	18.6	2.0
Tanjung Pelepas	M TEU	10.5	17.0	6.5

Sri Lanka Ports and their functions

Port Sector Overview

Sri Lanka's port sector comprises several ports around the island, including Colombo Port, Galle Port, Trincomalee Port, Hambantota Port, Oluvil Harbour, Puttalam Jetty, Point Pedro Port and Kankesanthurai Harbour.

The country's three largest ports (shown in the figure on the right) are:

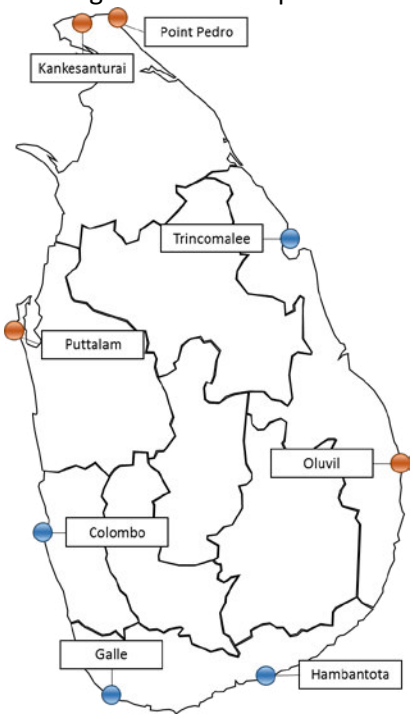
- Colombo Port, situated on the West coast of Sri Lanka;
- Hambantota Port, situated on the South coast of Sri Lanka; and
- Trincomalee Port, situated on the East coast of Sri Lanka.

The country's other ports[1] include:

- Galle Port, situated on the South-West coast of Sri Lanka;
- Puttalam Coal jetty, a small port on the West coast;
- Kankesanthurai (KKS) and Point Pedro on the Northern coast; and
- Oluvil on the East coast.

The Sri Lanka Ports Authority (SLPA) acts as the national port authority and has a hybrid role in the country's port sector. The SLPA simultaneously fulfils the following 6 roles:

1. Landlord – The SLPA has conceded several terminals in Colombo port under a landlord PPP structure.
2. Service Port – The SLPA provides port services, such as warehousing, support services, and administration.
3. Cargo handler – SLPA is cargo handler or stevedore and owns and operates container terminals and multi-purpose or common terminals in the ports of Sri Lanka.
4. Regulator – As regulator, the SLPA provides licensing services and sets the regulations for the ports.
5. Harbourmaster and marine service provider in all Sri Lankan ports
6. Port planner and port developer – SLPA plans, constructs and develops ports in Sri Lanka



The table below shows the current usage in Sri Lankan ports with respect to cargo- and passenger handlings.

[1] Fishery ports in Sri Lanka comes under the Ministry of Fisheries & Aquatic Resources and do not fall under SLPA, hence they are not mentioned here.

Table 1-3: Functional Overview Ports Current usage

Port	Container Transhipment	Containers	RoRo	Break Bulk / General Cargo	Dry Bulk	Liquid Bulk	Passengers
Colombo	X	X	X	X	X	X	X
Trincomalee				X	X	X	X
Hambantota			X	X		X	X
Galle				X	X	X	X
KKS				X			
Oluvil				X			
Puttalam					X		

In terms of port throughputs on gateway cargoes, Colombo Port is the most important port with 77% of all cargoes handled.
Including transhipment, the Port of Colombo has a total market share of 88% within Sri Lanka.

Table 1-4: Port Gateway Throughput (million Tons)

Port	Gateway Container	Coal	Wheat Maze	Cement / Clinker / Fertilisers	Crude Oils	Refined Oils	Other Liquid	Vehicles*	General Cargo	Total Per Port	*Share of Total*
Colombo	14.20	-	.19	2.19	.31	1.69	2.87	.19	.05	.71	**22.39**	*77.7%*
Trincomalee	-	.10	.87	2.24	-	-	.28	-	-	-	**3.49**	*12.1%*
Hambantota	-	-					.03			.33	**.35**	*1.2%*
Galle	-	-	-	.77	-	-	-	-	-	-	**.77**	*2.7%*
KKS	-	-	-	-	-	-	-	-	-	.03	**.03**	*0.1%*
Oluvil	-	-	-	-	-	-	-	-	-	-	**-**	-
Puttalam	-	1.79	-	-	-	-	-	-	-	-	**1.79**	*6.2%*
Total Per Commodity	**14.20**	**1.89**	**1.06**	**5.20**	**.31**	**1.69**	**3.17**	**.19**	**.05**	**1.06**	**28.83**	*100.0%*
Share of Total	*49.3%*	*6.6%*	*3.7%*	*18.0%*	*1.1%*	*6.0%*	*11.0%*	*0.7%*	*0.2%*	*4.7%*	*100.0%*	

*Transhipment of containers and vehicles are not considered in the total port throughput.
Source: SLPA

The number of vessels at the port of Colombo is 88% of all vessel arrivals in Sri Lanka. These vessels are dominantly commercial traded vessels handled by the cargo terminals. The ship repair segment only handled 50 vessels in 2016 or 1%. The total number of ships that took bunkers is around 35. The table illustrates that ship repair and bunkering are today relatively small markets.

Table 1-5: Ship Arrivals 2016

Port	Cargo Ships	Ships for Repair	Ships-bunkering	Other Ships	Total Arrivals
Colombo	4,280	46	29	50	**4,405**

Port	Cargo Ships	Ships for Repair	Ships-bunkering	Other Ships	Total Arrivals
Trincomalee	207	1	4	4	**216**
Hambantota	273	1	-	7	**281**
Galle	83	2	2	9	**96**
KKS	25	-	-	-	**25**
Oluvil*					
Puttalam*					
Total Arrivals	**4,868**	**50**	**35**	**70**	**5,023**

Source: SLPA

*No data available

Port of Colombo

General

Colombo is located on the West coast of Sri Lanka and is country's principal city and port. The port handles containerized cargoes, liquid bulk (crude oil and refined products), dry bulk (mostly grain and cement), general cargoes (mainly steel products, timber and RoRo) and cruise passengers. It is located near the main East West shipping routes and has become a major port for gateway cargo and transhipment of containers. The port covers three large containers terminals and has another one under development. Transhipment of containers accounts for approximately 75% of Colombo's total container traffic; the remaining 25% comprises local containerized cargo, driven mainly by exports of garment, tea, and rubber, and imports of consumer products, industrial and agricultural equipment. Whilst there is almost no effective competition for domestic cargo, Colombo competes with several major hub ports for transhipment traffic. In this segment, the port has benefitted from its strategic location, both close to the main east-west trade and close to the large and strongly growing Indian market.

The port handled 81.8 million tons in 2016 including 5.7 million TEU of containers. In 2016 the port had about 4,405 ships arrivals and was ranked as 23rd largest container port in the world. The port handles the largest container vessels in the world having dimensions of 400m in length and a capacity of 21,500 TEU due to quays with ample water depths of CD -18m and state of the art terminals.

The port was developed along the natural bay at the city and the old basin covers about 201.5 ha. A major expansion program has resulted in the development of South Harbour which came into operation by 2013. The new port basin consists of one state of the art terminal container terminal (58ha) and another container terminal that soon will be launched. The basin has space for a third container terminal and a liquid terminal.

Additionally, to handling imports, exports and transhipment, the Port of Colombo offers non-cargo services including harbour master services, pilotage and tugging, bunkering, ship repair, warehousing, water supply, weighing and scanning services, firefighting, hospital services, financial services and ship chandlery. Also, the navy is situated within the port limits. To the north of the port a maritime training institute is situated.

The port of Colombo is important for the nation and facilitates the majority of the import and exports trades today. The city is under large developments with the erection of many new hotels and resident flats and rehabilitation of historic buildings. Further, a new city port development, south of the existing port, including hotels, conference centres, residential flats, shops and marinas is under development. The new port city will be connected through an elevated highway which also creates additional port access. The western region has several plans for city and urban developments and improvements. Combined, the western region

developments and the city of Colombo generate high demands for the port of Colombo. This translates to required port improvements, a new cruise terminal, enlarged connectivity and major future port planning both for containers as well as for liquid bulk and multipurpose. Additional demand for warehousing and logistics needs to be captured in future planning as well.

Figure 1-3: Map Port of Colombo

	UCT	JCT	CICT	SAGT	PVQ	South Jetty	New North Pier	Colombo Dockyard	Slipway	JCT Feeder Berth	New Feeder Berth	Coastal Berths	Bandaranaike Quay	Sydney/Melbourne	Passenger Berth	Water Supply	Canal Berth	ECT	Dolphin Tanker Berth	Cement Storage	Warehouses	Weighing &	Hospital	Fire Brigade	Training Centre	Tug & Pilot Station
Number on Map	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*Not Indicated on Map*					
Containers	■	■	■	■						■	■							■								
Ro-Ro	■																									
Dry Bulk					■															■						
Liquid Bulk						■													■							
Gen. Cargo					■		■						■													
Passengers															■											
Ship Repair								■	■																	
Navy												■														
Auxiliary														■		■	■				■	■	■	■	■	■

Hinterland Connectivity

The port is characterised by an internal road network of four lanes (two lanes in both directions), leading to the main exit gate to the north. The port has a total of eight gates of which three are used for cargo. The maximum allowable height is limited (4.2m) by a bridge near the main administration building or 4.5m near main exit gate. Over-height cargoes are moved outside the port through customized route-solutions. A new elevated highway is planned on top of the existing port access road. The port will be connected to the highway with dedicated ramps.

The only rail connection with the port is a single track to Bandaranaike East Quay (13 on map). The rail connection is only used for the import of rail wagons into the country but currently this rail is not operational. The port has no rail connection to the Colombo South Port.

Cargo Traffic

The port of Colombo is the largest port in Sri Lanka with about 8 million tons handled per annum excluding containers. Between 2005 and 2015 the CAGR on "non-containerised cargo" was 1.1% per annum. Over the last ten years the dry bulk grew by 1.6%, and the liquid bulk by 1.3%. The non-containerised general cargo declined by 0.2%. The 2015 share of break bulk was 14%, the dry bulk represented 29% and the liquid bulk 57%. Imports of Ro-Ro and transhipment of Ro-Ro cargo in Colombo has been phased out towards Hambantota as the latter port has ample space available for this type of commodity.

Table 1-6: Throughput Bulk Colombo 2007-2016

Tons '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Non-containerised General Cargo	1,048	838	649	627	722	618	364	601	1,113	879
Dry Bulk	2,257	2,565	2,097	2,556	2,620	2,709	2,657	2,444	2,344	2,572
Liquid Bulk	4,264	4,068	4,026	4,159	4,565	4,839	4,265	4,420	4,579	4,746
Total	**7,568**	**7,471**	**6,772**	**7,341**	**7,906**	**8,165**	**7,286**	**7,465**	**8,036**	**8,197**

Table 1-7: Throughput RoRo Colombo 2007-2016

Vehicles in units	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic	30,047	21,875	6,732	45,779	90,824	38,886	6,651	21,296	71,738	31,888
Transhipment	10,065	2,154	4,973	2,455	993	183	466	-	13	778
Total	**40,112**	**24,029**	**11,705**	**48,234**	**91,817**	**39,069**	**7,117**	**21,296**	**71,751**	**32,666**

Containers are dominantly handled at Colombo port with so far only sporadic exemptions at other ports. Containers are the main cargo at the Port of Colombo in terms of volumes handled. In 2016 about 5.7 million TEU was handled. A large part of this volume is transhipment (about 75%) which means that these boxes are transferred between ships to reach their destination. The gateway containers amounted to 25% or 1.3 million TEU which consists of imports and exports. About 82% of all containers handled are laden containers. The remainder 18% are empty containers handled. In the past decade, the gateway throughput grew with 4.9% and transhipment throughput with 5.8 % (CAGR 2007 – 2016).

Table 1-8: Throughput Containers Colombo 2007-2016[2]

TEU '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gateway	803	813	752	932	1,047	1,020	1,032	1,127	1,218	1,300
Transhipment	2,469	2,785	2,633	3,096	3,124	3,065	3,208	3,700	3,888	4,355
Total	3,272	3,599	3,385	4,028	4,171	4,085	4,240	4,827	5,106	5,655
Tonnage Handled (million tons)	35.9	40.5	39.6	51.4	54.1	53.5	56.2	63.3	65.7	73.7

Marine Traffic

Table 1-9: Marine Traffic Port of Colombo

Ship type, no of ships	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Container	3,628	3,666	3,304	3,076	3187	3,092	3,142	3,239	3,643	3,804
Conventional	173	205	140	56	68	52	38	28	45	40
Other cargo	421	458	474	616	680	591	354	366	388	436
Ships for repairs	44	49	48	47	30	35	36	38	43	46
Ships-bunkering	12	21	106	68	65	51	50	25	30	29
Other ships	48	25	42	47	94	49	47	46	48	50
Total Ships Arrived	4,326	4,424	4,114	3,910	4,124	3,870	3,667	3,742	4,197	4,405

Port of Trincomalee

General

The port of Trincomalee comprises several scattered facilities in China Bay, a natural deep-water bay (up to 20m) on the North-Eastern side of the country. The port was originally used as a naval base. Additionally, the port comprised the country's main tea export facility (tea was handled at the Tea Traders Association (TTA) facility, as indicated on the map), after the institutional setting of Colombo port changed with the establishment of the Port Cargo Corporation (prior to the introduction of this port authority, the port was operated as a tool port). In the Northwest corner of China Bay a common fish port is located. Finally, the Mud Cove facility acted as a regional maintenance and repair facility, providing a slipway and workshops. The introduction of night navigation shall enlarge the accessibility and capacity of the port.

The naval base is operational and the SLPA managed TTA facility and Ashroff Jetty are currently used for imports of coal, clinker, and gypsum and general cargo, most of which are destined for a cement plant. Sometimes the Ashroff quay is also used a Cruise berth.

Besides SLPA managed facilities, the China Bay comprises several private waterfront facilities. The three main private waterfront facilities comprise:

- Tokyo Cement Milling Facility – a cement mill with a jetty that is used to import clinker to produce cement.

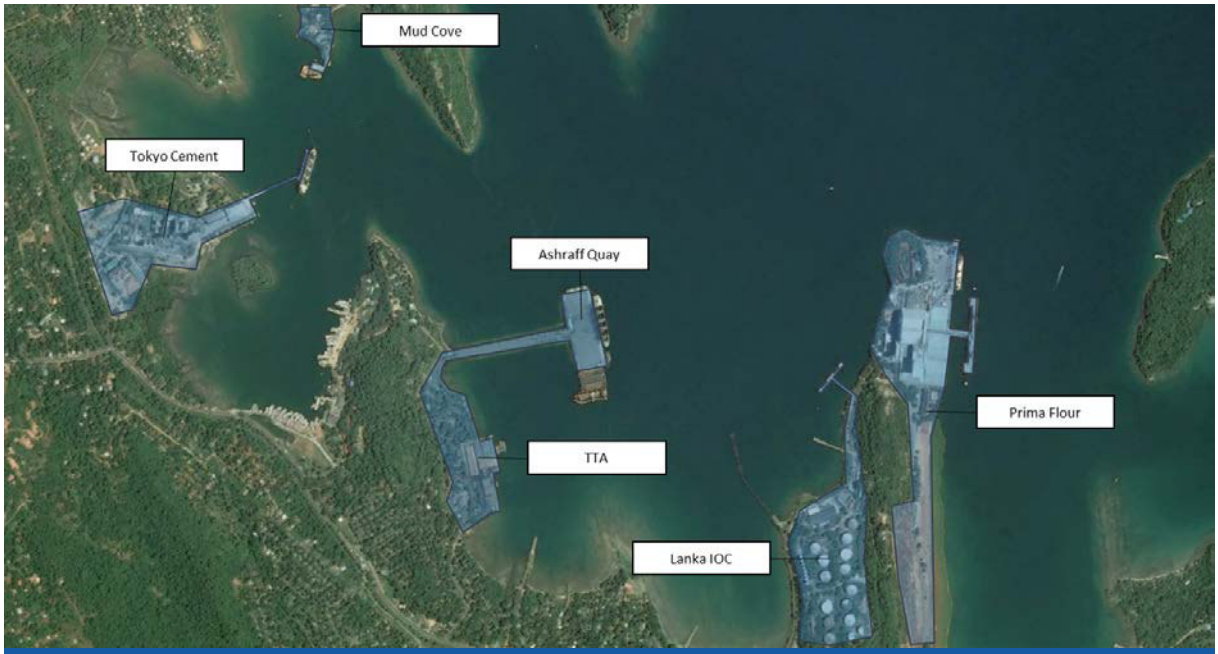
[2] Data is excluding re-stowage

- Prima Flour Milling Complex – a flour milling complex with a production capacity of 3,600 metric tonnes per day, and a storage capacity of 200,000 tonnes.
- Lanka IOC Facility – Lanka IOC is the Sri Lankan subsidiary of Indian Oil Corporation (IOC), the Indian petroleum company. This facility includes several storage tanks west of the Flour mill and many unused oil tanks Northeast of the airport.

Table 1-10: Functions Port Facilities Trincomalee

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Tokyo Cement				X						
Mud Cove								X		X
Ashroff Quay				X		X	X			
TTA			X							
Lanka IOC					X					
Prima Flour				X						
Navy facilities									X	

Figure 1-4: Trincomalee Facilities



Item	Value	Unit
Harbour Basin	2,000	ha
Ashroff Jetty – Main Berth Length	250	m
Ashroff Jetty – Side Berth 1 Length	90	m
Ashroff Jetty – Side Berth 2 Length	90	m
TTA Quay – Berth Length	190	m
Ceylon Quay – Berth Length	50	m

Mud Cove Jetty – Main Berth Length	50	m
Mud Cove Jetty – Side Berth Length	40	m
Prima Flour – Jetty Length	150	
Tokyo Cement – Jetty Length	240	m

Hinterland Connectivity

The existing railway line currently reaches the private facilities of Prima Flour and Tokyo Cement heading west. The future expansion of the railway to Ashroff Jetty is essential for smooth operations at the jetty. The port is connected by road to the east coast of Sri Lanka through the A15 and heart of the country in the direction of Colombo through the A6. Currently, the area west of the port lacks sufficient connection for it to be developed. A road connection along the rail connecting it with the A15 and the A6 is proposed in case of further development of the area.

Non-Containerised Cargo

The dry bulk import covers majority of the throughput in Trincomalee. The throughput amounted to 3.2 M tons in 2016, which is less than half of the throughput in Colombo. Dry bulk imports account for most of the throughput in Trincomalee. Below the table shows the Trincomalee Port throughput. The cargo on the Ashroff jetty is mostly destined for the Siam Cement facility in Puttalam and consists mainly of coal and clinker. There is a mid-stream operation to load clinker to vessels destined for Galle.

Table 1-11: Trincomalee Non-Container Throughput 2013-2016 per Operation

	Commodity	2013	2014	2015	2016
		('000) Tons	('000) Tons	('000) Tons	('000) Tons
Total Dry and Liquid Bulk		**2,440**	**2,750**	**3,020**	**3,549**

Source: SLPA

Marine Traffic

Cargo ships remain the main category of ships calling at Trincomalee port. Although the port today is limitedly called for repair or bunkering, the number of vessels is increasing, supported by higher throughputs and more lay-up/service vessels.

Table 1-12: Marine Traffic Port of Trincomalee 2010-2016

	2010	2011	2012	2013	2014	2015	2016
Cargo ships	0	0	0	113	120	158	207
Ships for repairs	0	0	0	3	1	1	1
Ships-bunkering	0	0	0	6	1	2	4
Other ships	0	0	0	12	5	3	4
Total ships arrived	**109**	**126**	**161**	**134**	**127**	**164**	**216**

Source: SLPA

Port of Hambantota

General

Hambantota port is situated just east of the southern tip of the country, approximately 10 nautical miles from the main east-west maritime trade lanes passing Sri Lanka. The port opened in 2011 and has a general cargo / RoRo quay (600m) operational. Further the port has a 315m liquid berth for bunkering and LPG. A container quay (835m), a feeder quay (470m), a (break) bulk quay (835m) to be delivered to the port operator in 2017. The port handled in 2016 0.35 million tons of cargo mainly consisting of vehicles and break bulk cargoes. It handled 281 vessels in 2016 of which 267 car carriers. The port is subject to a government agreement with port operator CMPort part of China Merchants Holdings International (CMHI). The concession contract with CMPort to operate and develop the port under a 99-years port management contract was finalised in July 2017. This deal would fit within the Chinese philosophy of building a maritime silk road with strategic nodal points along the route. Especially the available port areas (6070 ha) for industrial development in connection with the port makes the location ideal for large industries.
The management structure of the port is that of a port management company. A master concession contract was made with SLPA and a separate management company, Hambantota International Port Services (HIPS) was developed with 50.7% owned by SLPA, the remainder owned by CMPort. The company is responsible for items like; port security, navigational services, pilotage, anchorage, aids to navigation, dredging, widening and emergency responses. Further, for operations and project development Hambantota International Port Group was established with 85% CMPort share and 15% by SLPA.[3]

The port project was initially proposed in 2006, to accommodate expected demand growth fuelled by economic growth in the Asian continent. For this capacity expansion project, the following 2 factors led to Hambantota being preferred over Colombo:

- Proximity to the main maritime trade routes – Hambantota is more conveniently situated, as vessels on the main trade routes only require a minimal deviation to call at the port.
- Available land – Due to the port-city interface in Colombo, the port of Colombo had limited expansion potential. Conversely, there was ample land available in Hambantota.

Currently, the first phase of the Hambantota port project, which was developed by China Harbour Engineering Company (CHEC), is operational. This first phase consists of the following facilities:

- Two Ro-Ro berths of in total 600m for transhipment/imports – in 2012, the entire Ro-Ro operations were relocated from Colombo port to Hambantota port, due to the available space in Hambantota. The Ro-Ro operation covers approximately 11 ha and mainly comprises transhipment of vehicles and vehicle parts to East Africa and the Gulf region. The RoRo berth is equipped with two post panamax STS cranes.
- A small craft berth with a length of 205m.
- Bunkering berth of 315m and a LPG mooring location. –. The facility is connected to a tank farm which includes 8 tanks for marine fuel, 3 tanks containing aviation fuel and 3 for Liquid Petroleum Gas (LPG). The total storage capacity is approximately 70,000 tons, located approximately 1.2 km east of the oil terminal. Bunkering operations commenced in 2014; however, bunkering operations were halted shortly after, in February of 2015. It is envisioned that bunkering operations will recommence once a suitable operator has been selected.

Phase II consists of:

- A 15-floor administrative complex which has been constructed.
- A (break-) bulk cargo terminal is under construction with 835 m of quay and water depth of 17 m.

[3] Daily Mirror, December 2017

- A container terminal with two main line berths (835m quay in total) and two feeder berths (470 m of quay) with water depths of 17m are under construction.
- 15,000 acres for a special economic zone for industry and logistics
- An island constructed at the western breakwater provides space for real estate development and marina developments

Phase II was due for finalisation by mid-2017.

The mouth of the natural harbour at Hambantota has a 22m depth. When completed, the port has a 1.5 km long breakwater, with a minimum basin depth of 17m. This is compared to the 15.5m depth of the Port of Colombo in the old port and CD -18 m in South Harbour. The turning basin inside the port is 600m. A dam will also be built to prevent flooding in nearby areas, and a seawall made of interlocking concrete blocks will protect the port from high seas.

A USD 550 million tax-free port zone was set up outside the port consisting of 15,000 acre SEZ project. The land area was sourced from several communities including 5,000 acres from Hambantota and the rest from Monaragala, Ambilipitiya and Matara. The finished project is expected to provide indirect employment to over 50,000 people. Recently, the Board of Investments (BOI) indicated that additionally a new refinery, a sugar plant and grain terminal are projected.

Figure 1-5: Hambantota Facilities

Item	Berth Length	Water Depth	Cargo / Purpose
Multi-purpose quay	600m	CD -17.0m	RoRo
Oil berth	315m	CD -17.0m	100,000 DWT Oil Vessels
Small Craft Jetty	205m	CD -17.0m	Small crafts
(Break-) Bulk	835m	CD -17.0m	Under construction
Container berths	835m	CD -17.0m	Under construction
Container feeder berths	470m	CD -17.0m	Under construction

Table 1-13: Function Port Facilities Hambantota

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Multi-Purpose Terminal			X	X						
Container terminal	X									
Liquid bulk Terminal					X					
Tank Farm										X

Hinterland Connectivity

Hambantota is connected to coastal roads to Colombo and to the east of the country. The hinterland roads are congested during the day and not suited for heavy and frequent Container transport. Mattala airport has been constructed to the north of Hambantota. It is envisioned to be an international airport which makes the port ideal for an air-sea combination.

The port of Hambantota is not linked with the national Expressway but construction is planned. The distance to the expressway is approx. 96 km. The port has no railway line connection. Internal port roads are available and constructed based on two lanes.

Cargo and ships

Table 1-14: Throughput Non-Containerized Hambantota 2011-2016

Tons '000	2011	2012	2013	2014	2015	2016
Total Bulk and break bulk	**15**	**20**	**119**	**474**	**293**	**355**

Table 1-15: Throughput RoRo Hambantota 2011-2016

Vehicles	2011	2012	2013	2014	2015	2016
Total	**-**	**10,749**	**64,522**	**198,425**	**185,452**	**181,662**

Marine Traffic

Table 1-16: Marine Traffic Port of Hambantota 2010-2016

	2010	2011	2012	2013	2014	2015	2016
Cargo ships	0	0	34	136	269	278	273
Ships for repairs	0	0	0	1		2	1
Ships-bunkering	0	0	0		63	7	0
Other ships	0	0	0	2	3	8	7
Total ships arrived	**0**	**0**	**34**	**139**	**335**	**295**	**281**

Source: SLPA

Port of Galle

General

Galle port is Sri Lanka's oldest port, situated near the southern tip of the island. Galle has a strong position in services to main line vessels on the East-West trade route, due to its convenient location near the maritime trade lane. However, the port has limited draft and is not able to handle large vessels. In 2016 Galle had a throughput of 0.77 million tons and handled about 96 vessels in 2016 of which 83 cargo vessels the remainder arriving for repairs, bunkering or other activities. The port handles import of rice, flour, fertilisers, cement and clinkers. The cement related imports are typically transhipped by small bulk vessels, as the larger mother vessels are unable to enter the port of Galle. Additionally, Galle is the only Sri Lankan port that offers dedicated facilities for pleasure yachts, since the completion of a marina complex in 2015. The port also receives cruise vessels during the cruise season and it is a port in which often crew changes on main line vessels are organised with fast passenger vessels. Finally, the port houses navy vessels (these vessels often occupy SLPA berths as the dedicated navy berths provide insufficient space). and the port is used for cement related imports. The introduction of night navigation shall make this port more accessible for cruise and general cargo.

Figure 1-6 Port of Galle

Berth	Berth Length	Water Depth
Closenburg Jetty 1	130m	CD -9.0m
Closenburg Jetty 2	130m	CD -9.0m
New Jetty 1	160m	CD -9.0m
New Jetty 2	86m	CD -9.0m

Table 1-17: Functions Port Facilities Galle

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Closenburg Jetty				X			X			
New Jetty			X							
OPL & crew services										X

Marina										X
Fishery Berths										X

Hinterland Connectivity

Currently, Galle is accessible by a two-lane coastal road and inland roads making it accessible for minimum amounts of traffic. Port of Galle is located at 5.8 km from the Expressway E01.

Non-Containerised Cargo

Galle currently handles break bulk and dry bulk cargo (mainly clinker for the cement power plant). The port also receives cruise vessels albeit the quays and water depths at the existing port are limited. The ancient city has a large attraction to tourism and future cruise demand can be expected. Further, the port provides crew and other services to shipping lines through fast service boats. Ships pass Galle on their East-West Voyage and crew, stores and or spares can be brought to the ships without having them to stop sailing and call at a port. The port of Galle also has a yacht marina. The cement manufacturer has expansion plans at its facility at the port. When this development has reached approval from the authorities, the annual bulk volumes would increase to 1.5 million ton of which 95% would consist of clinker and 5% of gypsum. It should be noted that both commodities require additional attention with respect to dust and quay/water pollution during operations. Through suction systems dust and pollution can be controlled effectively.

The cargo details below concern cargo discharged as there is no cargo loaded in Galle.

Table 1-18: Galle Non-Container Throughput 2007-2015

Tons ('000) Discharged	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Bulk	**620**	**452**	**162**	**318**	**463**	**421**	**200**	**393**	**540**	**771**

Source: SLPA

Kankesanthurai (KKS)

Kankesanthurai and Point Pedro are the small ports which provide a sea entrance to the populated northern strip of Sri Lanka. Cargo operations in both ports are limited to 26 thousand tons of break bulk cargo in 2016 for the local market. In 2016 about 25 vessels were handled. The ports also have fishery berthing at shallow drafts and a navy facility. Kankesanthurai was closed during the civil war years in until, in 2011 Indian parties financed ship wreck removal and dredging to 8 m to ensure smooth operations. It is also home to an old cement factory which was shut down in 1991. Three piers are expected to be revamped, of which one for the navy.

Figure 1-7: Facilities KKS

Item	Berth Length	Water Depth
General Cargo	100 m	CD - 7.3 m
Fishery Berth	2 x 60m	-
Navy Berths	-	-

SLPA has formulated three objectives to develop KKS port:

1. To operate a commercial berth
2. To operate a passenger terminal
3. To initiate port related businesses to strengthen the region

To do this several projects have been identified to strengthen the port infrastructure:

- Constructing a new 1,400 m breakwater
- Constructing multi-purpose berth to accommodate passenger vessels and imports and exports to India.
- Connecting the port with KKS railway station 1.2 km to the east of the port.
- A possible economic zone for food related industries.

The throughput statistics for KKS show a significant demand in 2009 followed by years of differing throughputs of break bulk / general cargo.

Table 1-19: KKS Non-Container Throughput 2007-2016

Tons ('000) Discharged	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Containerized	-	-	15	-	-	-	-	-	-	-
Break bulk	-	-	166	11	28	60	49	21	32	27
Dry bulk	-	-	-	-	-	-	-	-	-	-
Liquid bulk	-	-	59	-	-	-	-	-	-	-
Total	**-**	**-**	**240**	**11**	**28**	**60**	**49**	**21**	**32**	**27**

Source: SLPA

Oluvil

Oluvil is a small port with a 4 hectares' general cargo yard having a 330m quay with a depth of 8 m. No throughput data has been reported. The port is mainly used for fishery which SLPA sees as its prime development goal along the development of food related industries. The detailed plans for Oluvil include:

- Inorganic Fertilizer & Agro Chemical Packing/ Storage Facilities
- Organic Fertilizer Manufacturing, Packing and Storage Facilities
- Dedicated Economic Centre
- Livestock Sector
- Milk Related Value Adding

In stage two of the commercial port development, SLPA plans to construct a general cargo berth with a length of 360 m and a depth of 11m to handle 16,000 DWT vessels.

Figure 1-8: Oluvil Port

Item	Berth Length	Water Depth
General Cargo	330 m	CD - 8.0 m
Fishery Berth	200 m	CD - 3.0 m

Puttalam Coal Jetty

Puttalam Coal jetty is a small landings jetty for the 900-megawatt (MW) coal power station located near the coast called Norochcholai Power Station or the Puttalam Coal Plant in the Puttalam District of the Northwestern Province in Sri Lanka. The annual coal requirement for the plant is around 1.4 million tons. Due to the monsoon period about 2.2 million tons is imported during the period mid-September to mid-May. The power station has a coal stock yard of 19.7 ha. The jetty has a total length of 590m but barges can only berth at the outer end of about 230m on each side of the jetty at water depth of CD -4.0m. The jetty is equipped with four coal discharge cranes to discharge coal from seven available barges (LOA 65m). The mother vessels are discharged at open sea through vessel gear into barges which sails to the jetty. Ceylon Shipping Corporation Ltd (CSC) organises the coal transportation from various countries to the outer anchorage of Puttalam with the MV Ceylon Breeze and MV Princess (63,000 DWT LOA 200m, Beam 32.2m and draught at 13.3m) and other chartered vessels.

Figure 1-9: Puttalam Coal jetty

Item	Berth Length	Water Depth
Jetty	230m berth on one side (total length jetty 590m) Berthing 65m barges on both sides	CD - 4.0 m

The supply of coal is cumbersome as coal needs to be transferred from main ship (mother vessels) to small barges at open sea. Due to monsoon periods the ship-to ship operation in open sea is postponed leading to higher stock pile requirements then normal. The plant has no additional investment planned for the coal transfer.

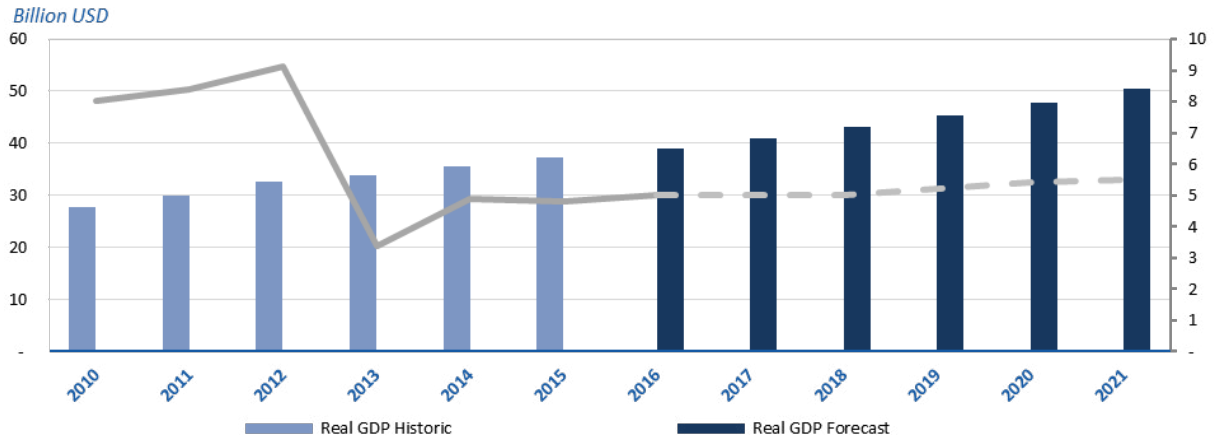
Demand analysis for the port Sector

Macro-Economic Overview

GDP Development

Sri Lanka can be considered an 21st century economic success story, with more and more people relieved from poverty every day through an impressive macro-economic development, which is leading to higher employment rates. With the end of the civil war in 2009, the country embarked on a new phase of stable development. Consequently, GDP growth reached an average rate of 6.0% p.a. over the past 5 years.

Figure 1-10: GDP Constant Prices Development 2010-2021 (Base year = 2002)



Source: IMF 2016

General Overview

With a positive macro-economic outlook, the country does face several major challenges in the years to come. The significant trade deficit causes an outflow of international monetary funds, leading to lower exchange rates. Government finances are negatively impacted by this development; as external debt is in foreign currency.

The population of Sri Lanka has been relatively stagnant over the past decade. The last census, which was carried out in 2011, revealed a population of approximately 20.5 M people, and forecasted a population of 22 M for 2021. Additionally, the population is aging: The country's working age population reached its peak in 2006, while the number of people aged 60+ is expected to double in 2041, as compared to the last census in 2011. (World Bank, 2016)

Foreign direct investments (FDI) in Sri Lanka have been low despite several fiscal measures, as can be seen in table 1.1. These investments are a good measure of a country's ability to sustain a favourable investment climate.

Table 1-20: Macro Indicators 2005-2015

Indicator	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP	Current Billion USD	28.27	32.37	40.72	42.04	49.55	59.16	59.38	67.34	74.92	81.25
GDP per Capita	Current USD	1,430	1,624	2,027	2,077	2,429	2,880	2,874	3,234	3,574	3,849
Inflation consumer prices	%	10.0	15.8	22.6	3.5	6.2	6.7	7.5	6.9	3.3	3.3
Government Debt	% / GDP	87.9	85.0	81.4	86.1	81.9	78.5	79.2	78.3	75.5	76.0
FDI inflow	Million USD	479.7	603.0	752.2	404.0	477.6	955.9	941.1	932.6	893.6	681.2
FDI inflow	% / GDP	1.7	1.9	1.8	1.0	0.8	1.5	1.4	1.3	1.1	0.8
Population	Millions	19.8	19.9	20.1	20.2	20.4	20.5	20.7	20.8	21.0	21.1
Labour Force	Millions	8.4	8.3	8.3	8.3	8.3	8.3	8.4	8.5	8.6	NA
Unemployment rate	%	6.6	6.2	6	5.9	5	4.1	4	4	4	4
Urbanisation rate	%	18.4	18.4	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3

Source: IMF 2016 and World Bank 2016

Overview Local

The western province, which includes Colombo, has the biggest share of GDP development (41.6% in 2014) and the biggest population (28.6%). The population distribution has apparently flat lined in between 2009 and 2014, but in the GDP development one can note a slight increase in the shares of other provinces other than Colombo.

Trade and production

The Sri Lanka exports are reliant on garments, tea and rubber, which are relatively low in value. The focus on exports of low value commodities results in a structural trade deficit, which is hurting the economy. Additionally, whereas rubber can be sustained as a competitive commodity, tea and garments face international competition from low-wage countries. Hence, the country should invest in manufacturing and diversification of its economy to maintain its strong economic growth. The shift to a more open economy will facilitate growth of manufacturing and industrial demand.

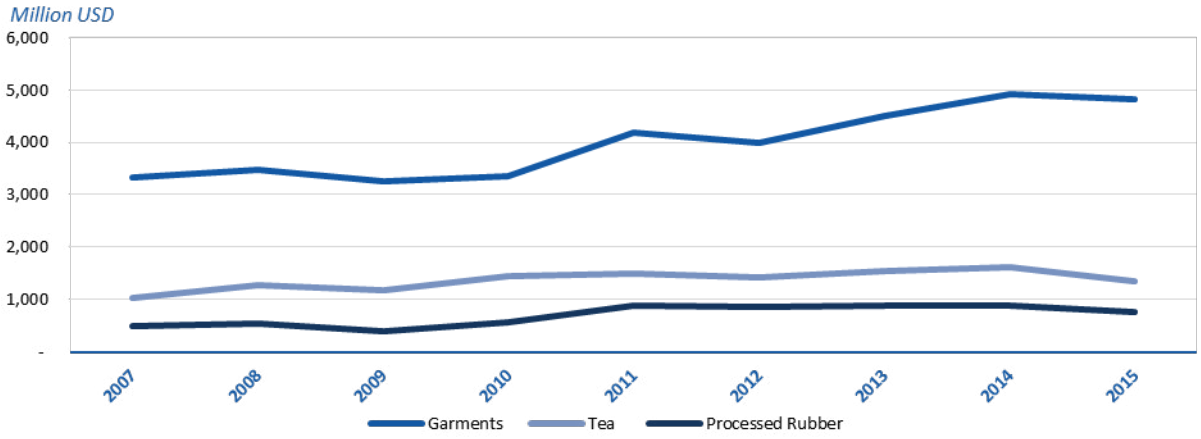
The development of value-added downstream activities in the manufacturing and industrial sectors will boost imports of raw materials and exports of end products.

Garment, tea and rubber together formed more than half of the USD 10,500 M export value in 2015. The export values seem to have flat lined, as can be noted from Figure 4-2. The tea and garment industry have low income competitors on a global scale (Haussmann, 2016). Sri Lanka is responsible for 28.0% of the global tea exports, facing also competition from countries like Kenya and India, that have a lower GDP per capita. The lower GDP per capita implies lower labour costs and consequently lower wages. This same analysis holds for the garment industry in which Sri Lanka may further develop itself focussing on quality whilst low cost competition is provided by countries like Cambodia and Bangladesh. The rubber exports show a different trend where the global main competitors like China and Thailand have a higher GDP per capita than Sri Lanka, thus the country is in a better position to compete in this industry.

Currently, Sri Lanka has an underdeveloped industry and manufacturing sector. However, it is expected that these sectors will be substantially developed. Specifically, the following broad developments can be noted:

- Overall, manufacturing and industrial activities will increase substantially.
- Medium manufacturing and industrial activities will be forced out of densely populated areas.
- Light manufacturing and industrial activities will be concentrated in and near the main metropolitan areas.
- Manufacturing and industrial areas will develop in central Sri Lanka, in line with currently proposed industrial estates.
- Manufacturing and industrial activities will develop in southern Sri Lanka, due to the establishment of a large FTZ in Hambantota.

Figure 1-11: Garment, Tea and Rubber Exports 2007-2015



Source: Sri Lanka Central Bank 2016

Tourism & Cruise

The tourism sector is an area of focus for the government as it is underdeveloped and has a lot of potential to bring foreign currency and foreign exposure to the country of Sri Lanka. The tourism sector is increasing in size and revenues. Port-related tourism is expected to grow substantially over the short to medium period, as general and port-specific Cruise facilities are further improved and created.

The government of Sri Lanka made tourism development a key focus point by instating the Sri Lanka Tourism Development Authority in 2005. The authority identifies special tourism zones where investments and coordination can take place to attract people to the country. Table 4-6 demonstrates that tourist arrivals, employment and receipts have been picking up for the past years, and this trend is expected to continue due low current foreign tourist expenditure per capita.

Sri Lanka's tourism sector has grown substantially over recent years, as tourist arrivals increased from 0.56 M in 2006 to 1.80 M in 2015. The Sri Lanka Tourism Development Authority intends to foster further rapid growth, to increase the annual number of tourists to 2.20 M by 2016, and 4.00 M by 2020.

Table 1-21: Tourism Overview 2006-2015

Item	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tourist Arrivals	1000 People	559.6	494.0	438.5	447.9	654.5	856.0	1,005.6	1,274.6	1,527.2	1,798.4
Total Employment	1000 People	133.6	145.2	123.1	125.0	132.1	138.7	162.9	270.2	299.9	319.4
Direct Employment	1000 People	55.6	60.5	51.3	52.1	55.0	57.8	67.9	112.6	129.8	135.9
Indirect Employment	1000 People	77.9	84.7	71.8	72.9	77.0	80.9	95.0	157.6	170.1	183.5
Gross Tourist Receipts	USD M	410	385	342	350	575	830	1,039	1,715	2,431	2,981

Source: Sri Lanka Central Bank, 2016

Sri Lanka has several touristic features all available in one island with limited distances from major cruise ports and airports. The cruise touristic values of the nation are:

- Sri Lankan social and cultural heritage
- Flora and Fauna
- Beaches
- Friendly people

Cruise industry shall also increase especially due to:

- Global interests in cruises due to widening of target groups.
- Cruise in Asia is new and fast-growing market.

- Vessels must travel between seasonal cruise markets (Caribbean/Europe/Asia) and Colombo is strategically located in the middle with ample tourism features.

The cruise industry gains a lot of attention by the Ministry which aims to create sustainable tourism development in Sri Lanka by:

- Focus on Colombo, Galle/Hambantota and Trincomalee
- Economics (gain revenues)
- Socially (integrate society, peace/ harmony)
- Environmental friendly (do not damage the environment)
- Above translates to the following needs assessments in ports:
- More common cruise berths near the city (walking distance)
- Marketing strategy needed
- Terminal building for the main cruise port of Colombo
- Develop home port concept (attract cruise passengers who start the cruise by flying-in)
- The cruise terminal focus on safe transit and shopping

Forecast on Commodities

Forecasts summary

The forecast methodology and key assumptions are discussed in detailed in the document, here the forecast results are presented under the Base Case scenario.

Table 1-22: Summary Forecasts and Growth

Commodity	Demand 2016	Demand 2025	Demand 2030	Demand 2050	Difference 2016 -2050	CAGR
Containers ('000 TEU)						
Gateway	1,300	2,197	2,630	3,737	2,437	3.15%
Transhipment	4,355	5,873	6,433	12,671	8,316	3.19%
Total	5,655	8,070	9,063	16,408	10,753	3.18%
Dry Bulk ('000 Tons)						
Coal	1,932	2,400	2,400	2,400	468	0.64%
Wheat / Maize / Corn	1,057	1,714	2,012	2,279	1,222	2.29%
Cement / Clinker / Gypsum	3,890	5,742	6,399	7,782	3,891	2.06%
Fertilizer	314	1,536	1,536	1,536	1,222	4.78%
Biomass	-	325	500	500	500	-
Ilmenite	-	700	700	700	700	
Total	*5,364*	*12,317*	*13,447*	*15,097*	*9,733*	*3.09%*
Liquid Bulk ('000 Tons)						
Crude Oil	1,685	2,512	7,512	7,512	5,826	4.49%
Refined Oil	3,059	5,322	1,691	4,527	1,468	1.16%
LNG	-	1,561	1,991	3,988	3,988	

Commodity	Demand 2016	Demand 2025	Demand 2030	Demand 2050	Difference 2016 -2050	CAGR
Total	*4,744*	*9,395*	*11,193*	*16,027*	*11,282*	*3.65%*
Break Bulk ('000 Tons)						
General Cargo	1,287	1,743	1,834	2,547	1,261	2.03%
RoRo ('000 Vehicles)						
Domestic	63	131	145	236	172	3.94%
Transhipment	151	100	113	222	71	1.14%
Total	*214*	*231*	*258*	*458*	*243*	*2.26%*

Each of the commodities are detailed in this document. As containerised cargo is the largest component these are here further detailed below.

Container Forecast Results

The container forecast for Sri Lanka is presented in the Base Case and in the High Case. Under the Base case the total volume is expected to grow from 5.6 M TEU in 2016 to 16.4 M TEU in 2050. Under the High Case the traffic is expected to increase to 25.5 M TEU by 2050.

Table 1-23 Base Case Container Forecast

Base Case		2016	2020	2025	2030	2050
Gateway Demand	'000 TEU	1,300	1,660	2,197	2,630	3,737
TS Demand	'000 TEU	4,355	5,775	5,873	6,433	12,671
Total	'000 TEU	5,655	7,435	8,070	9,063	16,408

Table 1-24 High Case Container Forecast

High Case		2016	2020	2025	2030	2050
Gateway Demand	'000 TEU	1,300	1,660	2,252	2,855	4,549
TS Demand	'000 TEU	4,355	6,304	7,311	8,473	20,996
Total	'000 TEU	5,655	7,964	9,563	11,328	25,545

Gateway Container

The forecasts show a strong growth prediction until 2025 after which the scenarios diverge more. This has to do with the GDP per capita development, as differences in the first 5 years are smaller. The growth does flatten after 2040 due to a decrease in industrialisation speed and a stagnant population.

Figure 1-12: National Gateway Throughput Forecasts

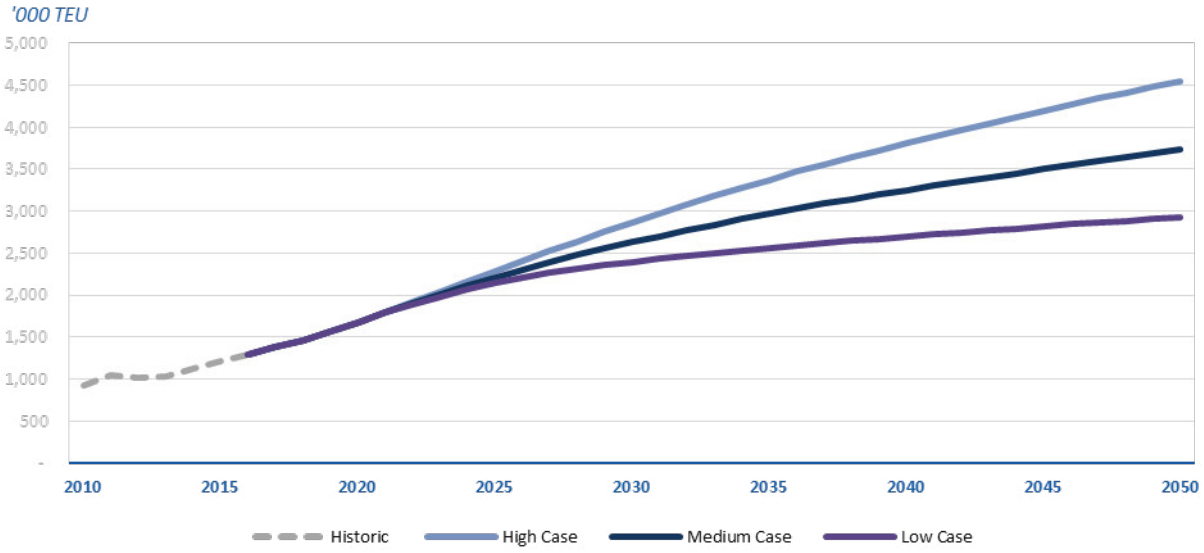


Table 1-25: National Gateway Throughput Forecasts Data Table

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050
High	1,218	1,660	2,252	2,855	3,368	3,802	4,192	4,549
5yr - CAGR		6.39%	6.29%	4.86%	3.36%	2.45%	1.97%	1.65%
Medium	1,218	1,660	2,197	2,630	2,969	3,254	3,508	3,737
5yr - CAGR		6.39%	5.77%	3.66%	2.46%	1.85%	1.51%	1.28%
Low	1,218	1,660	2,141	2,404	2,572	2,711	2,832	2,938
5yr - CAGR		6.39%	5.22%	2.34%	1.36%	1.06%	0.88%	0.74%

Transhipment Container Forecast

As one of the major cargo segments, the forecast of transhipment container volumes is critical for port development planning. Given the footloose nature of the transhipment business, and the uncertainties concerning the development of transhipment markets, two scenarios have been developed:

- The *Base Case*, where transhipment market experience moderate growth in transhipment demand and Colombo's market share growth decelerates over time, due to pressure from other hub ports.
- The *High Case*, where transhipment demand in Colombo's main transhipment markets grows more rapidly and Colombo is able to retain its dominant position in the region.

As such, the Base Case and High Case scenarios are aimed at reflecting the impact of variations in external factors on transhipment demand, as the container transhipment business is strongly dependent on such external factors. This is in contrast to the economic Low Case, Base Case, and High Case scenarios, as introduced in the previous chapter, which focus mainly on Sri Lanka's internal (economic) development. The table and figures below present the estimated transhipment volumes for both the Base and High Case scenarios.

Table 1-26 Base Case and High Case Container Transhipment Forecast

		2016	2020	2025	2030	2050
Base Case TS Demand	'000 TEU	4,355	5,775	5,873	6,433	12,671
High Case TS Demand	'000 TEU	4,355	6,304	7,311	8,473	20,996

The graph below shows Sri Lanka's total forecast transhipment container throughput under the Base Case, divided by transhipment market. The following observations can be made:

- Annual transhipment volumes are estimated to increase from 3.89 M TEU in 2015 to 12.67 M TEU in 2050.
- A dip in volumes can be observed around 2030, due to the expected implementation of several competitive projects.
- East India, West India and Bangladesh will remain Sri Lanka's key markets for transhipment containers, accounting for an estimated 89.9% of throughput in 2050.
- Due to increasing direct trade shares and increasing pressure from competing transhipment hub groups, growth of transhipment volumes is expected to decelerate after 2035.

Figure 1-13 Base Case Container Transhipment Forecast

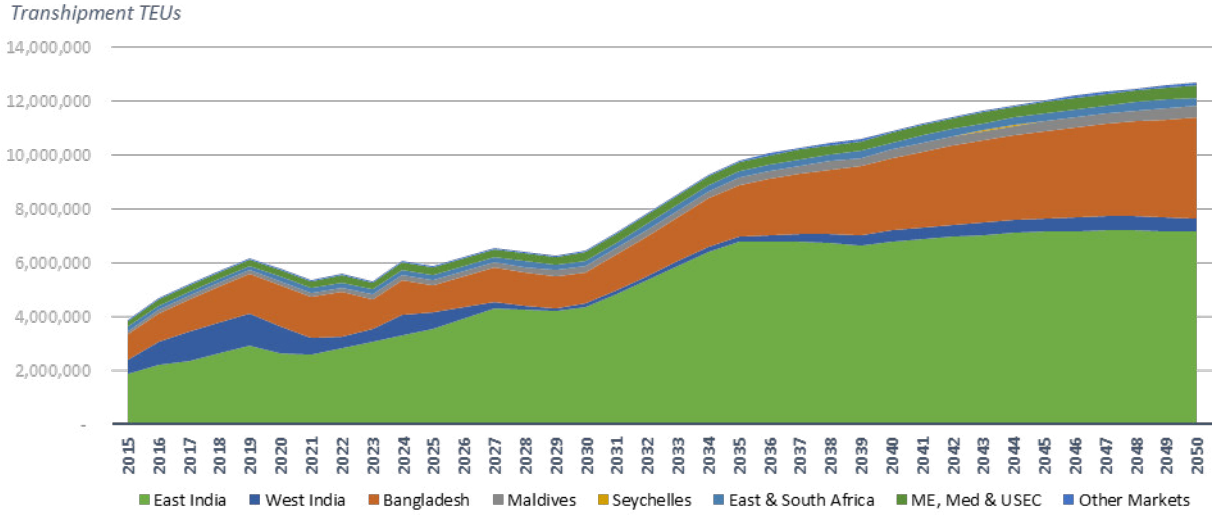
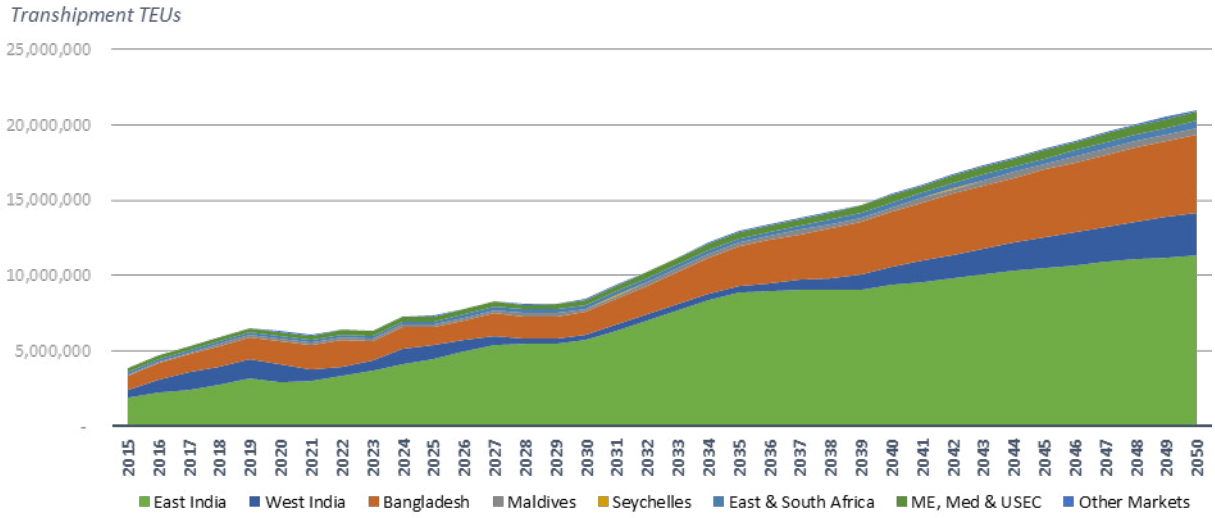


Figure 1-14 High Case Container Transhipment Forecast



Opportunities and Threats

Transhipment cargo is known as footloose cargo, this means that shipping regard the activity as non-captive for the port and are able to transfer the cargo activity to other ports along the service routes depending on cost, geographical position to end-feeder markets, quality of port service and available quay and stack spaces and sufficient water depths.

The table below summarizes key identified opportunities and threats that may impact Sri Lanka's ability to attract transhipment cargo.

Opportunities	Threats
Maritime Hub concept route boosts industrial productivity in Sri Lanka	China developing a more internal focussed economy, resulting in less exports
Geographical position of Port of Colombo serves shipping lines network enlargements developments	A focus on land based silk route developments instead of the maritime silk routes, resulting in decreased maritime trade growth
	Development of the northern passage
	India market to develop it ports faster, resulting in a more rapid decrease in dependency on transhipment
	Indian market becoming a real export market, which directly serves global markets
	War risks in the region, due to conflicts between nations.
	Liberalised cabotage regulations in India make cabotage more favourable, resulting in more competition from Indian ports.

Cargo allocation

For each of the commodities an allocation strategy was applied to make use of both the strengths of the ports as well as the international or regional function of the port.

The following table illustrates the main strengths of the several ports and their natural focus areas:

Table 1-27 Competitive Role of Ports

Ports	Strengths	Specifics	Focus areas
Port of Colombo	Deepwater terminals	Designed for Transhipment of Containers	Transhipment Containers
	Near demanding consumer regions	Western region	Gateway Containers & Logistics
	Attractive for Tourism	City & Port City & access to nation	New Cruise terminal (and marina's in Port City)
	Industrial supplies	Refinery supply, powerstation supply	Liquid Bulk
	Protected berthing for LNG	Planned LNG powerstation	LNG
	Dry Bulk	Limited waterdepths	Cement, Grain and animal feeds
	General cargo	Limited waterdepths	Assign additional quays
Port of Trincomalee	Natural deepwater in protected areas		Ship services and lay-up business
	Hosting Cement and Grain facilities	Private Cement plant Private Grain plant	Dry bulk (grains, cement)
	Strategic oil supply location	Private liquid bulk terminal	Expansion of Liquid Bulk
	City and Region is attractive to tourism	Boating industry to be developed	Marina's and Cruise terminal development
	Demand for power stations	Optional supply of power stations	LNG or gas
	Support regional development	Limited quays	Expansion of quays
	Support regional logistics developments	Optional industrial and logistics areas near rail	Develop industrial and logistics areas
	Support new export products and markets	Value added activities in light- and medium industries	Liquid bulks, Dry Bulks and Container traffic
Hambantota	New port with ample industrial space	Designed for Industry	Refinery, Cement plants Liquid bulk & LNG
	Ample space at break bulk quays	New break bulk terminal	RoRo business, general cargo and break bulk
	Planned shipyards	Opted for ships yards	Shipyards
	Supply regional projects	General cargo & Container trades	General cargo & Project cargo & Containers
	Support regional logistics developments	New container terminal	Container trades
	Support new export products and markets	Value added activities in medium- to heavy industries	Liquid bulks, Dry Bulks and Container traffic

Oluvil	Small port on East coast	Limited water depths	Fishery industry and cold chain
	Regional and local function	Limited water depths	Coastal activities, marina
KKS	Proximity to India	Limited water depths	Optional ferries
	Regional and local function	Limited water depths	Coastal activities, marina
Puttalam Coal jetty	Limited waterdepth	System with barges	Coal imports

As container traffic is the most prominent cargo flow, the allocation is here detailed in the summary. Other allocations are expressed in the document under the chapter commodity-level allocation.

Gateway Containers

- Of the total gateway demand, Colombo port is estimated to handle 98% in 2025, 95% in 2030, and 88% in 2050, due to the port's proximity to the consumer market.
- Hambantota port is estimated to handle 1% in 2020, 4% in 2030, and 9% in 2050, due to the envisaged logistics and industrial zone and the port's proximity to main trade routes.
- The remainder of gateway containers are expected to be handled at Trincomalee, which will solely serve its direct hinterland.

Transhipment

Transhipment container volumes are assumed to remain in Colombo during the forecasting period. While Hambantota is geographically better positioned to handle the transhipment cargo, several factors result in a favourable position for Colombo. These factors include Colombo's proximity to consumer markets, which entails that vessels carrying gateway containers will already call Colombo, the presence of the port community in Colombo, the maximum water depth of 17.0m in Hambantota, and the higher number of berths in Colombo.

Under the Base Case, transhipment volumes are expected to increase to 12.7 M TEU by 2050; under the High Case scenario, which assumes stronger growth of destination markets and a stronger value proposition for the port of Colombo, transhipment volumes are expected to increase to 21.0 M TEU by 2050. The table below presents the Base Case container allocation for the Sri Lankan ports.

Table 1-28 Sri Lanka Port Cargo Allocation - Containers

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Gateway								
Colombo	1,300	*100%*	1,643	*99%*	2,498	*95%*	3,289	*88%*
Trincomalee	-	-	-	-	26	*1%*	112	*3%*
Hambantota	-	-	17	*1%*	105	*4%*	336	*9%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,300**	***100%***	**1,660**	***100%***	**2,630**	***100%***	**3,737**	***100%***
Transhipment								

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Colombo	4,355	*100%*	5,775	100%	6,433	100%	12,671	100%
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**4,355**	***100%***	**5,775**	**100%**	**6,433**	**100%**	**12,671**	**100%**
Total								
Colombo	5,655	*100%*	7,418	100%	8,931	99%	15,960	97%
Trincomalee	-	-	-	-	26	0.4%	112	1%
Hambantota	-	-	17	0%	105	0.6%	336	2%
Other Ports	-	-	-	-	-	-	-	-
National Demand	**5,655***	***100%***	**7,435**	**100%**	**9,063**	**100%**	**16,408**	**100%**

** Excludes 79,812 TEUs that were re-stowed.*

Container Development needs

Colombo

Figure 1-15 displays the expected container volumes under the Base Case and High Case, with the current capacity in the Port of Colombo. The graphic shows that there is a large demand for additional port development to fill the gap.

Figure 1-15 Container Demand and Existing Capacity Supply – Colombo Current Facilities

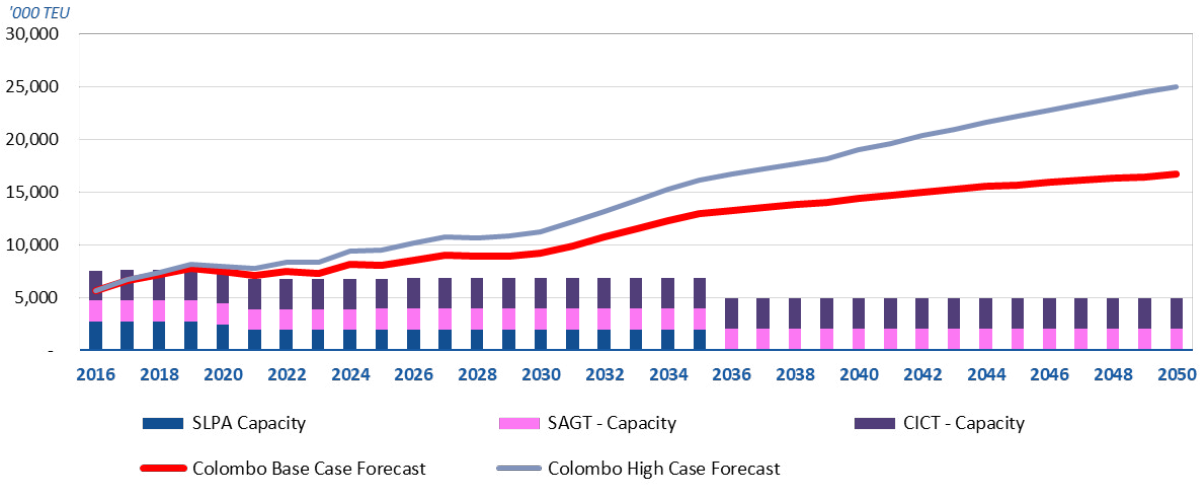


Table 1-29 Container Capacity Supply Gap

		2016	2020	2025	2030	2050
Base Case						
Demand	'000 TEU	5,655	7,418	8,026	8,931	15,960
Capacity	'000 TEU	7,500	7,294	6,789	6,806	4,948
Capacity Gap	'000 TEU	1,845	(124)	(1,237)	(2,125)	(11,012)
High Case						
Demand	'000 TEU	5,655	7,947	9,518	11,186	24,998
Capacity	'000 TEU	7,500	7,294	6,789	6,806	4,948
Capacity Gap	'000 TEU	1,845	(653)	(2,729)	(4,380)	(20,050)

Subsequently, Table 1-30 displays the envisaged development options of Colombo. The extension of WCT to WCT II is highly costly[4] and is only considered in the full port development option in the gap analysis, as other options are more cost effective. Table 1-33 identifies several development scenarios that comprise several of the facilities presented in Table 1-30.

Table 1-30 2050 Container Capacity Development Options - Colombo

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2050)		
SAGT I	2,068*	940
CICT	2,880*	1,200
Development Options (2050)		
WCT I	3,360	1,400
WCT II	3,360	1,400
ECT I	2,880	1,200
ECT II	1,440	600
SAGT II	2,640	1,200
North Port	6,120	2,550

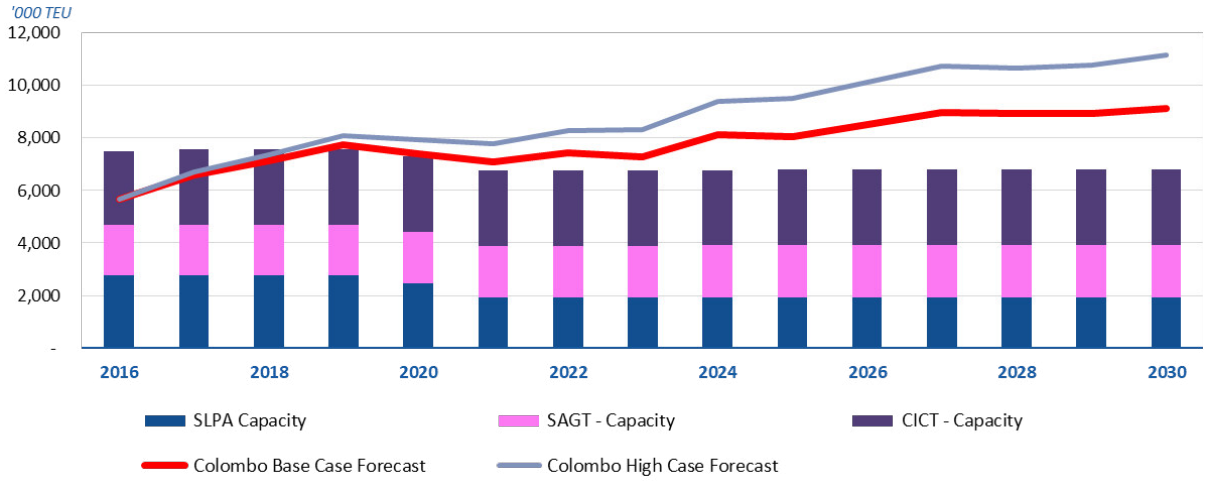
*Assuming an increase in productivity.

[4] The breakwater needs to be removed and a new breakwater needs to be developed

Port of Colombo in 2030

Figure 1-16 displays the expected 2030 container volumes demand under the Base Case and High Case, in relation to the existing capacity in the Port of Colombo. This shows a clear and urgent demand for development.

Figure 1-16 2030 Container Demand and Existing Capacity Supply – Colombo Current Facilities



The capacity gaps in TEU (2030) are illustrated in next table.

Table 1-31 Container Capacity Supply Gap

		2016	2020	2025	2030
Base Case					
Demand	'000 TEU	5,655	7,418	8,026	8,931
Capacity	'000 TEU	7,500	7,294	6,789	6,806
Capacity Gap	'000 TEU	1,845	(124)	(1,237)	(2,125)
High Case					
Demand	'000 TEU	5,655	7,947	9,518	11,186
Capacity	'000 TEU	7,500	7,294	6,789	6,806
Capacity Gap	'000 TEU	1,845	(653)	(2,729)	(4,380)

Subsequently, Table 1-32 displays the envisaged development options of Colombo. Under the Base Case forecast, the nearly completed ECT Phase I should provide adequate capacity. Under the High Case forecast, the second phase of the ECT terminal is required; alternatively, the first phase of the WCT could be developed.

Table 1-32 2030 Container Capacity Development Options - Colombo

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2030)		
SLPA	1,928	1,292
SAGT I	1,999*	940

CICT	2,880*	1,200
Development Options (2030)		
WCT I	3,360	1,400
WCT II	3,360	1,400
ECT I	2,880	1,200
ECT II	1,440	600
SAGT II	2,640	1,200

*Assuming an increase in productivity.

Port of Colombo in 2050

The following tables illustrate the situation in 2050.

Table 1-33: 2050 Container Capacity Development Scenarios - Colombo

Facility	SAGT I	CICT	WCT I	WCT II	ECT I	ECT II	SAGT II	North Port	Capacity ('000 TEU)	Quay (m)
Capacity Development Scenarios										
1. Current Facilities	x	x							4,948	2,140
2. Current & Planned	x	x	x		x				11,188	4,740
3. Current, Planned & Extended ECT + SAGT	x	x	x		x	x	x		15,268	6,540
4. Current, Planned & North Port	x	x	x		x			x	16,588	6,990
5. Full Port Development	x	x	x	x	x	x	x	x	24,028	10,190

Table 1-34 displays the container capacity gap analysis based on the estimated 2050 container volumes and the capacity development scenarios presented above. Red indicates a capacity shortage; orange indicates a deficit within the margin of error of 10%; and green indicates a capacity surplus.

The following table shows the TEU capacity gap by 2050 and is an indicator for the capacity required to be developed.

Table 1-34: TEU Gap Analysis Colombo 2050

	Unit	Base Case	High Case
1. Current Facilities	'000 TEU	(11,726)	(20,050)
2. Current & Planned	'000 TEU	(4,772)	(13,810)
3. Current, Planned & Extended ECT + SAGT	'000 TEU	(6,92)	(9,730)
4. Current, Planned & North Port	'000 TEU	628	(8,410)
5. Full Port Development	'000 TEU	8,068	(970)

The main conclusions from the analysis are:

- The future capacities of SAGT, WCT I, CICT and ECT (scenario 2: current and planned facilities) are insufficient for Colombo under the Base Case.

- Under the High Case scenario, which entails higher transhipment volumes for the Port of Colombo, the north port expansion is required to accommodate all container volumes.
- For both scenarios, the expansion capacities are based on improved handling efficiencies in the future.

Hambantota

Phase II of the Hambantota port development, which includes a container terminal (phase I), is nearing completion. Expansion options still exist for the port. Table 1-35 provides an overview of the forecasted capacity and quay wall requirement, given an assumed 2,400 TEU per metre per annum throughput capacity.

Table 1-35 Container Demand in TEU and Quay Metres for Base and High Case Hambantota

Scenario	2050 Capacity Requirement ('000 TEU)	2050 Quay wall Requirement (m)
Base Case Scenario	336	330
High Case Scenario	336	330

Subsequently, Table 1-36 displays the envisaged or planned development options at the port of Hambantota. Table 1-37 identifies the development scenarios that comprise several of the facilities planned.

Table 1-36 2050 Container Capacity Development Options - Hambantota

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2050)		
Phase II Container Terminal	3,116	1,299
Development Options (2050)		
Phase IV Container Terminal	9,240	3,850

Table 1-37 2050 Container Capacity Development Scenarios - Hambantota

Facility	Phase II Terminal	Phase IV	Capacity ('000 TEU)	Quay (m)
1. Current	x		3,116	1,299
2. Full Port Development	x	x	12,356	5,149

Table 4-47 presents the gap analysis for Hambantota for the Base Case and High Case scenarios, based on estimated 2050 container volumes. The gap analysis yields the following conclusion:

- The current container terminal is sufficient to handle expected demand under both the Base Case and High Case scenarios. Based on this gap analysis, additional container development is not required as it would provide unwanted overcapacity, hence part of phase II container terminal may be used for other purposes in the future.

Table 1-38 TEU Gap Analysis Hambantota

	Unit	Base Case	High Case
1. Current Facilities	'000 TEU	2,854	2,854
2. Full Development	'000 TEU	12,094	12,094

Trincomalee

Table 4-48 presents the estimated 2050 container volumes and quay wall requirement. The following is concluded:

- A single berth in Trincomalee is sufficient to accommodate estimated future demand.
- No detailed plans for container terminals are considered as projected demand is low.

Table 1-39: Container Demand in TEU and Quay Metres for Base and High Case Trincomalee

Scenario	2050 Volumes ('000 TEU)	2050 Quay Wall Requirement (m)
Base Case	112	300 m
High Case	112	300 m

Other Commodities Development needs

Other commodity development needs are expressed in the table below.

Commodity	Port	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Coal	Colombo	-	-	-
	Trincomalee	347	103	120
	Hambantota	-	-	-
	Puttalam	2,500	1,836	2,280
	Other Ports	-	-	-
Wheat, Maize, Corn	Colombo	710	190	342
	Trincomalee	1,161	867	1,709
	Hambantota	-	-	228
	Other Ports	-	-	-
Cement, clinker and gypsum	Colombo	2,250	2,179	2,334
	Trincomalee	2,200	1,712	3,113
	Hambantota	-	-	1,556
	Galle	1,000	535	778
	Other Ports		-	-
Crude oil	Colombo	6,570	1,685	2,512
	Trincomalee	-	-	-
	Hambantota	-	-	5,007
	Other Ports	-	-	-
Refined Oil	Colombo	4,531	2,871	2,264
	Trincomalee	10,692	238	1,358
	Hambantota	-	21	905

Commodity	Port	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Non-Containerized cargo	Other Ports	-	-	-
	Colombo	2,000	801	555
	Trincomalee	250	-	832
	Hambantota	750	399	1,054
	KKS	125	32	277
	Oluvil	250	-	28
	Galle	250	42	28
RoRo	Colombo	84	33	24
	Trincomalee	-	-	-
	Hambantota	515	182	434
LNG	Other Ports	-	-	-
	Colombo	-	-	1,994
	Trincomalee	-	-	-
	Hambantota	-	-	1,994
Fertilisers	Other Ports	-	-	-
	Colombo	314	314	-
	Trincomalee	-	-	1,536
	Hambantota	-	-	-
	Other Ports	-	-	-

Port development plans and Short Term Priority Projects

In this section the port directions are described including the short term priority projects and port plans. In the main text of the documents also the observations and bottlenecks are described.

Colombo port directions

> Port of Colombo will be leader in the Indian Ocean, Middle East and East African hub ports, and is to become an efficient logistic hub to attract sustainable investment and trade, to facilitate the national export strategy.

As such, the following threefold focus applies to Port of Colombo:

- Maintaining a World Class Transhipment Hub, serving the Middle East, East Africa, India, Pakistan and the Bay of Bengal;
- Becoming an efficient logistic hub for imports and newly developed exports;
- Becoming a sustainable Port.

Colombo Port is leader in the Indian Ocean as Transhipment Hub port and should stay competitive with other national and international transhipment ports. To achieve this, focus should be on operational excellence both on the marine services, cargo handling services, auxiliary functions and on interterminal traffic. The marine activities and handling activities are one of the core activities of SLPA. Port designs are adjusted and future capacity is planned for in order to stay ahead of demand. Innovations and new technologies will support this development.

The Port of Colombo should also become more efficient to facilitate the National Export Strategy on targeted exports sectors, as well as improving the logistics on import cargoes. As many trades are transported by containers, the container logistics chain is prime focus to become more efficient. This can be catered for through better infrastructure on port and hinterland connections as well as on administration and procedures. The latter can be achieved through a combination of digitalisation through a single maritime window as well as through trade facilitation and improved customs procedures. Further the development of cargo villages or Free Trade Zones (FTZ) connecting to the port should cater for demands on export manufacturers and foreign direct investment (FDI).

The above shows that the port sector needs to move fast on the innovation and efficiency improvements through investments to stay competitive both to support the transhipment Hub as well as the exports visionary. The port of Colombo will be a reliable partner in developing the nation and serving new clients.

Sustainability has become an important element in the global production chain. Global supply chains focus on partners which have a sustainability policy in place. Port of Colombo wants to align with modern practises of sustainability standards and green policies, innovation in the priority export sectors and integrate the logistics operation in the green supply chain.

Port role in the Country

The Port of Colombo is important for Sri Lanka and facilitates the majority of the import and exports trades today. The city is under large developments with the erection of many new hotels and resident flats and the rehabilitation of historic buildings. Furthermore, a new city port is under development, south of the existing port, including hotels, conference centres, residential flats, shops and marinas. The new port city will be connected through an elevated highway that also creates additional entrances to the port. The western region has several plans for city and urban developments and improvements. Combined, the western region developments and the city of Colombo generate high demands for the port of Colombo. This translates to required port improvements, a new cruise terminal, enhanced connectivity and major future port planning both for containers as well as for liquid bulk and multipurpose. Additional demand for warehousing and logistics needs to be captured in future planning as well.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Colombo, followed by the main conclusions from part B.

Figure 1-17: Colombo Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	1,300	3,289	2.8%	
Transhipment	4,355	12,671	3.2%	
Total	**5,735***	**15,960**	**3.1%**	**7,100**

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Dry Bulk ('000 Tons)				
Coal	-	-	-	-
Wheat / Maize / Corn	190	342	1.7%	710
Cement / Clinker / Gypsum	2,179	2,334	0.2%	2,250
Fertiliser	314	-	-100.0%	-
Biomass	-	-	-	-
Ilmenite	-	-	-	-
Total	**2,683**	**2,676**	**-0.0%**	**2,960**
Liquid Bulk ('000 Tons)				
Crude Oil	1,685	2,512	1.2%	6,570
Refined Oil	2,871	2,264	-0.7%	4,531
LNG	-	1,994	-	-
Total	**4,556**	**6,770**	**1.2%**	**11,101**
General Cargo				
Non-containerised General Cargo	801	555	-1.1%	2,000
RoRo ('000 Vehicles)				
RoRo	33	24	-0.9%	84
Cruise				
Vessels	43	207	4.7%	

*Includes 79,812 TEUs that were re-stowed.

Priority Projects Colombo

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Colombo:

SP1. **JCT Modernisation Plan –** A modernisation plan must be developed for JCT, to enable the terminal to continue performing container handling operations safely and reliably over the coming years, after which the container activities are to be phased out from the JCT location.

SP2. **Dedicated berth for grains and cement –** The dedicated berth can solve immediate sea side operations bottle necks and the accompanying depth issues.

SP3. **PVQ Upgrade Plan –** To handle bigger vessel dredging works might dredging if possible is needed.

SP4. **Sapugaskanda oil refinery -** Sapugaskanda oil refinery is in poor state and operates near densely populated areas. As such, the oil refinery may need to be revamped and/or relocated.

SP5. **LNG Storage Facility -** An LNG handling and storage facility is to be developed, to serve the envisioned Kerawalapitya LNG power plant and enable LNG bunkering activities in the port. A floating LNG storage vessel with regassification units on board is recommended. Such a solution would reduce the need for LNG related structures ashore. The pipeline connection to the powerplant should take into consideration the future location of North Port.

SP6. **UCT Transformation Plan –** A plan should be developed to guide the transformation of UCT towards a general cargo facility, as it is expected that container activities will be phased out in the short term (2020).

SP7. **An adequate passenger terminal**, with adequate berthing space and a modern passenger building, is to be developed. The preferred location for this development is on the BQ (once the CFS activities have been relocated to the South Harbour). An adequate facility will also enable an efficient passenger arrival process.

SP8. **Port Gate Upgrade Plan**, including an expansion of the current main gate from 3 in-lanes and 3 out-lanes to 5 in-lanes and 5 out-lanes, and a new gate complex that directly connects the South Harbour to the PAEH.

SP9. **BQ Warehousing Relocation Plan –** Current Warehouses on BQ need to be relocated to ensure continuation of operations. Additionally, new equipment needs to be procured and a modern Warehouse Management System needs to be adopted.

SP10. **Mechanical and electric workshops. –** Due to the PAEH project, a number of buildings need to be relocated.

SP11. **The resettlement of underutilised buildings**

SP12. **Widening of the port access road -** Port road should be widened to a 6-lane road. In case the PAEH, which will run above the port road, hampers widening of the port road at a later stage, the widening should be carried out before the PAEH is completed.

SP13. **Port Gate Automation –** Automation of the gate process is an absolute necessity when dealing to achieve port efficiency and alleviation of congestion.

SP14. **PAEH Simulations –** Traffic simulations are required to help shape the design characteristics of the PAEH.

SP15. **PAEH Development -** Development should proceed as planned by RDA, with SLPA input on construction issues, ramp locations, and gates locations.

SP16. **Securing Future Rail Development Path –** A path for optional future rail development towards south port should be secured.

SP17. **Port Community System –** Port Community System to help data exchange and paperless environment in the port.

SP18. **North Port Development** – A feasibility study on North Port Development is required including the impacts on the Kelani river outlet.

Colombo Port development plan

Taking into consideration the forecasted demand and planned short-term capacity increases/decreases, the table below summarizes the capacity requirements for each of the commodity groups.

Table 1-40 Capacity Development Requirement Colombo

Commodity	Capacity Development Requirement
Containers	**2025** – By 2025, 883m of additional quay is required. **2030** – By 2030, 1,735m of additional quay is required, including the 883m that is required by 2025. **2050 –** By 2050, 8,075m of additional quay is required, including the 1,735m that is required by 2030
Dry Bulk	**2025 –** In the immediate future, cement operations need a dedicated berth with a depth of 13.5m, to accommodate a design vessel with a draft of 12.5m. **2030 & 2050 –** Stabilisation of demand, no additional capacity needed.
Liquid Bulk	**2025** – LNG handling and storage facilities are required immediately to avoid operational delays of the new gas-fired power plant. Additionally, new refining capacity is required and the old pipelines need to be renewed. **2030** – Possible relocation of the dolphin jetty, in case of North Port construction and operations. **2050 –** No additional capacity requirements.
General Cargo	**2025 –** Development of JCT berth 1 for general cargo. **2030 –** Dedicated multipurpose terminal to handle general cargo and RoRo.

Commodity	Capacity Development Requirement
	2050 – No additional capacity needed.
RoRo	**2025 –** UCT needs to be transformed into a dedicated general cargo and RoRo facility. **2030 –** Dedicated multipurpose terminal to handle general cargo and RoRo. **2050 –** No additional capacity needed.

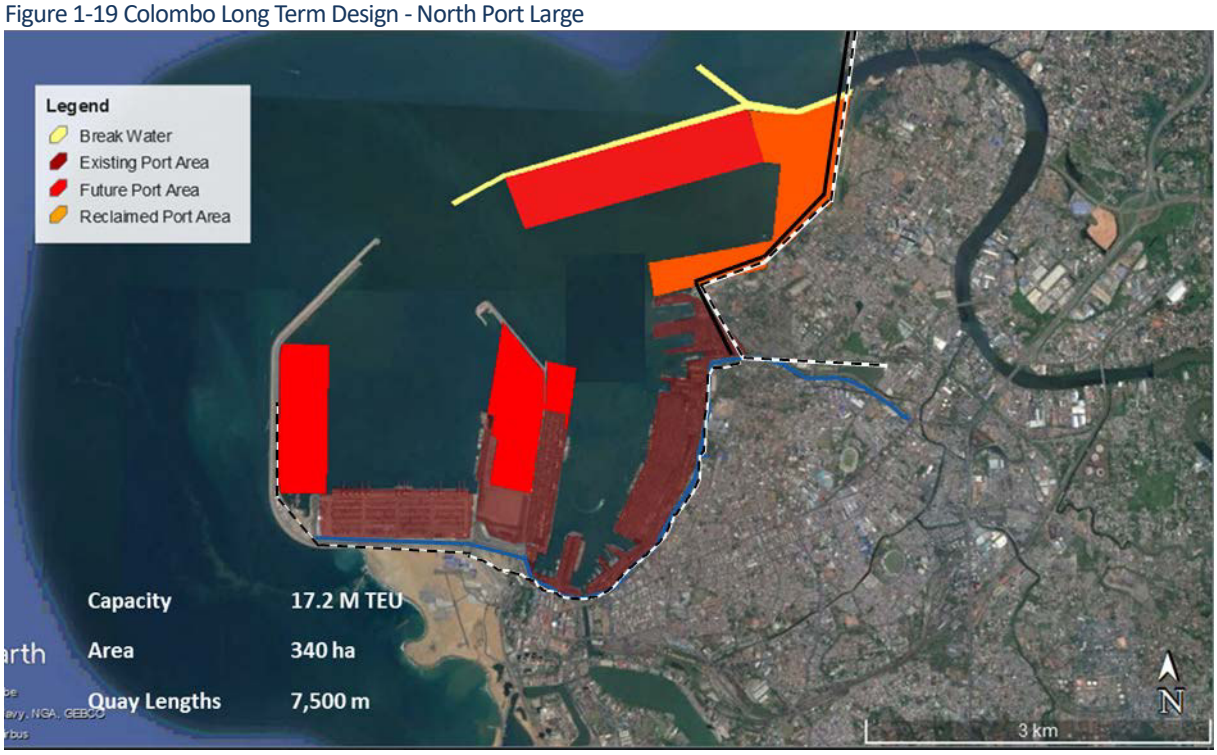
In order to meet the future Base Case capacity demand, the following two port layouts have been developed:

- South Port Max – The South Port Max design is based on the SLPA concept of the current South harbour basin development. The "South Port Max" concept incorporates this design with a wave protection on the north side of the port. This wave protection can be expanded to a break water if expansion of the port area is needed. This concept includes the extension of the current south port break water. In contrast to SLPA concepts, the envisaged West Container Terminal I and West Container Terminal II should have a quay length of 1,400 m, in order to enable accommodation of 3 mega vessels simultaneously.
- North Port Large – The North Port Large option creates the necessary space through a design that is based on the original SLPA North Port concept. Besides meeting cargo capacity demand, the development option will offer sufficient space for logistics development near the quay side. As the western breakwater is not extended, the angle of the northern breakwater is adjusted to bring it in line with the western breakwater. An underwater guide pier should direct sedimentation from the river estuary further to the north.

The figures below visualise the two long term development layouts.

Figure 1-18 Colombo Long Term Design - South Port Max

Figure 1-19 Colombo Long Term Design - North Port Large



In order to identify the preferred development option, a multi criteria analysis has been carried out. The table below summarizes the scores of the two development options; based on these scores, the South Port Max design is selected as the preferred long term development plan for Colombo Port.

Category	Score South Port Max	Score North Port Large
Capacity creation	**0.9**	0.6
Development flexibility	**2.2**	0.4
Terminal & port aspects	0.6	**1.4**
Manoeuvrability	**1.3**	0.7
Social & environmental impact	**1.4**	0.6
Final Score (weighted average)	**6.4**	**3.7**

In order to develop the port in line with increasing demand, a phased approach has been adopted towards the final 2050 South Port Max design. Specifically, additional layouts have been prepared for the short term (2025) and the medium term (2030). These two intermediate phases are visualised in the figure below.

Figure 1-20 Colombo South Port Max Phasing - 2025 (Left) and 2030

Potential of North Port development

South Port Max layout is based on the base case scenario in 2050 in the cargo forecast. North Port development is required only when unforeseen developments needs (or high case situation) emerge in the future. North Port development requires comprehensive technical and operational considerations, including vessel manoeuvring, water calmness in the basins, siltation, sand drift, flood- and river flows to determine its alignment (angle with the coast line) and layout. Some potential development options are preliminary assessed; these options are presented in the table below. Each option has its characteristics and of which pro and cons needs to be assessed during detailed studies.

Category	Assessment & Discussion Design		
	Energy Hub Concept	JICA Recommendation	SLPA Concept
			
Terminal & Ports Aspects	Aims at energy hub (liquid bulk) combined with containers, general cargo, RoRo and logistics	Aims at liquid bulk, containers, multi purpose and logistics through an island development	Aims at containers and liquid bulk with less space for logistics
Special feature	Energy hub can be developed as a standalone island in early phases. Bridge towards the North	Island with bridges towards North and South. Island can be developed with or without expanding south port	Bridge towards the North

Trincomalee port directions

Trincomalee has development potential due to its key strength of a protected natural bay with deep waters. It is the place of choice for bulk goods servicing the energy and production sector with a focus on the Bay of Bengal.

Trincomalee is a natural deep water port in eastern part of Sri Lanka. It is therefore ultimately well positioned to handle dry bulk cargoes for the country. Especially in connection to the planned corridor development and rail connections the port can emerge as important dry bulk and general cargo port. The establishment of a refinery and power stations would create an additional node in Sri Lankan industrial development.

Several key developments impact the success of the port of Trincomalee, among the most import is the development of the Colombo – Trincomalee corridor to ensure hinterland access to the port. Linked to that is the railway connection to the hinterland to ensure access and distribution of bulk goods to country. For Trincomalee to attract industries of its own, substantial effort should be placed in targeting investors in specific markets.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Trincomalee followed by priority projects.

Figure 1-21: Trincomalee Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	-	112	-	
Transhipment	-	-	-	
Total	-	112	-	-
Dry Bulk ('000 Tons)				
Coal	103	120	0.5%	347
Wheat / Maize / Corn	867	1,709	2.0%	1,161
Cement / Clinker / Gypsum	1,712	3,113	1.8%	2,200
Fertiliser	-	1,536	-	-
Biomass	-	500	-	-
Ilmenite	-	700	-	-
Total	**2,682**	**7,678**	**3.1%**	**3,708**
Liquid Bulk ('000 Tons)				
Crude Oil	-	-	-	-
Refined Oil	238	1,358	5.3%	10,692
LNG	-	-	-	-
Total	**238**	**1,358**	**5.3%**	**10,692**

General Cargo				
Non-containerised General Cargo	-	832	-	-
RoRo ('000 Vehicles)				
RoRo	-	-	-	-
Cruise				
Vessels	No data	21	-	-

Priority Projects Trincomalee

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Trincomalee:

SP1. **Ashroff Jetty Upgrade Phase 1 -** A belt system is needed to reduce inefficiencies of trucking to the Ashroff Jetty and to accommodate future cargoes. Land reclamation, the extension of the quay, new road development, new equipment amongst other should be included in the plans.

SP2. **Navigation Aids** - For night time navigation the ports needs lights, buoys and lighthouses to ensure safety. Maintenance can be outsourced to private parties. SLPA will be remunerated for these costs by increased traffic to the port for which it will receive port dues.

SP3. **Port Access Road Development** - A road connection starting from A15 near Lanka IOC heading North West will make it possible for port traffic to bypass the city traffic to A6.

SP4. **Rehabilitation and Extension of the Rail Connection** to the Ashroff Jetty

SP5. Make **promotional plan** on land and connectivity for newly assigned industrial and logistics.

SP6. **SLPA Land Use Plan** - The Trincomalee Port Zoning Report is a step in identifying the ports future needs to continue to think about which lands are lands need to be uninhabited for port development. A displacement plan, set-up years in advance will ensure a smooth process.

Trincomalee Port development plan

Ashroff Jetty

The proposed expansion of the Ashroff Jetty follows twee phases, adding two berths. The proposed shape is different from the SLPA development plans as it follows the natural depth of the water on the eastern side and tries to limit quay construction in shallow waters on the western side. The railway expansion from China Bay station is a necessity in order accommodate dry bulk transport to the Sri Lankan hinterland.

Figure 1-22: Expansion Ashroff, Railway and TTA

A	Phase 1 Ashroff Jetty expansion	F	Possible location coal stock pile
B	Phase 2 Ashroff Jetty expansion	G	SLPA land plot FVP 17
C	100m service jetty for tug boats	H	Rail expansion from China Bay station to Ashroff
D	Land reclamation	I	New road development
E	Service pier (-3m CD)		

Deep-water Oil Jetty

Due to the water depth constraint at Trincomalee jetty 3 (CD -11.5 m) the SLPA berthing facility can handle small tankers up to 45,000 DWT. Larger vessels are currently sailing to Colombo and Trincomalee is then opted as secondary discharge port. A new deep-water jetty could accommodate large mainline vessels of 50,000 to 80,000 DWT. This would enhance the economies of scale and have a positive effect on the purchase price of fuels in the nation.

The Jetty

Characteristics of the new jetty:

- Deep-water jetty of CD -18 m[5];
- Able to handle 80,000 DWT mainline vessels;
- Open jetty construction with service people walking about the jetty;
- Location at the end of prima flour;
- Maybe emergency response vehicles should be able to cross the jetty; then a regular steel construction is not sufficient;
- Pipelines exposed above ground to enable regular environmental checks and maintenance.

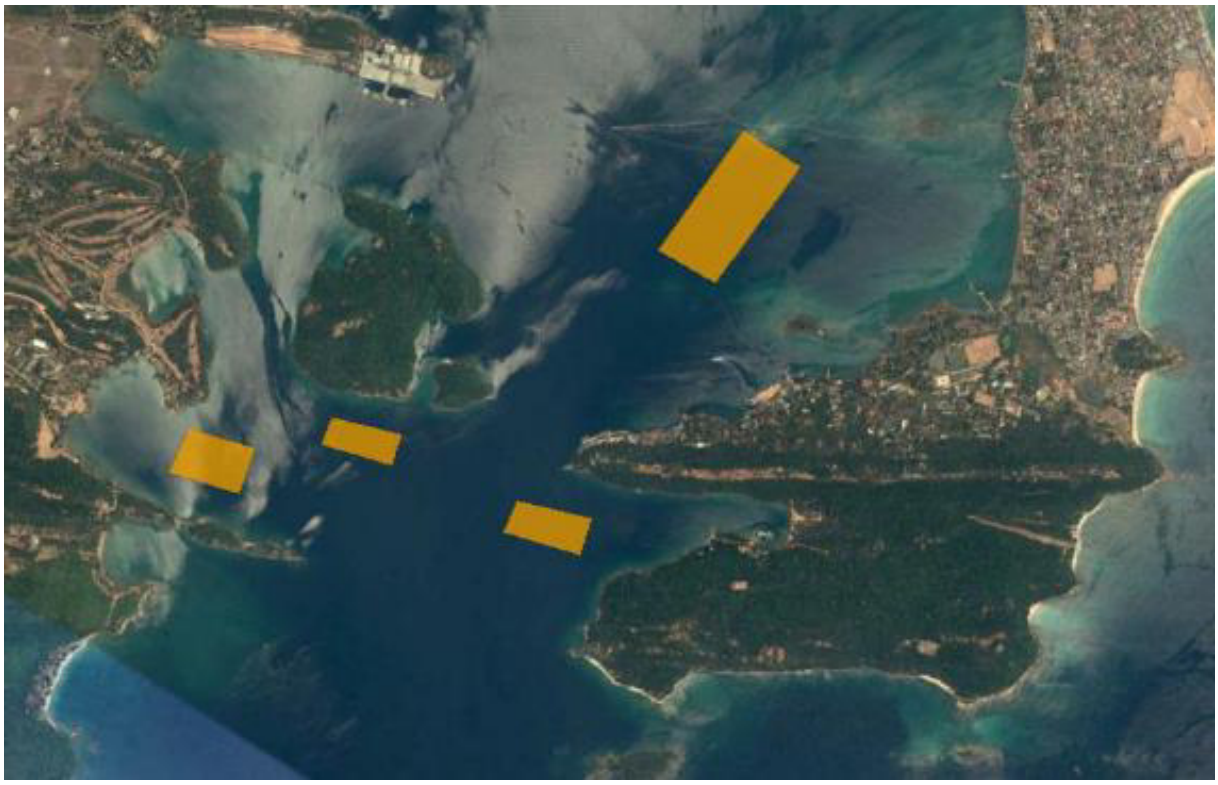
[5] It should be noted that in the proposed location about CD -18m water depth is available. The waterdepth required for a 80,000 DWT vessels would be around 15m.

Figure 1-23: Deep-water Oil Jetty

Ship Lay-up

The deep-water Trincomalee bay offers enough area for ship lay-up if SLPA deems the business case positive. The term 'ships laid-up' means ships which are temporarily idle due to lack of cargo or which are temporarily phased out of commercial operations. Ships are laid-up when freight rates are not sufficient to cover the running costs. During times of economic crisis, laying-up is often preferred to the sale of the ship.

Figure 1-24: Locations for Ship Lay-up



Connectivity

The existing railway line currently reaches the private facilities of Prima Flour and Tokyo Cement heading west. The expansion of the railway to Ashroff Jetty is essential for smooth operations at the jetty. The shunting yard next to the port needs expansion space as well, if possible.

The port is connected by road to the east coast of Sri Lanka through the A15 and heart of the country in the direction of Colombo through the A6. Currently, the area west of the port lacks sufficient connection for it to be developed. A connection starting from A15 near Lanka IOC heading north west will make it possible for port traffic to bypass the city traffic to A6. The land between road and rail can be used for industrial development.

Technical Assistance Consultant's Report

Project Number: 50184-001
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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

(Financed by the Japan Fund for Poverty Reduction)

The National Port Directions – Volume 1 (Part 2)

Prepared by

Maritime & Transport Business Solutions B.V. (MTBS)

Rotterdam, The Netherlands

For Sri Lanka Ports Authority

Asian Development Bank

Figure 1-25: Connectivity Trincomalee Port

Industrial Development & Logistics

SLPA has two potential areas of both in this picture of 160 ha to be designated to either logistics and more probably large-scale industries. The road connectivity will ensure good access to the areas.

Figure 1-26: Options Accommodation Phosphate Industry

Hambantota port directions

> Hambantota has ample industrial areas and combined with deep-water, the port is ideally suited for large voluminous products such as liquid bulk, cars, project cargoes and containers. It will act as anchor project for heavy and medium manufacturing industries port bounded industries which are not suitable for the heavy urbanised areas like the Western Province.

It is expected that Hambantota will encompass a bunker hub for vessels and emerge as an industrial port for Sri Lanka. The industrial value added activities can lead to economic gains to the region and Sri Lanka as a whole, if Sri Lankan labour will be trained and employed in the facilities.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Hambantota followed by priority projects.

Table 1-41 Hambantota Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	-	336	-	-
Transhipment	-	-	-	-
Total	**-**	**336**	**-**	**3,116**
Dry Bulk ('000 Tons)				
Coal	-	-	-	-
Wheat / Maize / Corn	-	228	-	-
Cement / Clinker / Gypsum	-	1,556	-	-
Fertiliser	-	-	-	-
Biomass	-	-	-	-
Ilmenite	-	-	-	-
Total	**-**	**1,784**	**-**	**-**
Liquid Bulk ('000 Tons)				
Crude Oil	-	5,007		-
Refined Oil	21	905	11.7%	-
LNG	-	1,994	-	-
Total	**21**	**7,906**	**19.1%**	**-**
General Cargo				
Non-containerised General Cargo	399	1,054	2.9%	750
RoRo ('000 Vehicles)				
RoRo	182	434	2.6%	515
Cruise				
Vessels	No data	10	-	-

Priority Projects Hambantota

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Hambantota:

SP1. **Container Terminal Concession -** A clear concession contract should be swiftly developed, after which operations should be handed over to the terminal operator.

SP2. **Break Bulk Terminal Concession -** A clear concession contract should be swiftly developed, after which operations should be handed over to the terminal operator.

SP3. **Industrial zone development plan -** A clear development plan sould be made to attract new businesses

SP4. **A dockyard development plan -** A feasibility plan for the development of a dock yard for large commerical vessels should be made.

SP5. **The refinery development plan** should be prepared - A feasibility plan for the development of a refinery should be made.

SP6. **SLPA Role** - The role of the SLPA/Customs/Navy in Hambantota port has been clarified and institutionalized under the concession contract and have to be implemented. These roles are important and comprise (i) the harbour master function; (ii) port safety and security; (iii) tugging and pilotage; and (iv) customs activities by Customs and (v) Navy should have a permanent base with mooring facilities for their largest ships.

Under the long term development the following additional elements are envisaged:

LP1. Develop a refinery in the industrial area near the port;

LP2. Should demand exists a Container terminal development (phase II) of additional 3960m quays;

LP3. An artificial island of 42ha for real estate commercial project development;

LP4. LNG operations and development on 110ha of land;

LP5. Small boat harbour (marina);

LP6. Additional industrial zones for the port.

Hambantota development plan

Short term development plan

The short term development focusses on:

- RoRo;
- Bunkering and LNG;
- Establishment of Dockyard and repair of large commercial ships;
- Development of Industrial zone;
- Concession of the conventional break bulk quays;
- Concession of the container terminal (phase I);
- Prepare for a refinery development.

RoRo operations

Sind 2012 when the RoRo was diverted from the Port of Colombo to the Port of Hambantota, the transshipment and local RO-RO operations have grown fast by utilizing its inherent features of land availability and well developed road network. In the short term development plan, priority has been given for this business by allocating wide yard space of 25 ha for RO-RO operation. Further measures have been identified to improve the quality, safety, security and efficiency of operation.

Bunkering/LPG/LNG and oil storage

Bunkering facility and tank farm in Hambantota will increase business after low utilisation during start-up periods. The private party offers bunker services, LNG and LPG. Further oil storage facilities (on total of 61 ha) has been established at some distance from the berths.

Dockyard for commercial ships

Establishment of a dockyard on 85ha of land for repair and building of ships has been considered in the short term business plan as a private investment project. It is envisaged to generate considerable employment opportunities in addition to the port income out of the project.

Industrial zone development

Utilizing the extensive land area available and the dedicated and integrated infrastructure, setting up of a planned industrial zone has been identified as a major development proposal in short term business plan. Successful bidders under RFPs will be given lands to establish their businesses and fresh RFPs will be invited for more investors to establish industries. Cement manufactures will be one of the first tenants for the zone.

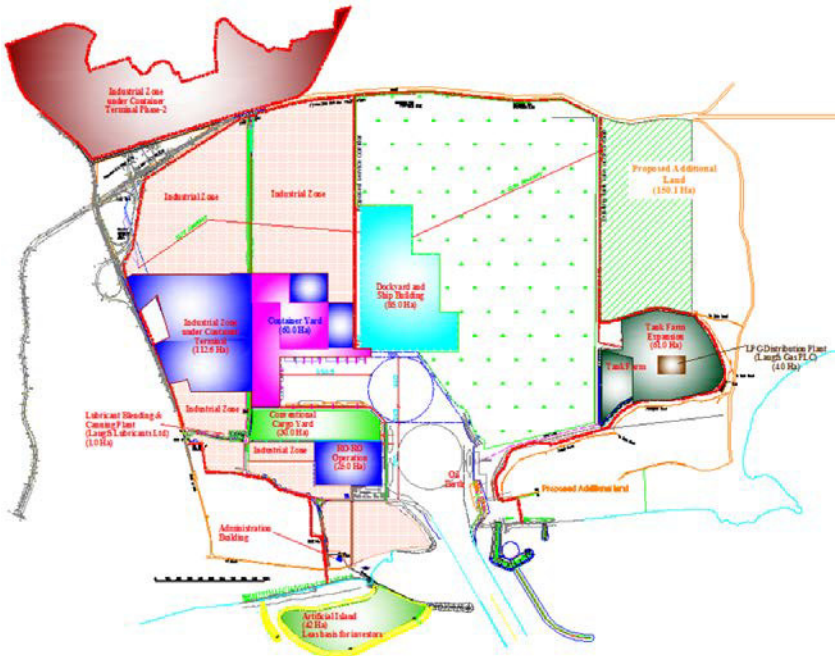
Conventional cargo

Conventional cargo or break bulk can be handled at the new facility. The total area is 30ha and has a berth length of 835m. A private operator shall be attracted to operate on this new facility. Cement and steel products are expected one of the first commodities.

Container terminal

The container terminal Phase I developed under Phase-II of the Port Development Project has been identified to develop and operate as a public-private partnership business. The new container terminal is planned to comprise 60ha. Currently only the feeder yard has been developed, the container yard at the back of the container apron has not yet been developed. The private investor will be offered land to establish industries and an area large 112.6 ha on the opposite site of the port road. This container terminal will facilitate importing raw materials and exporting finished products generated in the industrial zone.

Figure 1-27: Hambantota Short Term development



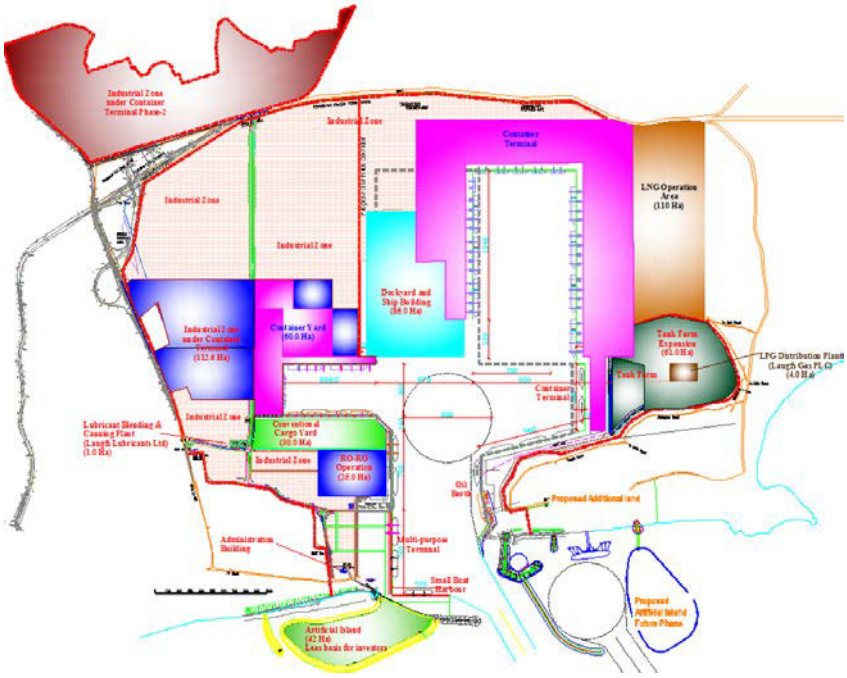
Long term development

Under the long term development the following additional elements are envisaged:

LP1. Develop a refinery in the industrial area near the port;
LP2. Should demand exists a Container terminal development (phase II) of additional 3960m quays;
LP3. An artificial island of 42ha for real estate commercial project development;
LP4. LNG operations and development on 110ha of land;
LP5. Small boat harbour (marina);
LP6. Additional industrial zones for the port.

This is illustrated in the picture below.

Figure 1-28: Hambantota Long Term development



Galle Port Directions

Galle port future is drafted around the touristic attraction of the heritage of the port. It is well suited for a cruise berth and additional touristic attraction including hotels. Galle's beaches; cultural heritage and future resorts can be a prime location for cruise and yacht vessels. The cement operations in Galle does not nicely combine with the tourism function. However, under strict conditions the facility may actually be able to upgrade and expand.[6] The ports Out Port Limit Services (OPL) consisting of crew changes services, supplying goods and spare parts shall remain acting in competition to possible new services from Hambantota. The marina for yachts is nicely combined with the tourisms attraction of the city and is rightly positioned.

Currently there are out of port limit services being performed at Galle which requires customs and immigration presence at the port. These businesses should be sustained as long there is a sustainable and profitable business model to the port. The passenger vessels or cruise vessels is a growing market for Galle port. Galle has a number of attractions including, the old fort and city heritage, world heritage rain forests Singharaja and

[6] The cement expansion plans came in after the submission of the first draft and hence not yet incorporated into the forecast.

Kanneliya, natural beaches (Unawatuna, Rumassala, corals and underwater attractions for divers. Galle is well connected to the national highway and daytrips are be planned frequently.

Combining the touristic values of Galle (Boating industry and cruise) with the existing cement manufacturing is not an ideal combination. However, modernisation of the cement plant with proper dust prevention through belt systems and green segregation between the facility and the port under a new concession with clear environmental criteria's could make the facility sustainable. It remains however advisable to discuss alternatives for settlements before approval is given on the modernisation plans.

Summary Conclusions

The table below provides an overview of the cargo flowing to Galle followed by a summary of the priority projects.

Table 1-42 Galle Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Galle		
Cement / Clinker / Gypsum	771	778
Non-containerised General Cargo	36	28
Cruise Vessels	no data	29 vessels

- It is expected that the cement facility in Galle will remain after major rehabilitation, resulting in ongoing cement handling operations in the port. It remains however advisable to discuss alternatives for settlements before approval is given on the modernisation plans.
- Galle is expected to have some local general cargo throughput.
- Galle is an attractive location for cruise passengers. A dedicated cruise berth can service demand; it is not foreseen that a dedicated passenger terminal is required.

Priority Projects Port of Galle

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Galle:

SP1. An improved **Vessel Monitoring System (VMS)**and communication system should be implemented.
SP2. **Power Barge** – The plans for a power barge should be further discussed and developed in cooperation with the Ceylon Electricity Board (CEB).
SP3. **Existing Marina extension under PPP** to about 100 berths (15m at 3m draft).
SP4. **Boat building and repair PPP facility** to be accommodated in the port.
SP5. **Decision by SLPA on modernisation of cement manufacturer at the port.**
SP6. **OPL additional mooring facilities** at breakwater under PPP.
SP7. **Breakwater works,** rehabilitation existing and creating a new outer breakwater.
SP8. **Customs and Immigration to be located at one building.**
SP9. **New offices** for deputy harbour master and regional manager.
SP10. **SLPA Land ownership** outside the port needs to be mapped and development options identified.

Following long term developments has been identified:

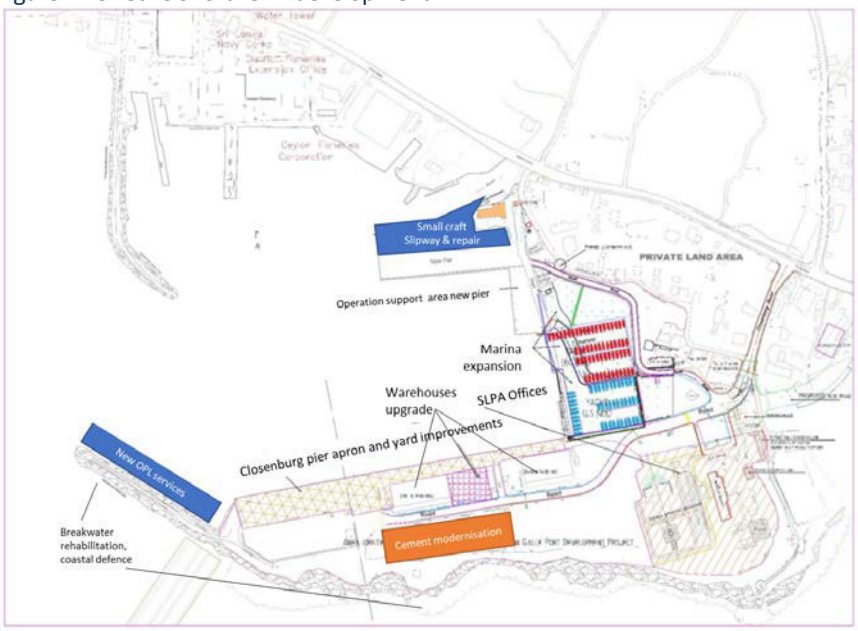
LP1. **Marina (phase II)** – Marina extension (phase II), close to Galle Ancient city, berthing for 100 yachts of 15m at 3m draft. The project would be under BOT terms.
LP2. **Marina (phase III)** – Marina extension (phase III) closer to Rumassala Hill as demand rises, berthing for approx. 100 yachts of 15m at 3m draft. The project would be under BOT terms.

LP3. **Cruise Berth** – A cruise berth should be developed in the long term to cater to the growing number of cruise vessel arrivals.

Galle development plan

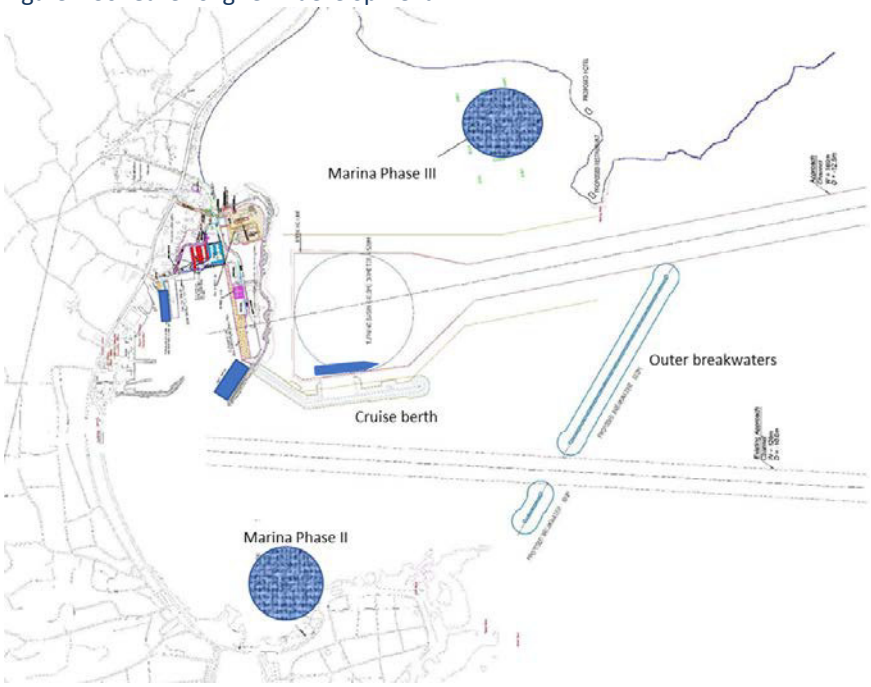
Galle development plan is illustrated in the picture below.

Figure 1-29: Galle Short Term development



Long term developments are displayed in the next picture, including the short term outer breakwater.

Figure 1-30: Galle Long Term development



Kankesanthurai (KKS) Port Directions

Kankesanthurai has a high development potential due to its proximity to a densely populated area and its (cultural) connection to India. The SLPA has several development options regarding the enabling of passenger transport and of the food and agriculture sector. Regarding port development, a need for a multi-purpose is apparent to service the region, but further studies should go into detail about the need for the railway line for cargo transport and passenger transport. The estimation in the SLPA master plan assumes 500 passengers per day in both ways which is an estimation of before 1984. The passenger estimation thus needs an update. Three piers will be revamped, one dedicated for the navy.

KKS can retain its navy presence for security and other auxiliary functions should be developed per demand.

Summary Conclusions

The table below provides an overview of the cargo flowing to KKS followed by a summary of conclusions.

Table 1-43 Kankesanthurai Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
KKS		
Non-containerised General Cargo	31	277

- KKS is envisioned to fulfil a major role in Sri Lanka's northern regions' throughput of general cargo to and from India.

Priority Projects Kankesanthurai

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Kankesanthurai:

SP1. **VMS –** An improved Vessel Monitoring System and communication system should be implemented.
SP2. **Port Planning** – A comprehensive port development plan should be prepared, including a demand study for passengers and cargo activities. Three piers will be revamped, one dedicated for the navy.
SP3. **Development of two small multi purpose warehouses**.
SP4. **Gate and gatehouse development**.
SP5. **Breakwater rehabilitation.**
SP6. **Pier I extension** to 120m at 6m waterdepth.
SP7. **Port road** connecting facilities at the breakwater to the main road outside the port.
SP8. **Develop economic zone near the port.**
SP9. **New Multi-Purpose feeder berth** – A multi-purpose berth should be developed under an to be granted Indian credit line.

The long term plans are:

LP1. Rail connectivity at the port through rail extension of 1.2km.

KKS development plan

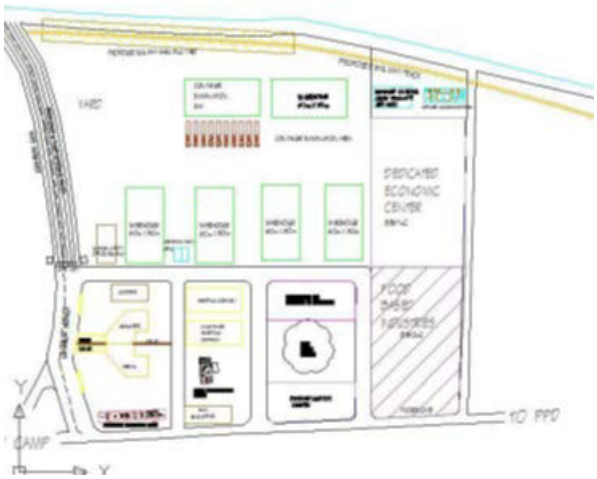
Kankesanthurai developments are illustrated in next pictures.

Figure 1-31: Kankesanthurai port developments

Under the short term an Economic zone development of about 9ha in planned for:

- Warehousing
- Container depot
- Mineral depot
- Rail shunting yard
- Dedicated economic centre
- Food based industries
- Customs inspections
- Offices

Figure 1-32: Kankesanthurai Economic Zone and Railway connection



Oluvil Port Directions

Oluvil will be a small port serving local, mainly fishery, needs. The port is not near an Expressway or any planned Expressway and therefor remains a small regional focussed (fishery-) port. SLPA plans to expand commercial operations for the food processing industry at Oluvil alongside the development of the fishery sector to allow for a mechanised fishing fleet and increased fish processing. The agricultural hinterland of Oluvil is expected to generate 25% of the nation's maize production and paddy production which is mainly processed locally and transported by truck. The agriculture sector generates also some fertilisers and storage facilities and packing facilities can be a target area. Also, the livestock sector is a possible market sector in which this port may become active. The eastern region contributes to 17% of the national milk production and possess 14% of the cattle population and 11.7% of the goat/sheep population and 11% of the buffalo population of the country. Hence it is viable to develop livestock related industries in the region such as meat processing and production of dairy products like Milk/Yogurt/Curd. These would require additional cold storage facilities.

Hence in the proximity of the port a FTZ/ EPZ zone should created with the focus to accommodate the industrial value added activities, processing and warehouse services for the following sectors:

- Fish industry (fish processing and canning)
- Agri sector (maize, paddy)
- Livestock sector (meat and dairy products)
- Agro chemical sector (warehousing and packaging of fertilisers).

The majority of the output of the region is for national consumption but export oriented processing can be developed through sea transportation. Also, some domestic feeder vessel can be expected in the future connecting to main ports of Colombo, Trincomalee and Hambantota.

Summary Conclusions

The table below provides an overview of the cargo flowing to Oluvil, followed by a summary of conclusions.

Table 1-44 Oluvil Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Non-containerised General Cargo	no data	28

- Oluvil is expected to have some local general cargo throughput.

Priority Projects Oluvil

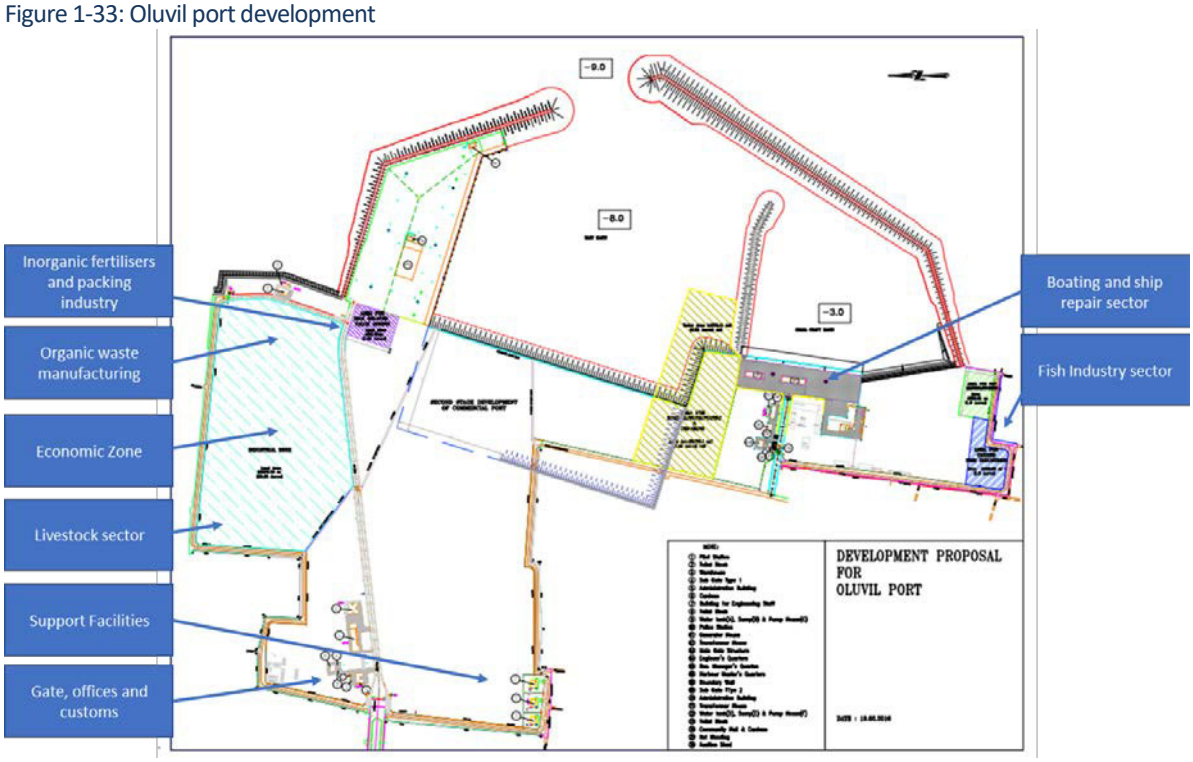
The following short term priority projects have been identified:

SP1. **VMS –** An improved Vessel Monitoring System and communication system should be implemented.
SP2. **Solve Siltation and Erosion** - Solve siltation issues in the port, protect coast from erosion
SP3. **Develop the fishery sector** – Attract fish processing and net manufacturing.
SP4. **Develop the agri sector** – Attract processing and warehousing for maize and paddy.
SP5. **Develop the organic waste –** Attract organic waste producer which utilise waste from fish manufacturing.
SP6. **Develop the inorganic fertiliser packing industry –** Attract packing and fertiliser processing industry.
SP7. **Develop livestock sector** – Attract cluster for dairy and meat processing.
SP8. **Develop the shiprepair industry for small boats and fishery vessels –** Attract shiprepair industry

Oluvil development plan

The following picture shows the proposed developments near the port.

Figure 1-33: Oluvil port development



Puttalam Directions

They jetty in Puttalam is used to barge coal to the stockpile next to the Norochcholai power plant. The jetty cannot be operated during Monsoon season leading to high stockpiles of coal, which add to storage and purchasing costs of coal. The solution is found in rail transport of coal through Trincomalee. The latter already takes place but rail connection onto the power station is lacking.

Summary Conclusions

The table below provides an overview of the cargo flowing to Puttalam followed by a summary of conclusions.

Table 1-45 Puttalam Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Coal	1,836	2,280

- Puttalam is to retain its function as import facility for the power plant.

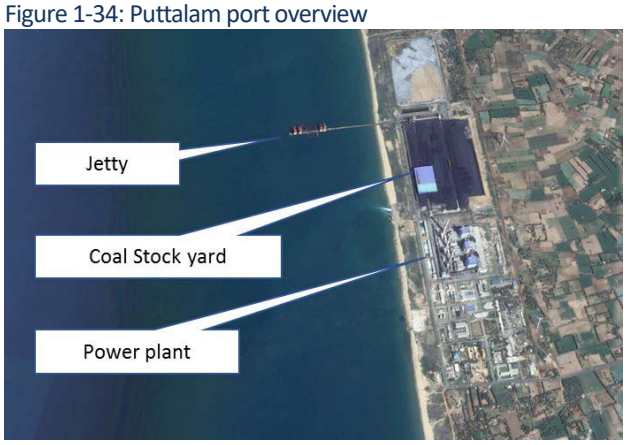
Priority Projects Puttalam coal jetty

No priority projects have been identified for Puttalam.

Puttalam development plan

The Puttalam coal fired power station stay an important contributor to the energy sector.
Developments on the jetty are focussed around maintenance. No major changes are expected except for the option that local cement manufacturers should explore the possibility to co-use the coal facility for their supply.

Figure 1-34: Puttalam port overview



Recommendations on other matters

Recommendations are given on other matters than direct port developments, these recommendations related to; **national connectivity roads and rail, coastal shipping, inland water transport, Dry Ports or logistic hub concepts, Innovation-Technology- IT and Port Community Systems, warehousing, trade facilitation, Customs, Navy and Auxiliary functions**. The numbering is done to provide clarity on the numerous recommendations and their topics. For detailed observations, assessments, international best practice and examples the reader is invited to read the respective sections.

Recommendations on National Road Connectivity

The national highway structures should provide connectivity to all major ports and connect between them through nodal points near the Western region.

R1. Development of the Port Access Elevated Highway, 5.2km (Fort to 2nd New Bridge Project).
R2. Development of improving Colombo port roads and connectivity to PAEH.
R3. Development of 2nd New Kelani Bridge project with connection to PAEH and E03
R4. Development connection 2nd New Kelani Bridge to E02.
R5. Development of the E04 Expressway, which connects Colombo to Kandy.
R6. Development of E01 Expressway extension from Matara to Hambantota.
R7. Proposed Central Expressway from Colombo to Trincomalee (partly using E04).

Recommendations on National Rail Connectivity for cargo transportation

For the improvement of cargo rail transport, the following development projects recommendations have been identified:

R1. A rail track reservation in the Port of Colombo with extension to south port will enable direct rail handling near the terminals. The future rail cargo transportation according to the national rail masterplan towards newly developed inland dry ports can then be accommodated.
R2. Extension of network from China Bay station to Ashroff jetty – like the development of a rail connection between Maho junction and Puttalam, an extension of the rail network to the Ashroff jetty would reduce transhipment costs from truck to rail (at China Bay station), making rail transport from the port of Trincomalee more competitive.
R3. Extension of network from Maho junction to Puttalam – currently, coal for the Puttalam cement factory is shipped to Trincomalee, trucked to China Bay station, transported by rail from China Bay to Maho Junction, and then trucked to Puttalam cement factories. A direct rail connection to the Puttalam facility would substantially improve the cost-efficiency of coal transport to the cement plants, as it removes the need for the last transhipment from rail to truck. A more cost-efficient connection between Trincomalee and Puttalam could also make coal transport to the Puttalam power plant more attractive.

R4. Extension of network from Matara to Hambantota – it is envisioned that Hambantota port will handle several types of gateway cargo for Sri Lanka; currently, the port already handles vehicle imports, which are mainly destined for the Colombo area. A rail connection between Hambantota port and Colombo could substantially reduce land transport costs.
R5. Extension of network from Kankesanthurai to Kankesanthurai port – the city of Kankesanthurai is already connected to the national rail network; through a short extension of the existing network, the port of Kankesanthurai can be included in the network.

Recommendations on coastal shipping transportation

There are five types of coastal shipping opportunities which are recommended to be developed:

R1. Development of coastal Container feeder transportation development
R2. Development of coastal Bulk transportation
R3. Development of coastal Liquid bulk transportation
R4. Development of Passenger transportation
R5. Development of Cruises for Multiple ports in Sri Lanka

Recommendations on inland waterways passenger transportation

On inland water transportation the following recommendations are made:

R1. Perform feasibility studies for the inlandwaterways passenger transportation (taxi, cruising and crossing) on the three identified rivers in the Colombo district (Kelani, Beira lake and Wellawatta – Battaramulla Line)
R2. Create a national overview for the development of the boating industry at river estuaries/ lagoons taking into account the development to touristic centra, local geography and attractiveness of nature and/or wildlife. Some place would be ideal for (speed)boating whlist other should be developed for ecotourism.

Recommendations on Logisctics Hubs – Dry Port – FTZ

The container handling and Logistic activities in the port hinterland are dispersed and in heavily urban areas with little room for expansion.

R1. New logistics areas have to be assigned to complement the Port of Colombo and to facilitate the export strategy of Sri Lanka. Zoning for this should cover an area of about 450 ha in the first phase with options for further expansion.
R2. A case for centralisation of dry port areas should be made and less inhabited land seems available West of the E03. This would create optimal location to connect to New North Port development with dedicated cargo roads and linking the existing highways. Rail connection should be planned for in line with Sri Lankan rail Authority rail cargo transportation plans. Operational and financial feasibility studies with an underlying transport plan which includes the PAEH could offer further guidance.
R3. It is recommended to assign SLPA as land lord of the single or multiple dry ports to enable to maintain a close connection with port planning.

Recommendations on Colombo – Trincomalee Corridor

The Colombo - Trincomalee corridor is recommended to be supported by at least five elements on infrastructure:

R1. Connectivity to central region and industrial hinterland, proposed nodes and urban centres: A central Expressway along corridor spine A01-A06 with a 50km influence area on either side. Further multimodal strengthening of rail connectivity of trincomalee to dambulla and direct connectivity to Kurunegala would improve rail connectivity for Bulk-users near Colombo
R2. Urban infrastructure to support increase in urbanisation and enhanced quality of life. The Eastern corridor region infrastructure is one of the least developed with low road density and low level of urban infrastructure.

R3. Efficiency and effectiveness of water and power supply to support the competitiveness of industrial activity.

R4. Support infrastructure for Dry ports & inland terminals: Domestic container handling at the port could move inland to FTZ zones to reduce congestion at the port and to incentivize value added services along nodes at the corridor. These logistics hubs need warehouses and basic infrastructure on roads, watersupply and electricity (power) including waste managementplant and waste treament plants.

R5. Gateway capacity and efficiency: Port of Colombo will continue to remain the primary gateway for goods as well as for passeger traffic expansion with BIA and a second runway and Colombo Port is set to expand capacity and bring efficiency improvements.

Recommendations on IT and Port Community system

Following IT system introductions are recommended to increase business efficiency and introduce paperless business environment:

R1. MIS – develop MIS information system linked to single window

- Management Information Dashboard - With functions to drill down and compare projected vs actual. Provide warnings for action, emails and alerts for action, division specific for quick action.
- Inter Port Information - To provide statistics and utilization, demands, productivity and performances. Other technical and business information that needs only to be shared between terminals, will be resident here.
- Internal procedure manuals, circulars, process flow diagrams, handbooks, business information, notices boards are enabled.
- Rental & Lease Agreements
- Business Intelligence for management decision making

R2. TOS – Upgrade Navis Sparcs to N4

- Intelligent Yard, Equipment, Shifts Planning and Gate Automation
- Operation & Utilization - of the Quay, Yard, Equipment, Storage, Business Intelligence, his allows pre-planning of the yard, assigning of cranes, and other handling equipment, manpower planning for optimum throughput.
- For billing information to be generated without human interference, instead to run as a procedure, and process based.
- Reservation and Priority services

R3. Warehouse Management System

- Introduction of a fully automated warehouse system that will systematically receive the cargo, and store in the pre-defined space. Automatically calculate storage and demurrage charges, advise to shuffle cargo to optimize floor utilization. This system to automatically send out the cargo information to the single window system to advice consignee to follow instructions and to make arrangements, includes booking reservation to clear after the dues are paid to a bank.

R4. Single Window – Including sub systems works to provide the essential information. They can be gradually incorporated, and will be unrestricted for time of introduction and automation. The system and the demand will automatically drive the need. Always a proven system is recommended. Knowledgeable people have done this before.

- FAL convention – electronic data from ship to port
  - Mapping data elements with various organisations and institutions.
- Customs link with Portal
  - Customs procedures

- Information required by the consignee to clear his cargo
- Customs e-declaration
- Customs e- payment
- Customs clearance notifications

- Shippers & Consignees Portal
  - Organise export documentation
  - Organise import documentation
  - Check status of the container
  - Truck and cargo arrival notifications
  - Vessel arrival/departure notifications
  - Exchange notice of Readiness
  - Container release notification

- e-Commerce - The list is unlimited and each subsystem can be selected from the master page. The business portal for all service providers and service seekers enabling a transparent fair playing ground customer service
  - Competitive and fair to all
  - Links approval granting organizations to speed up processes
  - National business Port information and data published for information sharing
  - Truck & Transport Services
  - CASA (Ceylon Association of Ships Agents)
  - Banks & Payment Gateways
  - Contract Labour
  - Private warehouses

- Media
  - Web Sites
  - Language Translation
  - Customs Notifications
  - Business Announcements
  - Financial Notifications
  - Contact page

- Central Publications & Corporate Communication
  - Port Legal Policies Procedures & Rules
  - Language Translator
  - Call Centre, Complaint Handling & Customer Services
  - Social Media & Library of References and Business Publications
  - Safety Rules, location maps & Calendar
  - Registration formats & online data input forms
  - Space Availability, public announcements, procurement & charts

Recommendations on Warehousing by SLPA

The following recommendations can be made regarding SLPA's warehousing design and development:

R1. Port of Colombo: Design and construction of a **new warehouse to cover the MCC** operational requirements in the future.

R2. Port of Colombo: Investment in new equipment (pallet trucks, reach stackers) to **operate the logistics warehouse.**

R3. Port of Colombo: Procurement of a modern, state-of-the-art **Warehouse Management System (WMS).**

R4. All Ports: Apply the Warehouse Management System (WMS) to new warehouse developments.

Recommendations on Trade Facilitation

The following recommendations are identified on trade facilitation to create a proper business environment to attract FDI and to support Economic Processing Zone and Logistics Hubs.

R1. Develop a Roadmap for the development of Logistics hubs.

The plan should address following identified issues:

- Reduction of fragmentation institutional network: the purpose is to reduce cost and time of import and export procedures. China has only 11 agencies that provide 129 services, from customs clearing to issuing Authorised Economic Operator (AEO) authorisation. Sri Lanka has more than 20 and less developed services;
- Defining operational guidelines: to implement new or updated regulations and legislation such as Merchant Shipping Act;
- Unified Customs duty: unify the existing Customs duty and other pare-tariffs (PAL, VAT, CESS, Customs Surcharge, etc.) into a single Customs duty;
- Information Technology Agreement: join the Information Technology Agreement of the WTO to create a free trade in electronics, to attract FDI to this sector as shown in the examples of Singapore, China and South Korea.

In the planning of the port linked EPZ development and attracting FDI the following aspects are recommended to be addressed:

R2. EPZ policies that attract investments from large logistic sector operators, banks and insurers as well as developers: national and local tax benefits including full exemption of tax for companies from priority sectors for up to 5 years with diversified investment threshold. Priority sectors for the port EPZ are food and beverages, spices and concentrates, IT/electronics and logistics;

R3. Solutions for easy establishment of foreign labour: the EPZs should offer to investors the opportunity to employ foreign high-skilled labour with fast-tracked permit procedures and more relaxed labour laws regarding termination of the contract;

R4. Lower investment threshold for manufacturing companies: manufacturing companies would have a lower investment threshold with the view of prioritising export sectors and value-added operations for the transhipment goods, especially targeting Indian sub-continent. The duration and size of the benefits will vary with the size of the investment. Detailed thresholds will be determined by better understanding type and size of companies with potential interest to establish in the EPZ;

R5. Use of modern technologies: base development on use of modern technologies to connect logistic companies, institutions, industries and service providers – Port community, Single Window, Trade Portal, Integrated trade platforms;

R6. Improve skills: improve skill base at SLPA through structured training programmes targeting skills required to run EPZs;

R7. EPZ promotion programme: design a modern EPZ promotion programme based on geographical advantages; the opportunities offered to traders by signed FTAs, trade and logistics hub concept, stimulating trade policies and strong investment incentives.

Recommendations on Customs

The following recommendations are made on Customs:

Customs – General

R1. **Customs should further improve and liberalise their activities** to create a split between the physical flow of goods and the administrative flow of goods. In this way, the import flow can be sped up and import duties can be paid once goods are in transport. Digitalisation of the import duties payments shall improve the flow of goods.

R2. Move to fully electronic Customs processing: customs entries are currently being filed electronically. Next step should be to move towards getting the appraisal/verification of Customs entry to be done electronically on the system. This obviates the need to visit the Customs office and will greatly speed up and simplify the processing of documents;

R3. Build modern set of incentives for customs officers: to facilitate moving to full online processing and increase transparency, a generous incentive scheme to reward Customs officials for speed in processing documents should be considered. Such a reward scheme could be based on the number of applications approved per day, to align the interests of the importer and the Customs staff;

R4. Allow pre-documentation as standard for all goods: currently, this facility is available only for perishable cargo; it should be extended to all cargo, to minimise bottlenecks when vessels arrive;

R5. Develop AEO scheme: SLPA could start promoting port level AEO scheme that could be extended to PA run EPZ. The scheme should include provisions to improve valuation and risk management and, in this way, reduce the congestions at the port. Modern customs management technology such as extended port single window can be employed to fast track AEO status to all export firms in line with the best practice. All new investors in PA EPZ should be considered for fast-track into the AEO scheme;

Customs - IT

R6. Asycuda World is able to handle electronic payments and electronic payments should be encouraged. Eg Customs should facilitate e-payment more and industry needs to be educated to use it.

R7. Customs is recommended to further improve the **customs single window** and become paperless. Further it is recommended to facilitate and promote the development of a **single maritime window** (with which customs in the future, would electronically distribute their clearances)

Customs - Clearance of goods

R8. **Goods Clearance should become independent of the physical flow**. By promoting the use of EDI the E-declaration can be done whilst goods are in transport towards the port of entry. E-Clearance can therefore (based on risk management) already be provided before the goods arrive at the port. Customs in this respect should not interfere in the physical flow with exemption of the identified goods under the high risk profiles. Digitalisation is also the best method to reduce the level of bribery.

Customs - Risk management

R9. **Risk management is key in the allowance of free movement of goods** when clearance is provided.

R10. Risk profiles in Sri Lanka is still set at high levels. **Once more trust has been built into the system the share of the green line can increase**. This can be obtained by increase fines for trespassers and reduce the costs for trustworthy consignees. “Intervention squads” should ensure that Green line consignees are indeed occasionally checked. Charge on manual declarations should be made rather than at computerized declarations to create incentives.

Customs Gate efficiency

R11. **The gate procedure needs to be simplified and to become paperless**. This can be done through a digital gatepass. Seals with GPS will enable the truck to pass through a RFID identifier at the main gate. In that case the seal needs to be mounted at the terminal gates instead of at the main gate.

Customs Green line

R12. **The Green line should be promoted and increased through proper risk management**. Due to the large number of small consignees and the rapid changes of consignees this is not easy but it is the only way

forward to a more efficient transport system. Large and or regular consignees should be promoted to the green line. Customs is advised to increase the Green line volumes supported by random scanning checks at newly assigned Green line users. In the end shippers and consignees shall have a full paperless interface with customs through their customs single window and physical inspection is dramatically reduced.

Customs Scanning

R13. The **terminal inspection should be reduced to a minimum** and more containers should be send through Green Line or through to the Scanning line. Reasoning is that space at the terminals is required for cargo operations.

R14. **A Scanning Line is to be introduced next to the Green Line based on proper risk management**. This scanning is done before physical inspection is carried out and should have the aim to reduce the amount of physical inspection. Automate Customs inspections by installing scanners: replace physical inspection with electronic scanning as a standard procedure. The physical inspection should be based on modern risk management models.

R15. Customs likes to implement 100% scanning. This is not advisable when the set-up and operational efficiency is not in place and the scanning results in unacceptable queuing and waiting times. So **the risk/reward of 100% scanning should be evaluated** as well as the cost incurred to society when 100% scanning leads to long waiting times of trucks as well as increased number of physical inspections.

R16. **The scanning is done preferably by fixed scanners in which the driver will exit the truck**. The health issue of exposure to radiation needs to be addressed and normally the truck-driver will exit the truck whilst the truck is pulled through the scanner.

Customs Inspection

R17. **Inspection should be concentrated among a few (preferably one) site(s**) to increase use of resources and planning.

R18. The area near Bloemandhal Area has been appointed for this. The total capacity on inspection should become more efficient to handle more containers simultaneously and have a **larger capacity by implementing fixed container scans** and to reduce the level of physical inspections.

Customs detained goods

R19. **The areas for customs detained goods should be allocated outside the port zone to free warehouse spaces.** Customs has several spaces in the port zone which is used for detained cargoes. These warehouses and spaces occupy valuable port land without any income for the port.

Recommendations on Navy

R1. The coast guard function of the Navy is important to protect the Nation. In view of increased boating activities around the coast the Navy should prepare themselves for increased demand for surveillance. The influence phere in coastal waters is 200nm beyond which is regarded as international waters, as determined in the United Nations Convention in the Law of the Sea (UNCLOS).

R2. A permanent Navy basis should be implemented in Hambantota as this port is closest to international shipping routes.

R3. Additional berthing spaces to be developed in ports of Hambantota and Trincomalee for the largest navy vessels.

Recommendations on Auxiliary functions

International benchmarking

R1. Port of Colombo lacks development space for **distribution centres and logistics**. This is either to be found in several sections North of Colombo (but preferably one) or at reclaimed land as part of north port development.

R2. Port of Colombo has to cater for new industries like the new **LNG powerplant**

R3. **Bunkering** is an auxiliary function which hold promises for the future. The port should prepare to offer this in a liquid bulk hub.

R4. Port of Colombo should be part of a **national unit which offer emergency response** and salvage through supplying heavy offshore tugs.
R5. The Sri Lankan **free trade zone policy** is not adequate, and should upgraded in this respect.
R6. **Tax incentives** are provided to new industries and port zones but a one-stop shop for FDI is required.
R7. Through **investments in the logistics chain** and port accessibility, Sri Lanka should move up in the ranking of the World Bank Logistic performance index.
R8. **Ease of doing business**. This is a ranking from the World Bank to summarize the ease of doing business. It includes customs bottlenecks and bureaucracy in general. Sri Lanka is to upgrade its position through implementing trade facilitation policies and a Single Window.
R9. The **airport to sea function** should be promoted to attract additional cruise vessels.

Tug and Pilots

R1. Given the growth in demand for pilotage services, **it is recommended to purchase an extra tug of 80 ton Bollard Pull.** This could also avoid the costs of hiring tugs from private suppliers. A 80t BP tug can be used for Mega containerships and ocean emergency response or salvage.
R2. **SLPA should reduce the crew size** assigned for tugs which is well above the required levels.
R3. It is advisable **to outsource the maintenance activities** of tugs in order to provide continuous pilotage service.
R4. **Tugs which perform salvage operations should be additional to the port operations** in order to the keep the port towage operations running whilst a salvage operation is executed. Salvage tugs to be stationed at geographical strategic locations like Port of Colombo, Hambantota and Trincomalee.
R5. It is recommended **to form a company which is a fully owned subsidiary of SLPA to carryout pilotage services** in the long run as the company structure would be flexible and effective in operations and finance decision making. It should be independently operated as a profit centre.

Bunkering

R6. It is recommended **to develop capacity for bunkering services at Colombo port** considering short and medium term needs having duly assessed the services of competing ports such as Hambantota.
R7. **LNG** being a new source of fuel for ships which is currently being tested, could become category of fuel that port of **Colombo must be ready in the long run with appropriate capacity**.
R8. It is recommended SLPA to form **joint venture company with Ceylon Petroleum Corporation**(CPC) to benefit from synergies of both. SLPA has the infrastructure while CPC has the speciality in supplies. The newly formed joint venture company should be independently operated as a profit centre.

Watersupply

R9. **Port of Colombo: Water supply should remain in the same location**, but investments needed on water barges & pumping capacity
R10. **New quays should be equipped with water supply abilities once developed in ports.**
R11. Other ports should have water supply services as well.

Weighing and scanning

R12. **Terminals operators** must have a **VGM facilities** as each container and each port should be verified otherwise they are not allowed to be loaded on a vessel
R13. The **digitalisation** and the **integration** of information of **weighing facilities** should be organised.

Ballast Water Management

R14. Investigate the **BWM regulation** and the way SLPA can conform to this at each port.

Ship repair and facilities

R15. SLPA should consider to have the **periodic maintenance their own tugs and pilot boats** and other marine equipment done by third parties in order to concentrate to their core activities.
R16. It is advisable to **rent-out ship yard facilities** during idle times.
R17. It is recommended to **monitor Marine Engineering division as an identified business segment** of SLPA with separately tracking of revenue and costs.
R18. It is recommended to investigate to obtain **more stake in Colombo Dock Yard PLC** in the long run to be benefited from repair services given to the SLPA as a related party as well as a share of the overall profits of the company from its total operations.
R19. At Trincomalee, ship repair facilities for small vessels is to developed under PPP.
R20. At Hambantota ship repair facilities for large vessels is planned
R21. At port of Oluvil ship repair for small boats is planned.

Container maintenance and repair

R22. **Container maintenance & repair** services to remain with the private sector and promoted to be near Ports and Logistics Hubs.

Empty depots

R23. **Container empty depots to be facilitated** at newly developed Dry ports.

Fleet registration and classification

R24. Ship recognition and identification should be supported by a **fleet database** which ensures updated information on the vessels particulars and classifications. This applies to all ports.

Out of Port Services and crew services

R25. **OPL and Ships crew services** are important for the vessels that pass Sri Lanka on route. Fast crew services can be further expanded from Galle and developed in Hambantota. An efficient connection with the airports is required.

Training centres

R26. It is recommended to market the courses provided by the Centre among **external students to generate revenue** and sustain as a self-sufficient centre.
R27. It is advisable to **improve the current status of the centre** to campus through external affiliations and finding synergies with other training institutes in the world.
R28. It is recommended to restructure the centre as a **fully owned subsidiary company of SLPA** in the long run which independently operates as a profit centre.

Marina's

R29. It is recommended to develop **marina facilities outside the commercial port** boundaries of port of Colombo to minimize disturbances to commercial activities and possible accidents.
R30. A new marina is to be planned at Trincomalee.
R31. At Galle the existing marina is to be upgraded.
R32. At Hambantota a new marina is planned.
R33. At Oluvil small boats moorings are projected.
R34. At KKS small boats moorings are projected.
R35. It is recommended to make a PPP construction for each for the large marina's in the nation.

Licensing & Chandlery

R36. The **licenses should be digitalised** where possible. An online system should show the status of licenses.

R37. It is advisable for ship chandlery service **to remain with private parties** as the SLPA should focus on core value added activities.

Fire department

R38. At Colombo the fire department should be strengthen with adequate number of **firing engines and staff** considering the development of more terminals at Colombo Port and expected increase in oil tankers of LPG & LNG.

R39. At all ports in Sri Lanka the Fire department service should continue to be provided by SLPA as an **essential service** under harbour master control.

R40. It is recommended to **financially monitor fire division** as an identified business segment of SLPA with separately tracking of revenue and costs.

R41. **Emergency response plans** should be updated for all ports in Sri Lanka.

Medical services

R42. It is recommended that port authority should consider **outsourcing medical services** to private/public entity to focus on more value added activities.

R43. SLPA **employees** should be given **medical insurance** covers to reimburse the medical expenses obtained from private entities. The cost of medical insurance cover could be shared between SLPA and employees in appropriate proportion.

Financial services

R44. SLPA should promote **electronic payments** among port users by providing required platforms at all ports.

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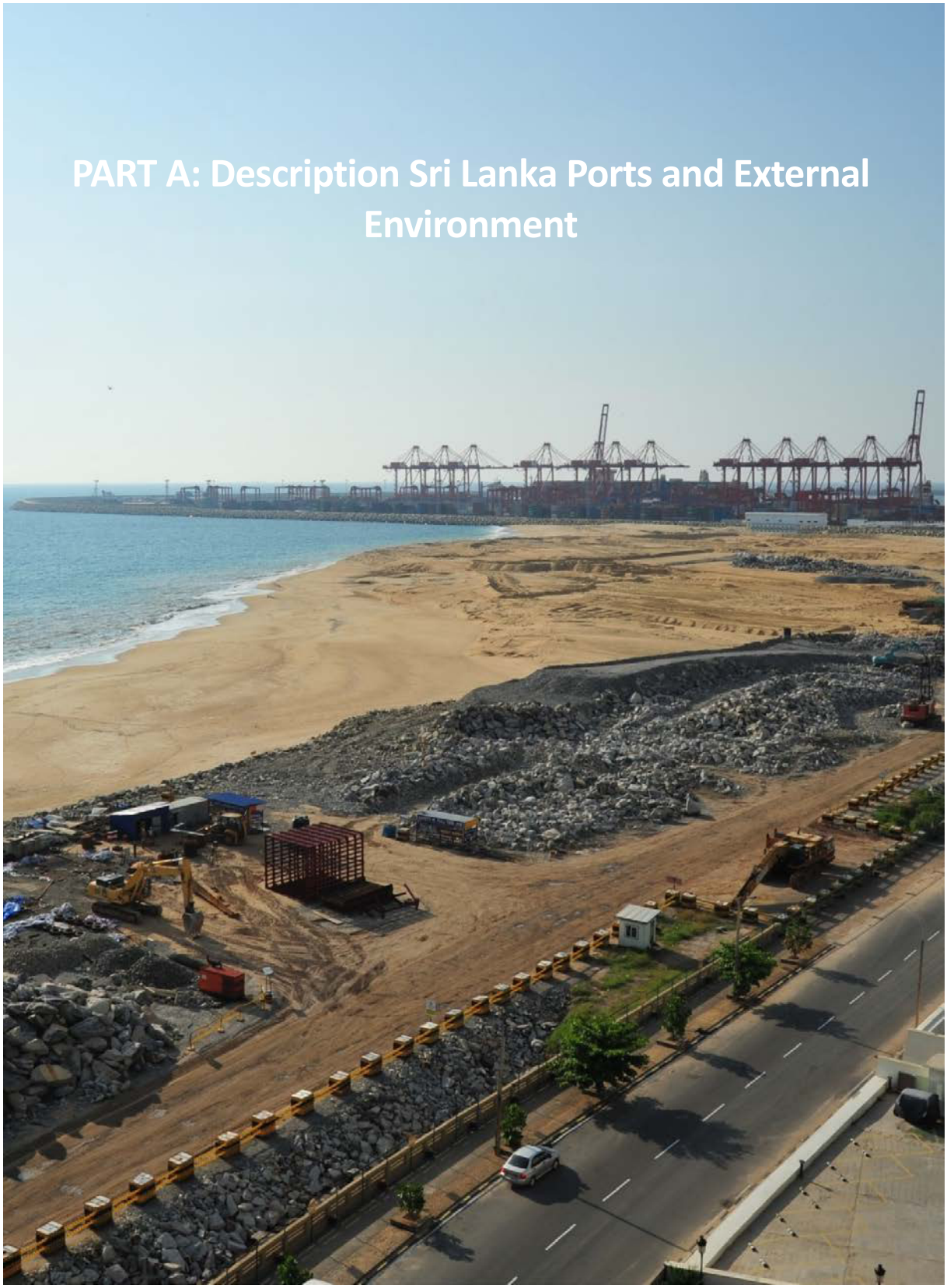
PART A: Description Sri Lanka Ports and External Environment



1 Introduction

1.1 Background

On the 30th of November 2016, the Asian Development Bank (ADB) and Maritime & Transport Business Solutions B.V. (MTBS; representing the Consultant) signed the contract for the development of a National Port Master Plan for Sri Lanka (ADB reference 50184-001).

The primary objective of the assignment is to develop an overarching and integral guidance document that can be employed by the Sri Lanka Port Authority (SLPA) to harmonize and strengthen the Sri Lankan port sector. To this end, the Sri Lanka National Port Master Plan will comprise the following main components:

- National Port Directions (this report);
- Detailed Port Development Plans:
  - Colombo;
  - Trincomalee;
- A Shortlist of Connectivity Projects; and
- An Assessment of the Port Access Elevated Highway (PAEH).

1.2 Objective

The National Port Directions Plan covers the next 30 years and includes a summary of investment plan for priority projects to be carried out in the next 10 years, following an assessment of the characteristics of existing port operations, and of existing and planned maritime and landside infrastructure.

The National Port Directions plan is developed through the following reports:

- Draft National Port Directions Report, covering the draft national forecast of cargo flows and related requirements for ports;
- Draft Colombo Port Development Plan, covering the Colombo Port Development Plan including priority projects but excluding prefeasibility analysis;
- Colombo Port Development Plan, including the pre-feasibility of priority projects, which were decided by the stakeholders, based on the Draft Colombo Port Development Plan;
- Draft Trincomalee Port Development Plan, covering the Trincomalee Port Zoning Plan;
- Trincomalee Port Development Plan, including the pre-feasibility of priority projects, which were decided by the stakeholders, based on the Draft Trincomalee Port Development Plan;
- Passenger Terminal Concept report, covering a passenger terminal construction project in Colombo port;
- An assessment of the Port Elevated Highway (PAEH); and
- National Port Directions Plan (this report), covering the national forecast of cargo flows and related requirements for ports.

1.3 Structure of the report

In order to enable easy navigation through the report, related topics have been grouped in overarching Parts. The following parts are distinguished:

- Part A covers the general strategic policies of the plan, the description of Sri Lankan Ports, the international context of developments and strategic directions and tasks driving the needs for port development;
- Part B covers the national trade and production, macro-economic views and includes the tourism & cruise sector. A demand analysis per commodity segment is described and translated to the capacity development needs reviewing the existing facilities, volumes handled, and performing the gap analysis. The chapter Port Development Directions describes the port development directions for the ports of Colombo, Trincomalee, Hambantota, Galle, Kankesanthurai, Oluvil and Puttalam jetty. For each port the main directions, observations, development requirements and recommendations are mentioned. The main recommendations result in short term priority projects. Finally, the chapter ends with mapping the main development options.
- Part C presents Port Connectivity & Logistics hubs. In this chapter the national road, rail, coastal shipping and inland waterways issues related to port connectivity are discussed and recommendations provided. In the chapter on Logistics Hubs the international best practice is discussed first where after the relevant studies on Logistics hubs and corridor development are reviewed and recommendations provided.
- Part D covers Innovation, Technological developments and trade facilitation. This part covers issues on IT, Port Community Systems, Warehousing, Trade facilitation, Customs, Navy and auxiliary port functions. In the latter topic, the international best practice on Maritime Cities and their attractiveness and competitiveness are also reviewed.

2 Port Sector Directions

2.1 Introduction

This chapter introduces the main directions for the Sri Lankan Port sector. It addressed the vision and mission and set out the long-term strategy for the port sector. The core values and management tools are discussed, and it translates the strategy into strategic tasks.

The following approach has been used for this chapter:

- Paragraph 2.2 provides the Government export vision on Sri Lanka describing that Sri Lanka exports should diversify through attracting new export commodities and products;
- Paragraph 2.3 provides the Strategic directions on Ports;
- Paragraph 2.4 displays the Strategic tasks; and
- Paragraph 2.5 provides the trends in the international environment.

2.2 Government National Export Vision on Sri Lanka

The National Export Strategy (NES) document published in December 2017 highlighted that the nation export sector needs to be reshaped and transformed. In alignment with the vision 2025 and the National Trade Policy the NES aims to simulate growth and job creation by improving the ability of firms to export and compete in foreign markets. Current obstacles need to be dissolved and "things need to be done differently" to increase the contribution of trade to economic development according to the document. Economic reforms for a more flexible business environment combined with increasing regional trade opportunities and major transformations in production techniques provide a unique window of opportunity for Sri Lanka to modernise and start a new cycle of export growth.

It was clearly addressed that Sri Lanka should realize its full potential as regional trade hub taking the opportunity to catch up to fast growing Asian export countries. Sri Lanka centrally located on major trade routes between Asia and Europe, Middle East, Bay of Bengal, and Africa is well positioned to participate in global production networks serving large consumers markets. The focus should be at new exports beyond today's exports which rely on a blend of traditional industries of apparel, tea, gems and rubber. To create the new export environment high tariffs, complicated administrative procedures and challenging access to inputs will be addressed to favour growth of high technology and knowledge intensive exports.

The National Vision is there for defined as:

"Sri Lanka – an export hub driven by innovation and investment".

There are four strategic objectives:

1. To have a business-enabling, predictable and transparent policy and regulatory framework that support exports.
2. To strengthen Sri Lankan exporters' market entry and compliance capacities
3. To become an efficient trade and logistics hub to facilitate exports
4. To drive export diversification through innovation and by strengthening emerging export sectors

The following six focus sectors have been identified under the NES and the role of ports has been added:

Focus sector	Type of Industry	Growth trend	Ports involvement
IT-BPM	Services	Mature	High (container traffic)
Wellness / tourism	Services	Emerging	Medium (cruise)
Spices and concentrates	Agriculture	Mature	High (air and shipping traffic)
Boating industry	Manufacturing	Visionary	High (marina's and boat yards)
Processed foods and beverages	Agriculture	Emerging	High (container traffic)
Electrical and electronic components (EEC)	Manufacturing	Visionary	High (container traffic)

The following picture shows the NES strategy schematically.

Figure 2-1 Export Strategy

Strategy and the port sector.

In this document the strategy of ports to facilitate the national export strategy and the role of ports as engine of the economy is highlighted.

The ports of Sri Lanka play a vital role in the implementation of this strategy. As an island, all what is consumed is imported or exported goes through nations ports. Without proper functioning of the ports, the import of raw materials and the exports of half fabricates, or final products is hampered, and the export strategy may

fail. Hence the need for modern and effective ports. This implies creating more efficient ports by upgrading port infrastructure, creating more efficiency by modern handling techniques and reducing the administration paper works by innovative systems. Additionally, the ports should be connected to dry ports which facilitates the newly attracted export processing activities. Most of the focus sectors as mentioned in the NES, translates to the flow of containers through Sri Lankan ports. It therefor that this segment should get prime focus in line with the logistic hub concept and the excellent geographical location Sri Lanka has on the containerized trades. Next to facilitating trade, the ports sector is an area at which new industries can settle. Especially medium to heavy industries are best located near the ports where logistical advantage can be obtained in the supply of raw materials. In this respect ports and their industry play a vital role in the energy consumption of the country both for power stations, refineries, and industry as well as for imports for consumer markets like refined products such as petrol, gasoline and kerosene. Ports also play a vital role for the food consumption/processing in the country and for the construction sectors. With increased wealth of citizens is it also expected that the roro sector of imported cars will boost. Finally, ports have a role in the tourism sector. Many Sri Lankan ports and cities are worthwhile to visit and to start or end wildlife and or cultural excursions. The cruise industry has discovered the island already, but the industry is only at an "early entrance" stage. Marina's and boat yards are common features when the "boating industry" visionary export sector is developed.

The following paragraph explains the strategic directions for ports based on the National Export Strategy, the Vision 2025 and the National Trade Policy.

2.3 Strategic Directions on Ports

To define the Strategic directions on Ports first the Ports vison and missions is addressed. Within a framework of core values and management policies which apply to the entire setting, the strategies are defined and the main components, the strategic directions.

Figure 2-2 Strategic framework

A combination of the National Export Strategy and the excellent position as transhipment hub are highlighted in the National Ports Sector Vision.

Ports vision:
"Sri Lanka will have leading ports in the Indian Ocean, Middle East and East African whilst developing the Nation through new networks of efficient logistic corridors to support development of key import and export sectors".

This vision statement emphasises that the transhipment hub position on maritime trades is to be maintained and enhanced. It also encompasses that the ports maritime strategy should focus on facilitating logistics efficiently and innovate through applying new technologies. Further the ports should focus on attracting sustainable investments supporting the nation and the national export strategy. Finally, the strategy is to become an international well recognized maritime centre.

A few elements are highlighted in this vision statement:

- **Transhipment hub** – The ports sector will focus on maintaining leadership in the transhipment business by a world class transhipment hub at Colombo, serving the Middle East, East Africa, India, Pakistan and the Bay of Bengal;.
- **The Logistics Hub** – The steps towards becoming a logistics hub involves identifying strengths, identifying potential markets and business and attracting those utilising the full capacity of SLPA and the government.
- **Sustainable ports** – The ports in Sri Lanka will become sustainable through sustainable investments and introducing "green" concepts in a safe working environment.
- **Maritime Centre** – The port of Colombo is to become a well recognized international maritime centre, offering services to the maritime industry.

Ports Mission statement:
"SLPA facilitates economic opportunities for Sri Lanka by creating a competitive, knowledge-based and industry-accumulated port environment utilising Sri Lanka's strategic advantages in the maritime trade."

This mission statement expresses SLPA's reason of existence by aligning the organisation's mission with that of the nation. SLPA ultimately provides the economic gateways to the country in the form of its ports and is thus subject the nation's greater economic strategy but is also central in the local function for a region.

A few concepts highlighted in this vision and mission statement are:

- **Trade and Economic Opportunities for Sri Lanka** – The ports are the facilitator for the nation's exports and imports in terms of infrastructure, efficient procedures, investment climate and safety and security.
- **Competitive Port** – Sri Lanka should position their ports competitively in relation to other hub ports. The need is there to promote ports and logistics hubs and as a total concept to the outside world. Port competition is mainly focussed on to achieve maximum value and minimal costs for the country. Constant comparison with global leading ports and direct competitiors ensures the organisation is aware of potential improvements.
- **Knowledge Based Port** – Investments in people and technology will ensure sustainable growth.
- **Logistics corridors** – The concept of logistics corridors is applied to facilitate efficient logistics hubs.
- **A role in wealth of the nation** – Each port shall have a function and role to serve the growing wealth of the nation.
- **Accumulated port environment** – Each port will set a growth path for attracting maritime businesses and specifically Port of Colombo is to become a well recognised International Maritime Centre (IMC).

Core Values

The core values whilst striving for the vision and mission are:
"Integrity", "accountability", "reliability", "knowledge-based", "efficiency", "transparency"

Although these words are self-explanatory it will require considerable efforts to achieve these core values. Mind-set needs to be changed and training is required to create similar values at all levels throughout the Port Sector.

Management policies

This reflects the main management policies to achieve the core values.

- Harmonising through IT. Key is to utilise modern technologies to change and harmonize the Port Sector
- Demand oriented. Processes should be demand driven with transparent inputs and outputs.
- Institutional reform. Institutional reform is required to align roles and responsibilities in the sector, to create focus and to create a level playing field.
- Safe, secure and sustainable policies. Ports serve the nation and are the backbone of the Society. Port activities should be safe, secured and contribute to an national sustainable agenda.

2.3.1 Strategies

There are five main strategies derived from these vision and mission statements which encompasses the major components of the port vision and the port mission:

1. Transhipment Hub port strategy
2. Logistics Hub strategy
3. Serving the nation economic growth strategy
4. Sustainable development of ports strategy
5. International Maritime Centre Strategy

These strategies are explained in next paragraphs.

Transhipment Hub Strategy "One nation"- "One Hub"

This strategy aims on staying a leader of hubs ports in the Indian Ocean. Port of Colombo ranked 23rd on the global container handling ports in 2016 with a total of 5.7 million TEU handled TEU of which 75% was transhipment cargo. It is the main hub port for transhipment in the Indian Ocean. The geographic position of Port of Colombo near the main East West shipping routes is key in maintaining leadership position. The transhipment in Sri Lanka is focussed at a single Port, Port of Colombo, to benefit from centralization and utilise the capacities which have been designed for it. Centralisation will provide economies of scale and ensure focused investments. As such the shipping community will be able to act jointly to do want has been done already for many years making Port of Colombo a large transhipment hub. Gateway cargo acts as a corner stone for shipping lines to call at ports and therefore a successful transhipment Hub also should have a significant share on gateway cargo. With ample development space with sufficient water depths and serving the largest consumer markets, the western region, Port of Colombo is to be promoted as National Transhipment port. Multiple ports serving this same transhipment industry would divide the shipping community and will be less efficient for shipping lines which have to serve the western region and like to centralize their operations as much as possible. Although the Port of Colombo has several terminals both in public and private sector, the marketing should be focussed on "One nation" One "Hub". Coordination, cooperation amongst Port Authority, terminals and the port community are required to make the total system efficient and to promote Sri Lanka as a whole and Port of Colombo specifically as transhipment hub. The aim is to focus on "working together" and "act together". With a changing environment in the transhipment business with more competition, larger vessels, and more direct trades, the challenges under this strategy are high.

Logistics Hub Strategy "Becoming an intelligent Logistics Hub"

The Logistics Hub strategy is focussed on creating the business environment to attract logistics to designated areas so-called Dry Ports which have proper connections to the ports. The logistics industry should aim at value added activities in the global production chains. Products can be manufactured and re-exported again. Electrical appliances, household goods, and other consumer market products should be strived for. Through connecting the Ports with these Dry Ports through Corridors an efficient network for the exports and imports is created. Digitalisation of the network will support intelligent logistics. The logistics sector will become attractive through establishment offered trade zones and other trade incentives. Together with trade policies and trade agreements, value added logistics can create Sri Lanka as an export driven nation making efficiently use of the central geographical location in the Indian Ocean and the ample options of connectivity provided by the container line shipping services.

Serving the nation economic growth strategy "Accelerating the economy"

Ports act as "engine" and as a "front-door" for the economic development of the nation. The front-door should be wide open to ensure efficient cargo flows towards the nation and should pave the way to facilitate new exports. Barriers of congestion are to be removed and ports should contribute to the national growth strategy by focussing on specific trades optimising their individual strength and their role in serving the nation as well as the region. The specific trades such as Liquid Bulk, LNG, Dry Bulk, Containers, RoRo each has their characteristics and investments in port infrastructure should well utilised.

Sustainable development of ports strategy "Green and sustainable"

The sustainable component in this strategy comes from the world class ports taking the direction to contribute to a sustainable port environment. The carbon foot print of ports and their facilities is measured and policy is created to (gradually) reduce the emissions and contribute to a cleaner world. The emphasis is to green the port and the port users gradually. In order to understand the effects measurements and monitoring systems should be implemented. It is noteworthy that some private terminals have already taken this direction by implementing electrical RTG as such reducing the emissions.

International Maritime Centre strategy

The Port of Colombo is to become a well recognized as Maritime Centre, a place in which efficient maritime services are provided and which various trade related services and maritime industries are vested. The strategy is to be developed over time. The development of Port City may act as accelerator to this strategy.

Three main "centres" have been identified:

- Centre of trade sectors:
  - Finance / Insurance / Trading & Arbitration
  - Logistics companies
- Centre for port and shipping industries:
  - Shipping and classification societies;
  - Maintenance and Repair
  - Port Technology
  - Bunkering
- Accumulation of supporting industries
  - Education & Training
  - Research & Development
  - Consultancy

The following table illustrates the main strengths of the several ports and the focus areas:

Table 2-1 Competitive Role of Ports

Ports	Strengths	Specifics	Focus areas
Port of Colombo	Deepwater terminals	Designed for Transhipment of Containers	Transhipment Containers
	Near demanding consumer regions	Western region	Gateway Containers & Logistics
	Attractive for Tourism	City & Port City & access to nation	New Cruise terminal (and marina's in Port City)
	Industrial supplies	Refinery supply, power station supply	Liquid Bulk
	Protected berthing for LNG	Planned LNG power station	LNG
	Dry bulk	Limited water depths	Cement, Grain and animal feeds
	General cargo	Limited water depths	Assign additional quays
Port of Trincomalee	Natural deep water in protected areas		Ship services and lay-up business
	Hosting Cement and Grain facilities	Private Cement plant Private Grain plant	Dry bulk (grains, cement)
	Strategic oil supply location	Private liquid bulk terminal	Expansion of Liquid Bulk
	City and Region is attractive to tourism	Boating industry to be developed	Marina's and Cruise terminal
	Demand for power stations	Optional supply of power stations	LNG or gas
	Support regional development	Limited quays	Expansion of quays
	Support regional logistics developments	Optional industrial and logistics areas near rail	Develop industrial and logistics areas
	Support new export products and markets	Value added activities in light- and medium industries	Liquid bulks, Dry Bulks and Container traffic
Hambantota	New port with ample industrial space	Designed for Industry	Refinery, Cement plants Liquid bulk & LNG
	Ample space at break bulk quays	New break bulk terminal	RoRo business, general cargo and break bulk
	Planned shipyards	Opted for ships yards	Shipyards
	Supply regional projects	General cargo & Container trades	General cargo & Project cargo & Containers
	Support regional logistics developments	New container terminal	Container trades

Ports	Strengths	Specifics	Focus areas
	Support new export products and markets	Value added activities in medium- to heavy industries	Liquid bulks, Dry Bulks and Container traffic
Oluvil	Small port on East coast	Limited water depths	Fishery industry and cold chain
	Regional and local function	Limited water depths	Coastal activities, marina
KKS	Proximity to India	Limited water depths	Optional ferries
	Regional and local function	Limited water depths	Coastal activities, marina
Puttalam Coal jetty	Limited water depth	System with barges	Coal imports

Five strategies lead to 21 strategic directions.

The five strategies are displayed in next table with T (Transhipment Hub Port Strategy), L (logistics Hub strategy), N (serving Nation economic growth strategy), S for the Sustainable strategy and C for International Maritime Centre. For each of the strategies the strategic directions are displayed.

There are 21 strategic directions formulated for the port sector based on the five strategies.

Table 2-2 Strategic directions and tasks

T	L	N	S	C	Strategic directions	Strategic tasks
V				V	Leader in Indian Ocean Hub port	Hub port marketing "One Nation", "One Hub" Effective ITT Low handling tariffs Efficient auxiliary functions (like bunkering) Excellent nautical services & safety
		V		V	Improve Colombo as Maritime Centre	Profiling and branding Colombo Port Boosting Ease of Doing Business Creating a vibrant business and living environment Facilitate new business opportunities Provide incentives to attract business Partnership with other IMCs
		V		V	Tourism development	Perform Cruise marketing (incl. home port) Create Cruise terminals with PPP Develop Marina's with PPP
V	V	V	V	V	Supply oriented and timely port development to ensure supply is offered in advance of demand growth	Port Master Planning covering next 30 years with periodic 5 years updates
		V		V	Port investment for primary sectors for the nation and right-fit	Energy sector - Align requirements to port solutions Industry sector – Facilitate existing and new refineries and new industries

T	L	N	S	C	Strategic directions	Strategic tasks
						Fuel supply - Facilitate the growth for fuel supply Food sector – Facilitate grain and fertilisers supply Consumer markets – Facilitate container traffic Construction – Facilitate general cargo and project cargoes Car industry – Facilitate RoRo cargoes
V					New Products and commodities	Facilitate the development of newly traded commodities like Liquid Bulks (LNG and refined), Dry Bulks (Biomass, grains and minerals)
V	V			V	Modernisation of equipment and services	Increase productivity at quays to reduce ship waiting times Invest in new quay and yard equipment Gate automation Workshop systems and support
V	V	V	V	V	Demand oriented	Boost commercial management with focus on PPP
		V			Reform and Self-sustainability	Restructure into business units, commercialize and corporatize (with PPP) Tariff restructuring
V	V			V	Enhance logistics competitiveness	Assign Dry ports with FTZ Modern warehouses and systems
	V			V	Customs efficiencies	Single customs window and risk management
V	V	V		V	Efficiency through digitalisation	Port Community System Digitalisation of information flows, “smart port” technologies Measurements of KPI’s and display at dashboards
	V				Serving dry port developments and connectivity	Connect Port with dry ports efficiently through bonded transport
V	V	V		V	PPP	Enhance port environment with PPP to attract world class operators
V	V	V	V	V	Knowledge and education	Ensure education is modern and appropriate for the maritime and port sector, increase women participation
			V		Green port concept	Introduce measurement systems and execute EIAs in early stages of development

T	L	N	S	C	Strategic directions	Strategic tasks
						Prepare carbon footprint and promote emission reduction schemes Facilitate the change in bunkering requirements
V	V	V	V	V	Safe and secure working environment	Ports will provide safe and secure working environments according to international standards
V	V	V	V	V	Compliance with IMO and SOLAS	Ensure compliance with latest IMO and SOLAS regulations. For example, ISPS, Ballast Waste Management, VGM, and FAL convention
V	V	V		V	Attracting foreign direct investments	Act as landlord for new industrial and logistics areas near ports and along the corridors Participate in trade facilitation legislation Trade policy development Boosting Ease of Doing Business
	V	V		V	Focus on add value and logistics industries	Newly export oriented industry will require new demand from ports in terms of infrastructure and services levels. The port sector will participate in facilitating requirements.
	V			V	Facilitate global production networks	Participate in defining framework of requirements for new industries

Strategic directions observed

This paragraph presents some background information on the strategic directions as illustrated in the framework. The following 21 strategic directions have been identified:

Table 2-3 Strategic directions observed

	Strategic direction	*Observation*
1	Leader in Indian Ocean Hub port	Colombo is ranked 23rd on the global container handling ports in 2016. Within the Indian Ocean Colombo is leader.
2	Cruise sector development	Tourism is an important industry for Sri Lanka. The ports of Colombo, Galle and Trincomalee can benefit from this opportunity by having specialized cruise berths
3	Supply oriented and timely port development to ensure supply is offered in advance of demand growth	The South Harbour development has supported Colombo Hub port concept in time and ahead of competition
4	Port investment for primary sectors and right-fit	Sri Lankas primary sectors are energy, food, industry and consumables. Being an island, all what is required by

	Strategic direction	Observation
		the economy flows through the ports and as such is reflected in port requirements. The energy production is depending on the existing power plant capacities and the development of new capacities by CEB. Fuel for power stations, being gas, LNG, oil or coal needs to be catered for. Fuel products are also needed for local car and truck consumption. The industry in Sri Lanka needs to diversify whilst dated factories need to be replaced or upgraded such as the refinery in Colombo. New industries should be place at logical locations ensuring right-fit. The car industry has a special focus as it generates RoRo traffic through ports. The food sector drives the grain and rice trades which is imported mainly by large bulk carriers. The consumables sector encompasses mostly the containerized gateway cargo flow.
5	New products and commodities	The nation is developing new products and commodities which will require port infrastructure. A good example is the Biomass in Trincomalee which generates wood pellets that can be exported as second fuel to coal fired power stations in Asia. Another example would be the need for Cold stores. These cold stores can cater for fresh foods and beverages a facility which is lacking today.
6	Modernisation of equipment and services	SLPA terminals equipment should be modernised to maintain competitive services
7	Demand Oriented	SLPA's has direct and indirect clients. The direct clients can be split between Port concessionaires and SLPA terminal users such as shipping lines, agents, consignees. Indirect clients can be regarded and the port community. Information on developments is to be improved and transparency on policy is required.
8	Reform organisation and self-sustainability	SLPA organisation is structured as a line organisation with departments. Cabinet approvals are required for many decisions and the company is less responsive to market demands than commercial entities. Ports entities should become self-sustainable to ensure efficiency, right fit and sustainable units.
9	Enhance logistics competitiveness	The Sri Lankan ports today have an inefficient logistic setting due to the scattered warehouse facilities near the port and old-fashioned facilities in the port and congestion at the roads
10	Customs efficiencies	Single customs window and risk management
11	Efficiency through digitalisation	There is still a high level of paperwork especially in the warehousing sector and SLPA terminals. Today

	Strategic direction	Observation
		digitalisation of the information flow is a prime subject in the ports environment. A huge efficiency gain can be created once steps are made into digitalisation of the information flow.
12	Serving dry port developments	Today inland depots are scattered over the city. Modern warehouse facilities at dry ports with a proper connection with the port has been identified as important setting for logistics hub port developments
13	PPP	Private Public partnerships are key to attract foreign direct investment and at the same time to create additional revenues for the Authority. Colombo has successfully implemented PPP structures with terminal operators and is expected to continue with this.
14	Knowledge and education	Today the training institute of SLPA provides many port workers. Knowledge and skill are very important for the Ports and Maritime sector in Sri Lanka. Training institutes play a vital role to prepare the employees of the future but in that case modernisation of the institute and tie-up with international developments related to education and simulations are required.
15	Green port measurement systems	Today the ports of Sri Lanka have no such measurement systems and to become modern ports the sector will need to address this. Several individual operators have already invested in sustainable port solutions. Port Authorities have a prominent role in regulation which steers the carbon footprint of the port sector. To market the Sri Lankan port sector with a sustainable vision, investors with similar ambitions will be attracted. The port and its users shall contribute to a modern safe and clean port environment.
16	Safe and secure working environment	orts will provide safe and secure working environments according to international standards
17	Compliance with IMO and SOLAS	Ensure compliance with latest IMO and SOLAS regulations. For example, ISPS, Ballast Waste Management, VGM, and FAL convention
18	Attracting foreign direct investments	The port sector is an international playing field. The create the right investment climate shall attract foreign direct investments into Sri Lanka contributing to employment and wealth for the nation. The port sector needs the right legal framework to attract FDI and to create win-win situations for both the investor and the Authority. The port sector already has attracted considerable amounts of foreign direct investment through concessions with global terminal operators and through the recent Hambantota deal. The future is that SLPA stays in control to attract FDI in ports

	Strategic direction	*Observation*
19	Focus on add value and logistics industries	The hub port strategy of Sri Lankan ports can be enhanced by attracting value added logistics. This Light manufacturing and assembly markets are key for developing logistics centres near the ports.
20	Facilitate global production networks	Participate in defining framework of requirements for new industries Ports become increasingly important for the link in logistics to serve global production networks. This means that the nation not only produces for internal consumption but also for export of components and half fabricates to serve global manufacturing

2.4 Strategic tasks

The strategic directions have been translated into strategic tasks as displayed above in Table 2-2. Each of the strategic tasks have been further detailed in next paragraph.

Leader in Indian Ocean Hub ports

- Profiling and branding Port of Colombo including Hub port marketing, "One Nation", "one Hub" . Sri Lanka should be promoted as one nation one hub to attract shipping lines to perform their transhipment at Port of Colombo. In this respect Port of Colombo is adequately positioned to add additional container capacities in the future to accommodate additional services. The marketing function is to be performed by the marketing unit of the National Port Authority. It will ensure participation at major shipping events world wide and "stay close" with shipping lines.
- Effective ITT. The transhipment function is depending on efficient Inter Terminal Traffic (ITT). This encompasses the fact that communication between terminals should be effective and efficiently organised again minimal costs. Digitalisation, combined with adequate truck capacities and well organised gates with digital truck recognition will contribute to efficient ITT.
- Low handling tariffs. Transhipment business is considered non-captive cargo. This means that shipping lines may move their transhipment package to other competitive ports when the price is too high.
- Excellent nautical services & safety. A transhipment hub is stronger when primary services like tug boats, pilots and mooring is performed efficiently. Night navigation will be implemented in Trincomalee to increase productivity.
- Efficient auxiliary functions (like bunkering). A transhipment hub is stronger when auxiliary functions are well organised and shipping lines have efficienct access to services such as bunkering, crew services, and ballast waste management.

Tourism development

- Perform Cruise marketing (incl. home port). Cruise marketing is important to attract Cruise shipping lines.
- Create Cruise terminals with PPP. A new passenger terminal is projected at the BQ quay in Port of Colombo; additionally, plans have been prepared to create a passenger terminal in Trincomalee and Galle when demand is sufficient.
- Develop Marinas with PPP. The boating sector holds promise for Sri Lanka. In several ports, marinas are projected to facilitate this sector. Examples are new planned marina's in Colombo port city, Trincomalee, Hambantota and the expansion of the marine facilities in Galle.

Timely port development

- The ports of Sri Lanka will facilitate trade developments in a timely fashion. The purpose is to have a blueprint for future development, reserving space where it may be needed in future, taking into account the regulatory and environmental requirements, and creating an efficient and economic port operation. National and regional masterplans are aimed at creating the optimum allocation of functions within a country. In a masterplan, development lay-outs are provided to determine indicative cost figures but the level of detail is limited. As port development takes time, planning should be done well in advance of demand growth. Port masterplanning will consists of short term three-year national plans, medium term plans thar cover 5-10 years and support certain development, and masterplans which cover future possible developments over a period of approximately 30 years. After each five years, the long term masterplans are updated. Execution of port expansion shall be done in a sustainable way, through proper pre-feasibilities and feasibility studies, in order to ensure project deliver positive financial and economic returns. The plans in the framework of long term, medium term and short term are interrelated. The masterplan forms the framework for the medium plans and the medium plans forms the basis for the short term plans. The masterplan requires an update interval of about 5-10 years during which the original phasing is reviewed against demand monitoring and phasing is enhanced or delayed. As such, it is a continious planning process.

Port investment for primary sectors of the nation and right-fit

- Energy sector - Align requirements to port solutions. This is primarily LNG and Gas, as coal fired power stations are not the preferred solution due to emissions. Right-fit means that power stations are planned in areas where power is required, ample space is available, and supply of gas or LNG can be secured through marine facilities (floating buoys and or port facilities). A new LNG power plant is projected near Colombo and LNG supply can be secured through the Port of Colombo. Other power stations are planned in the Sampur area (near Trincomalee) and at Hambantota.
- Industry sector – Facilitate existing and new refineries and new industries. A new refinery is planned for Hambantota; this port has ample space to develop this industry.
- Fuel supply - Facilitate the growth for fuel supply. The nation's fuel supply should be undisrupted and continuous. Historic events caused temporarily shortage and this needs to be avoided at all times. Additional tank storage and marine facilities should be created to ensure sufficient fuel supply. Deep water marine facilities are required to create economies of scale.
- Food sector – Facilitate grain and fertilisers supply. Grain imports are expected to increase and deep water facilities are existing in Trincomalee. For fertilisers no production facility is present. Opportunities to supply both the nation as well as for exports are present. The port of Trincomalee has ample space to develop such factory but also Hambantota would be suited for such facility.
- Consumer markets – A facilitated through container traffic. Ports to handle containers are Colombo, Hambantota and to lesser extend Trincomalee. The connectivity of the port with nation's highways are crucial for the gateway cargoes. The efficiency of existing flows can be optimized.
- Construction markets – Facilitate general cargo and project cargoes. The nation is being developed rapidly. Construction works in the western region are large but also other parts of the country face heavy demand for construction works. The majority can be translated to the import of steel products which are commonly imported through the use of general cargo ships. These ships can be accommodated in Colombo, Hambantota and Trincomalee.
- Car industry – This market drives the import (and exports) of RoRo cargoes through the ports. Due to the space required at ports to handle finished cars, some ports are less suited than others. Colombo port and Trincomalee have limited parking spaces whereas Hambantota has ample space available. The latter is therefore the optimum port to handle these commodities despite the fact the majority of demand is triggered by the western region.

New products and commodities

- Sri Lanka export sector should diversify.
- New export products are for example biomass (wood pellets) and ilmenite and agriculture products. These products require additional port facilities from cold stores to silo's and belt systems to additional quays at sufficient water depths.
- Other new products will be LNG, both required for powerstations as well as for bunkering fuels.
- In the edible oil sector options arise grinding of seeds for additives in animal feed or for biodiesel. Recycling of waste oils and used fats to create the so-called 2nd generation biodiesel is also a trending topic. CO2 emissions are reduced as biodiesel produced is of high-quality, has no impact on the environment, and has a favourable effect on engine performance.
- Ethanol is also earmarked as interesting new commodity. Ethanol is a renewable fuel made from corn and other plant materials. The use of ethanol is widespread in developed countries, and more than 97% of gasoline in the U.S. contains some ethanol[7]. The most common blend of ethanol is E10 (10% ethanol, 90% gasoline). Ethanol is also available as E85 (or flex fuel)—a high-level ethanol blend containing 51%-83% ethanol depending on season and geography—for use in flexible fuel vehicles. E15 is defined by the Environmental Protection Agency in the US as a blend of 10.5%-15% ethanol with gasoline. E15 is an approved ethanol blend for use in model year 2001 and newer light-duty conventional gas vehicles. Ethanol is in high demand in countries in Asia to green the fuel types and to reduce emissions. Sri Lanka is well positioned to act in the value chain or to act a distribution hub of this liquid fuel.
- In the mineral sector (supply to ceramics) construction. Grinding of minerals is best done near the port where raw materials are imported. This industry can support the ceramics industry in the country.

Modernisation of equipment and services

- Invest in new quay cranes and yard equipments
- Investments in adequate IT systems to support the technological improvements.
- New Terminal operating software to increase productivity at quays to reduce ship waiting times.
- Gate automation.
- New workshops and maintenance support systems.
- Warehouse equipment and IT systems
- ITT services to be upgraded with IT planning, modern equipment and improving availability.

Demand oriented

- Sri Lanka Ports will become more client oriented. The port has direct clients and indirect clients. The ports shall be organised with improved marketing and commercial departments to respond quickly and in a professional manner. It is important to set decision trees with clear mandates so that transparency is provided in the decision making process. Proposals for planning are separated from procurement rules and claim handling is done at the business unit concerned. Information to clients shall be improved through the use of on-line services where appropriate. Administrative procedures shall be improved through the use of e-signatures and digital flow improvements.

Reform and Self-sustainability

- SLPA organisation is structured as a line organisation with departments. Cabinet approvals are required for many decisions and the company is less responsive to market demands than commercial entities. Ports entities should become self sustainable to ensure efficiency, right fit and sustainable units. Through the reform into a port authority and a port management company, the organisation will be transformed to become more transparent with accountable business units.
- Restructure into business units, commercialize and corporatize (with PPP).

[7] US Department of Energy

- Tariff restructuring. The tariff restructuring is required in order to offer services against proper rates and to become sustainable, whilst at the same time the tariffbook is simplified where appropriate. The tariff restructuring would also enable to set competitive prices whilst recovery of investments is secured. A new tariff system will go in parallel with the reform process, as tasks and responsibilities between a port management company and operational units changes.

Enhance logistics competitiveness

- A business platform / taskforce is required to streamline wishes and ideas to improve competitiveness and create mandated plan of actions. SLPA should be part of the platform.
- Administrative procedures will be reduced through the use of a Port Community system which shared and distributes relevant information of cargo in the logistic chain.
- Assign a network of Dry ports with FTZ regulations
- Create modern warehouses at (dry) ports
- Warehousing services will be improved with modern IT systems (cargo management system) and modern pick and place equipment to improve the services on LCL and MCC cargoes.
- Create information statistics and transparency through modern IT solutions
- Reduce congestion at gates through implementing new gate systems

Customs efficiencies

- Customs efficiencies shall be improved through the use of a Customs Single Window with E-declaration and E-payment
- Ensure of communication with New Port Community system
- Customs gate procedures to be improved through digitalisation and e-electronic seals
- Improvement of risk management systems
- Use of scanning equipment to speed up the amber line procedure
- Increase green channel traffic combined with random scanning and checking squads.

Efficiency through digitalisation

- Port Community System
- Digitalisation of information flows
- Introduction of “smart port” technologies
- E-port permit applications to enhance port access at gates
- Measurements of KPI’s and display at dashboards
- New terminals operating systems support the use of E-manifest, E-communication, E-facturation and E-control and dashboards.
- Warehousing services will be improved with modern IT systems supporting bar code scanning, pick and place, and warehouse management.

Serving dry port developments and connectivity

- Facilitate the development of dry ports which act as bonded cargo villages. These areas can be designated for free trade zone and will have trade facilitation support measures.
- Port are connected through highway networks with dry ports.
- The port of Colombo will have access to the Elevated Highway (PAEH).
- Dependening on the national rail masterplan, these dry ports may be connected with the ports to allow rail transportation of cargo.
- The ports of Colombo, Hambantota and Trincomalee shall be connected by rail in alignment with the national rail masterplan.

PPP

- New PPP structures will be planned to allow joint ventures and partnerships in order to benefit the private and the public sector at the same time. New ventures on warehousing and on dry ports are envisaged.

Knowledge and education

- Knowledge and eduction is crucial for the sustainability of the ports and shipping sectors. Maritime and logistics education is key for the well being of the sector in the future. Also the enpowerment of women is promoted to diversify the labour force in this industry. The local institutes like the Mahapolo Ports and Maritime Academy will expand their education programs whilst at the same time develop partnerships with international Universities and Polytechnics on shipping and logitics to ensure modern education programs including simulation training capabilities in the long run.

Green port concept

- Establishment of a green policy and implementation framework including measurement systems, monitoring and controlling emissions, set targets for the emission controls.
- Establishment of HSSE department. Attention for environmental issues within the operation of the port would be greatly served by establishing a dedicated, relatively independent Health, Safety and Environment (HSE) department. Such a department should conduct its task from the perspective of assuring optimum conditions for health, safety and environment. It should not be subordinate to a section with merely economical and efficiency interests.
- Green the port organisation, effective measurements to green port activities (own organisation and port users).
- Execute EIAs in early stages of development;
- Prepare carbon footprint and promote emission reduction schemes;
- Prepare for solar power at buildings and warehouses to reduce carbon footprint of the Port itself;
- Introduce cold ironing at new facilities in Ports
- Promote electrical equipment and vehicles when replacing existing ones; and
- Facilitate the change in fuel types both for road transport as well as for bunkering requirements.
- Set up an environmental Management System in line with ISO 14001 certification for the different parts of its operations.

Safe and secure working environment

- Ensure a safe and secure working environment by applying international standards of ILO and modern technology;
- Ensure safe cargo working and ships working through excellent trained and educated employees;
- Ensure that emergency reponse plans are updated and drilled;
- CCTV and port monitoring and surveillance will be improved to maintain a modern and safe working environment.

Compliance with IMO and SOLAS

- Ensure compliance with latest IMO and SOLAS regulations. For example ISPS, Ballast Waste Management, Ship waste, VGM, and FAL convention. A complete overview is presented in Appendix XI.

Attracting foreign direct investments

The port sector is an international playing field. To create the right investment climate shall attract foreign direct investments into Sri Lanka contributing to employment and wealth for the nation. The port sector needs the right legal framework to attract FDI and to create win-win situations for both the investor and the Authority. The port sector already has attracted considerable amounts of foreign direct investment through

concessions with global terminal operators and through the recent Hambantota deal. The future is that SLPA stays in control to attract FDI in ports.

- Secure and land plots for future industry near the ports and in Dry ports;
- Perform port marketing based on the "One nation, One port" concept (our ports are "one" due to well established networks of roads and corridor developments;
- Participate in identification of new export oriented industries or added value services and draw a framework of requirements to attract these industries. The port sector will participate in facilitating requirements once identified and found feasible. A common approach is the value chain analysis in the global production chain networks;
- Act as landlord for new industrial and logistics areas near ports and along the corridors;
- Participate in establishment of trade facilitator committee; and
- Participate in trade policy developments.

Value added logistics

- The hub port strategy of Sri Lankan ports can be enhanced by attracting value added logistics. This Light manufacturing and assembly markets are key for developing logistics centres near the ports.

2.4.1 National development programs

Several studies have been analysed to create this report:

- Prime Minister speeches, november 2015
- Prime Minister statement, October 2016
- Prime Minister budget speech, 2017
- Vision 2020, SLPA
- The Ministry Megapolis and Western DevelopmentMasterplan, November 2016
- Multi Modal Transport Project, ADB and Japan Fund for Poverty Reduction, 2012
- SLPA Port Development Masterplan 2016
- Colombo - Trincomalee Economic Corridor (CTEC), ADB November 2016
- Colombo - Trincomalee Economic Corridor (CTEC), comprehensive Development Plan, ADB January 2016
- LNG break bulk opportunities, PWC 2017
- SLPA three years budget plan, December. 2017
- JICA Logistics Study Full report, June 2017
- Preliminary Draft of Sri Lanka Energy Sector CTEC, PWC November 2016
- Proposed landuse plan UDA, June 2017
- Improvement of Land Transport System in Sri Lanka, Policy Perspectives
- Colombo East Terminal Traffic Study, Drewry Sri Lanka, 2016
- Feasibility Study and Preliminary Design of Southern Highway Extension towards Colombo SHETC project and Final report for the Port Access Evlevated Highway Project (PAEH), Katahira & Engineers International, August 2014
- Enabling Clean marine transport, International Gas union, March 2017
- Harbours review, Baltic Press, January 2017
- Port Strategy of India's Next Big Leap in Trade, AP Chamber, February 2017
- Ports and Terminals, H Ligteringen/ H. Velsink, Delft 2012
- Port management and opertions, P. Alderton, 1999
- Ports in Proximity, Competition and coordination amoung seaports, T. Notteboom/C.Ducruet/P de Langen 2009
- Newspapers Mirror Business, specfic articles
- Newpapers DailyMirror News, specific articles

- Business Observer, specific articles

2.5 International environment

The main external maritime trends are described in this paragraph:

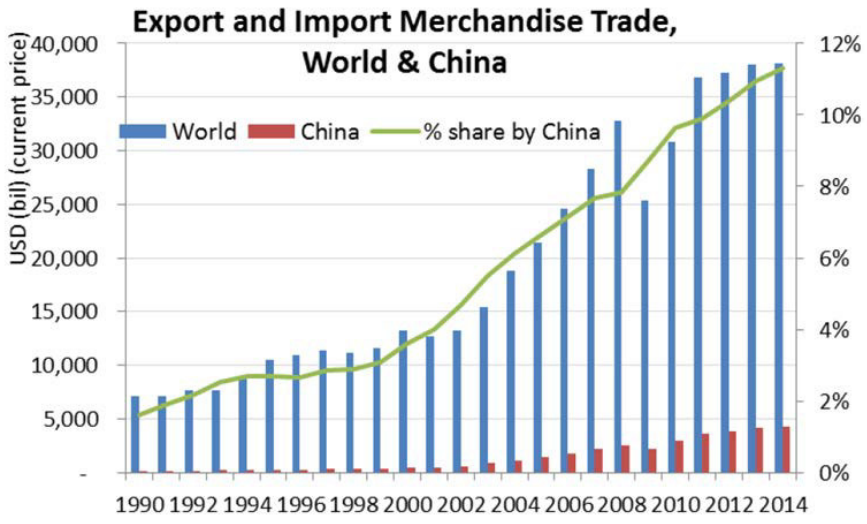
1. International trade growth slows down
2. China's role is slowing down
3. India emerging role?
4. Increased vessel sizes and cascading
5. Alliances and consolidation
6. Changing port management structures
7. Digitalisation in the port industry
8. Technical changes in the maritime shipping industry
9. International Port Competition

2.5.1 The international trade growth slowed down

After strongly rebounding from the 2008 Recession, international trade has grown at a sluggish pace that further deteriorated in 2015 according to statistics from WTO. The world trade volumes remained low at a growth of 2.6% (similar to 2015) and expected to rise by 3.6% in 2016.

Per UNCTAD, a substantial part of the drop in international trade was due to nominal factors, principally the fall in the price of commodities and the overall appreciation of the United States dollar. Weaker demand also played a role, especially in East Asia and in other parts of the developing world. Although the largest decline occurred in commodity sectors, the value of trade also contracted in all manufacturing and agricultural sectors. Declines in the value of trade were also observed in the service sectors. The trade collapse of 2015 affected all geographic regions. In general, trade flows of developing countries registered a sharper downtrend relative to the last trade collapse of 2009. South–South trade performance was also weak, largely driven by lower East Asian imports. In terms of export performance, countries in East Asia generally fared relatively better.

Figure 2-3 Export and Import Merchandise trade



2.5.2 China's role in international trade is slowing down

In particular, China's emerging role in international trade cooled down due to slower GDP growth of 6.9% compared to double digit growth over several years between 1990 and 2010. The centralised economy is slowly focussing more on internal development rather than export focussed resulting in less seaborn trade. China's role in global merchandise trade had become rather dominant with a share in world imports from 1% in 1980s to 10% in 2014 and to 12% share in world exports. The shift in trade flows to/from the East Asia has resulted in the emergence of mega scale ports in Asia. In 2015 9 out of the top 10 ports were from Asia compared to only 4 in 1980. This has been dominated by the development of Chinese (export oriented) deep-water container ports like Dalian, Tanjin, Qingdao, Shanghai, Ningbo and Xiamen.

Figure 2-4 China Merchandise trade

Source: WTO, National Bureau of Statistics China, ADB, ICF

Outlook

The World Bank outlook for the East Asia and Pacific region is projected to grow at 6.2 % in 2017, and at a slightly lower 6.1 % on average in 2018-19, in line with previous forecasts. A gradual slowdown in China is offsetting a continued modest pickup in the rest of the region, led by a rebound in commodity exporters and a gradual recovery in Thailand. Growth in commodity importers excluding China is projected to remain robust, as stronger exports will offset the negative effects of eventual policy tightening on domestic demand. Downside risks are mainly external. They include heightened policy uncertainty and increased protectionism in key advanced economies, and the risk of an abrupt tightening of global financing conditions. A sharp slowdown in China is a low probability risk, but it would have major negative consequences for the main East West trades on which Sri Lanka performs considerable transhipment volumes today.

2.5.3 India as emerging nation?

Indian economy is one of the economies with great potential to become an emerging economy in global production due to the large labour force and low wages. However, the so far India growth has not accelerated. With new incentives from the Government to stimulate well developed manufacturing clusters India hopes to improve manufacturing output to 25% of GDP from current levels of 16%, like in many key sectors with low cost production countries such as China and Vietnam. To boost manufacturing they adjust regulations and tax regimes to attract foreign direct investments for special economic zones in sectors like defence, automobiles, textiles, garments and electronics. It has been identified that the current industrial centres are located remotely from the ports. Incentives to place these industrial clusters near to the west and east ports has been identified in India's port strategy.

These long developments will have impact on the Sri Lankan transhipment position once deep-sea ports have been created and more direct trades occur.

So far India showed the following performances:

- During 2016-17, major and non-major ports in India have accomplished a total cargo throughput of 1,133 million tonnes, an increase of 5.7 % on previous year 2015-16. The growth in cargo handled at major and non-major ports in 2016-17, were 6.8% and 4.2%, respectively. The share of major ports in the total traffic handled by Indian ports increased from 56.5% in 2015-16 to 57.2% in 2016-17.
- The country's major ports handled a combined traffic volume of 647 million tonnes during 2016-17, registering an annual growth rate of 6.8 per cent. The major ports recorded the highest ever capacity addition of 100.37 MT in 2016-17, thereby raising the total capacity to 1065 MT per annum, as against a capacity of 965.36 MT per annum in 2015-16.
- The government has taken several measures to improve operational efficiency through mechanisation, deepening the draft and speedy evacuations.
- The Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, reported that the Indian ports sector received FDI worth US$ 1.64 billion between April 2000 and September 2017.
- Between FY07– FY17, cargo traffic grew at CAGR 0.38%
- Over FY07–16, CAGR in the volume of different segments was as follows:
  - Solid cargo 2 % per cent.
  - Liquid cargo 3.1 %.
  - Container cargo 6%

Source: Ministry of Shipping; Indian Ports Association (IPA)

The Indian Port strategy is to bring manufacturing areas closer to ports as it has been estimated that India can save up to USD 28 billion in infrastructure investment and another USD 3.3 billion in transportation costs if 50% of overall trade moves closer to ports by 2020[8].

The Indian government plans to develop 10 coastal economic regions as part of plans to revive the country's Sagarmala (string of ports) project. The zones would be converted into manufacturing hubs, supported by port modernisation projects, and could span 300–500 km of the coastline. The government is also looking to develop the inland waterway sector as an alternative to road and rail routes to transport goods to the nation's ports and hopes to attract private investment in the sector.

The strategy includes upgrading and expansions of ports with 39 million TEU which is illustrated in next table for the container segment.

Table 2-4 Main capacity increases by Indian and Bangladesh ports.

Region	Capacity Increase (million TEU)
East India - Capacity Increase	13.5
West India – Capacity Increase	14.3
South India - Capacity Increase	11.4
Bangladesh – Capacity Increase	9.0

[8] Port Strategy of India's Next Big Leap in Trade, February 2017

Total India	39
Total Bangladesh	9

Ports included in analysis were: JNPT, Mundra, Pipapav, Cochin (Vallarpadam), Vizhinjam, Colachel, Visakhapatnam, Krishnapatnam, Chennai, Kattupalli, Ennore, Tutucorin, Sonadia Port and Payra Port.

Development of Maritime Policies in India

India's Merchant Shipping Act, dating from 1958, included several strict rules that restricted intra-country transhipment and paved the way for international transhipment hubs such as Colombo. Specifically, the Merchant Shipping Act included the following restrictions:

- Generally, only vessels with Indian flag were allowed to carry out cabotage.
- Only fully-owned Indian vessels were allowed to be registered under the Indian flag.

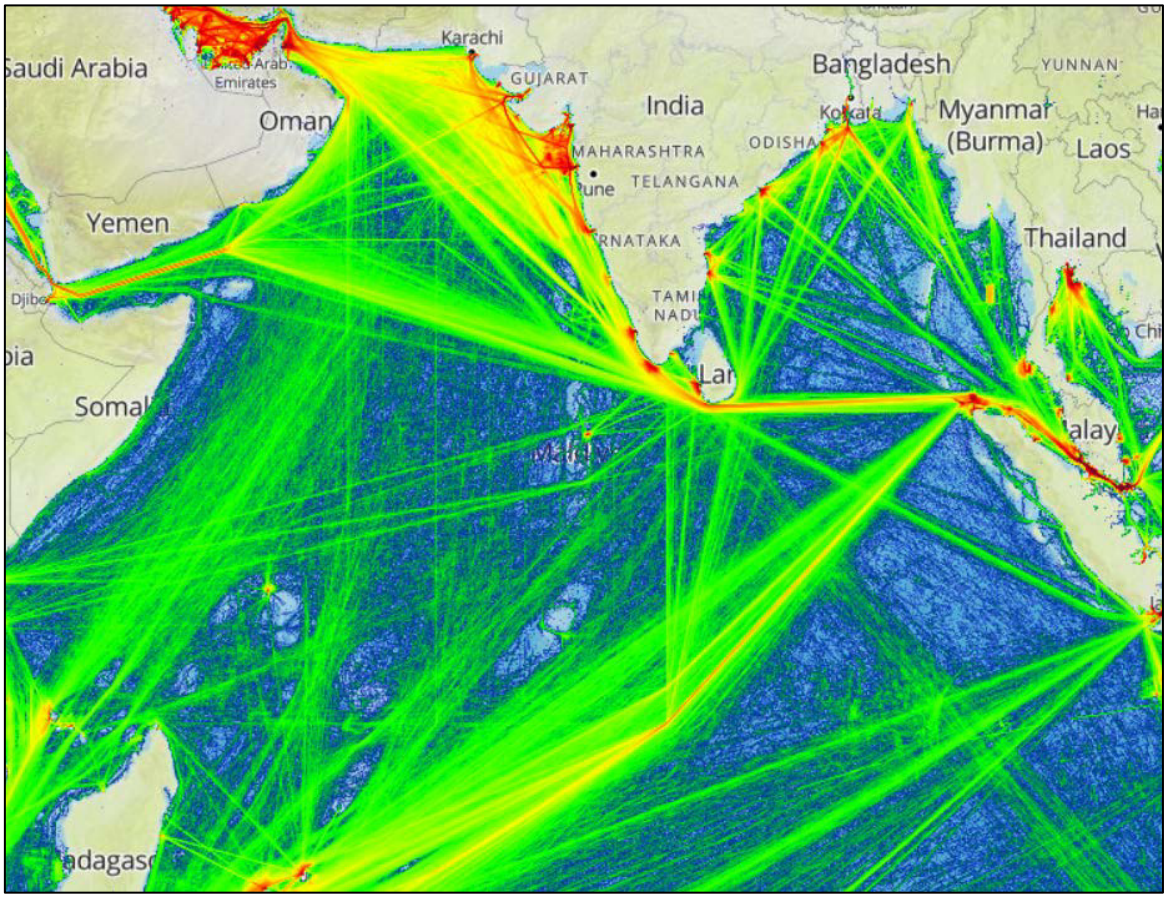
These rules, among others, restricted the size of the fleet capable of carrying cargo between Indian ports. However, in late 2016, a new Merchant Shipping Act was ratified, which aims to solve this issue by relaxing the requirements for registering vessels under the Indian flag. Through these improvements, the Indian Government aims to quadruple the available tonnage of the country's fleet by 2020. Substantial growth in intra-country transhipment will put further pressure on international transhipment activities.

The conclusion is that India is strongly preparing the port and transport sector to facilitate export growth through new developed industrial zones closer to ports. With respect to coastal shiping the abolishment of cabotage legislation may attract foreign shipowners performing on domestic transhipment around indian coast. Due to the existing infrastructure issues and long haul distances to existing production sites it will take time before India's economy becomes a leading economic exporter like China is today.

2.5.4 International Shipping & Transhipment

Transhipment of containers is a core activity at the port of Colombo. Transhipment cargo amounts to approximately 75.0% of all containers handled. In 2015, the port handled about 5.1 M TEU. The transhipment volume of approximately 3.8 M TEU is mainly captured due to the strategic position of the port, proximate to the main East-West Shipping lanes and close to feeder destinations along the Indian coastline. It has adequate water depth and container facilities to handle the largest vessels in the global container trades.

Figure 2-5 Colombo strategic position near main shipping routes – density chart

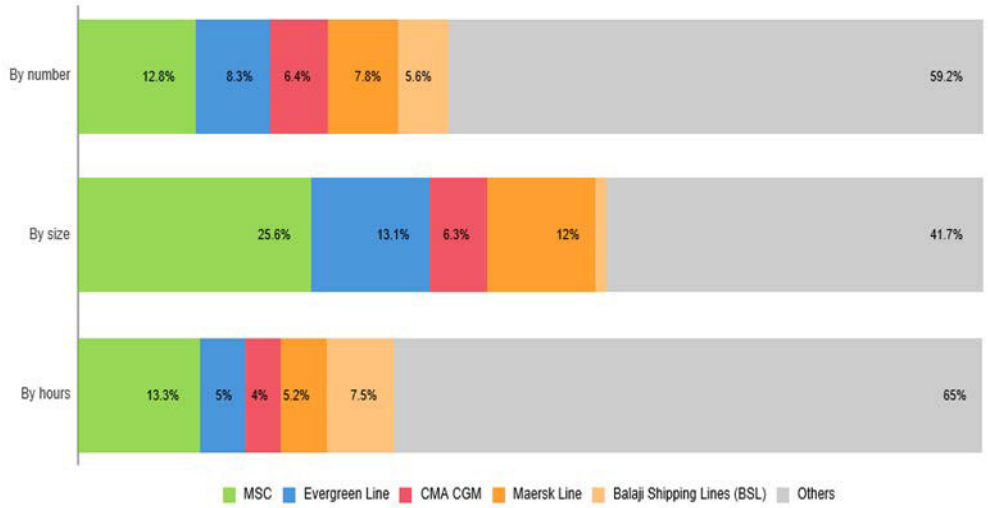


Colombo is used both for transhipment of containers from mother vessel to mother vessel (relay activities), and for transhipment from mother vessel to smaller feeder vessels. The latter is the traditional transhipment case. In this case, a hub-and-spoke system is applied, with feeder vessels distributing containers to destinations with insufficient draft, such as destinations on the East and West coasts of India, the Maldives, Bangladesh, Myanmar, and Pakistan. The relay business has increased considerably in the recent past. Main regions, such as the Middle East, East Africa, and the Indian West coast are served when the main westbound services, originating from South East Asia or the Far East, relay their cargo to the eastbound services originating from the US East Coast, Europe, and Middle East. It should however be noted that transhipment trade is "foot-loose". This means that the activity of transhipment can be moved to other ports should the shipping line wishes to concentrate its transhipment somewhere else along the shipping chains. At the same time the tariffs for transhipment handling are low compared to gateway cargo handling simple because of this competitive edge. This also stresses that the efficiency of handling and other service elements play a role in the competitive profile of a transhipment port.

Out of the 17 East-West Services Colombo only receives 3 of the main services performed by the Ultra Large Container Vessels.

MSC is the largest operator in Port of Colombo by number of calls and by average sizes. The three main East West services are the NEU6, AE-1 and the FE5 displayed in the picture below. The 2M with MSC and Maersk offer the AE-1 service. The Ocean Alliance offers NEU6 through COSCON and CMA CGM and Evergreen. And the FE5 is performed by The Alliance. Noteworthy is that still about 50% of the vessel calls are offered through a high number of smaller shipping lines performing on the various feeder trades.

Figure 2-6 Colombo weekly vessel call analysis 2017Q3



Source: Alphaliner

Figure 2-7 Main East West Services

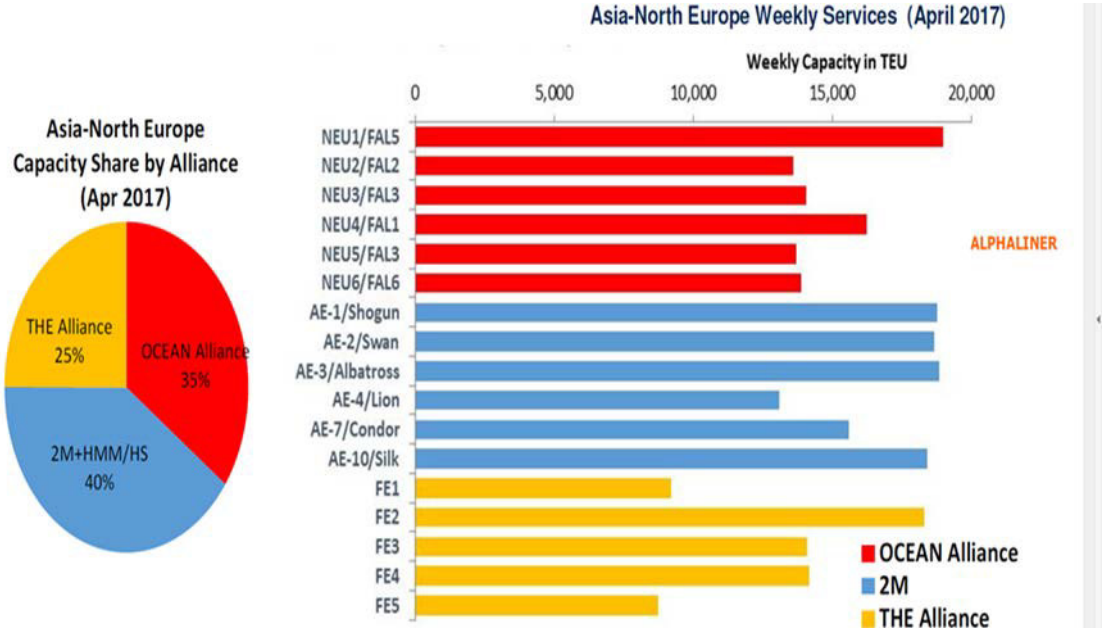


Table 2-5 Main lines and hub calls

Westbound	Singapore	T. Pelepas	Colombo
NEU1	x		
NEU2	x		
NEU3	x	x	
NEU4	x		
NEU5	x		
NEU6			x
AE-1		x	x
AE-2		x	

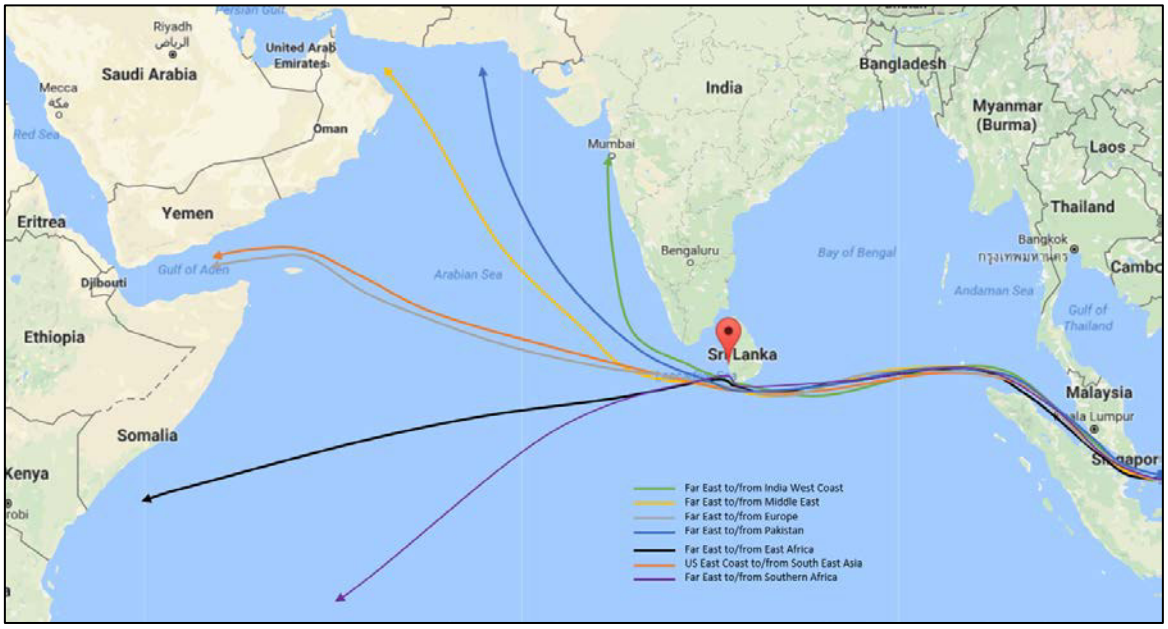
Westbound	Singapore	T. Pelepas	Colombo
AE-5		x	
AE-6		x	
AE-7		x	
AE-10		x	
FE1	x		
FE2	x		
FE3			
FE4			
FE5			x

Table 2-6 Main lines hub through relays on six main trades

Region from/to	Region to/from	Vessel operators
Far East/South East Asia	India West Coast	CMA CGM-ANL, Maersk Line/CMA CGM, OOCL, ESL, APL, MSC, KMTC, RCL, NYK, Hapag Lloyd, Yang Ming, Xpress feeders, Wan Hai, PIL, MOL, Evergreen, COSCO
Far East/South East Asia	Middle East	G6, Maersk Line, MSC, KMTC, ESL, RCL, Evergreen
Far East/South East Asia	Pakistan	APL, NYK, Xpress, MOL, Wan Hai
Far East/South East Asia	Europe/Mediterranean	G6, 2M, CKY-Evergreen, CMA CGM-ANL, MSC
Far East/South East Asia	East Africa, South Africa, West Africa	MSC, CMA CGM, UASC, Maersk Line, MOL
Far East/South East Asia	US East Coast	2M, G6, ZIM, Evergreen

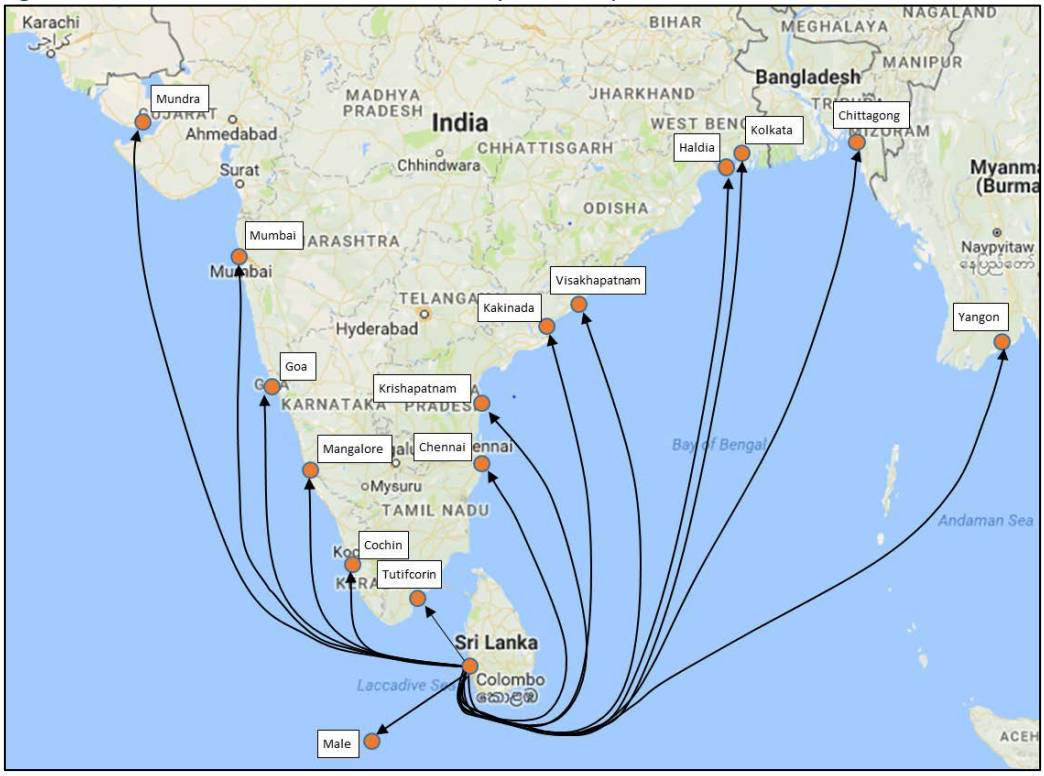
The following table displays the six main Far East originated routes for the port of Colombo.

Figure 2-8 Colombo as a Hub for the 6 Main Trade Routes



It should be noted that the main East-West container shipping services are operated by the global vessel operators (amongst others, Maersk Line, MSC, CMA -CGM), which deploy the largest container vessels of the world. These Ultra Large Container Ships (ULCS) today have a capacity of around 20,000 TEU, have a length of up to 400m, a width of 59m (25 container rows in width), and a draught of up to 16.5m when fully loaded. This trend towards larger vessels results in the need for ports to expand their capacity in time, to continue to handle these ULCS and to remain competitive as a hub. The construction of the South Harbour, with the new CICT terminal, is a good example thereof.

Figure 2-9 Colombo's direct feeder destinations by hub and spoke



2.5.5 Shipping trends

The following shipping trends are important for the Sri Lankan port environment

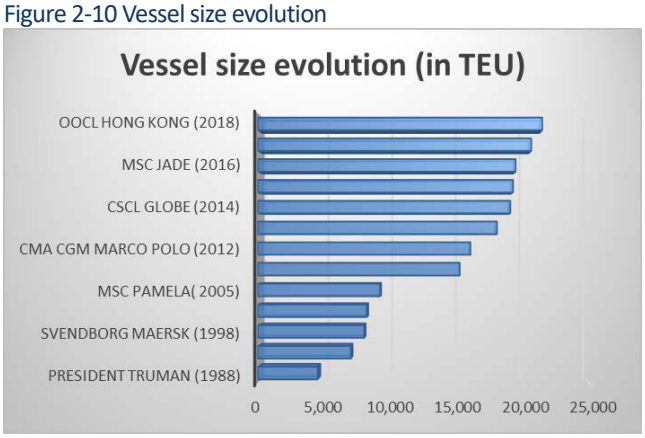
1. Increased vessel sizes
2. Cascading and low freight rates
3. Alliances and consolidation
4. Reducing turnaround time
5. Technical changes in the maritime shipping industry

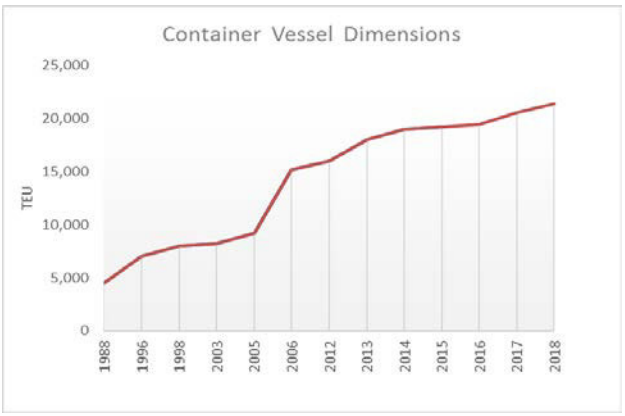
Larger vessel sizes and cascading

The trend towards larger vessels sizes is caused by the cost focus of shipping lines. They maximise economies of scale and reduce unit costs through applying larger vessels. The fact that growth of the global economy has been limited contributed to lower demands and lower freight rates. This again urged shipping lines to excel in ordering larger units to save fuel through technological improvements and to further reduce unit costs.

The typical large container vessel increased from 3,000 TEU in 1980 to the "EMMA MAERSK" of 15,000 TEU in 2006, the MAERSK McKinney MØLLER of 18,000 TEU vessels (Triple E-class) in 2013, and in 2017 the vessel MAERSK MADRID of 20,568 TEU. The latter is part of the new Triple E – II-class which have a dimension of 400m*58m*16.5m (LOA, Width, Draught) and are especially designed for the Far East - North Europe trade. The largest vessel today is OOCL Hong Kong with 21,400 TEU and a dimension of 400m*58.8m*16m.

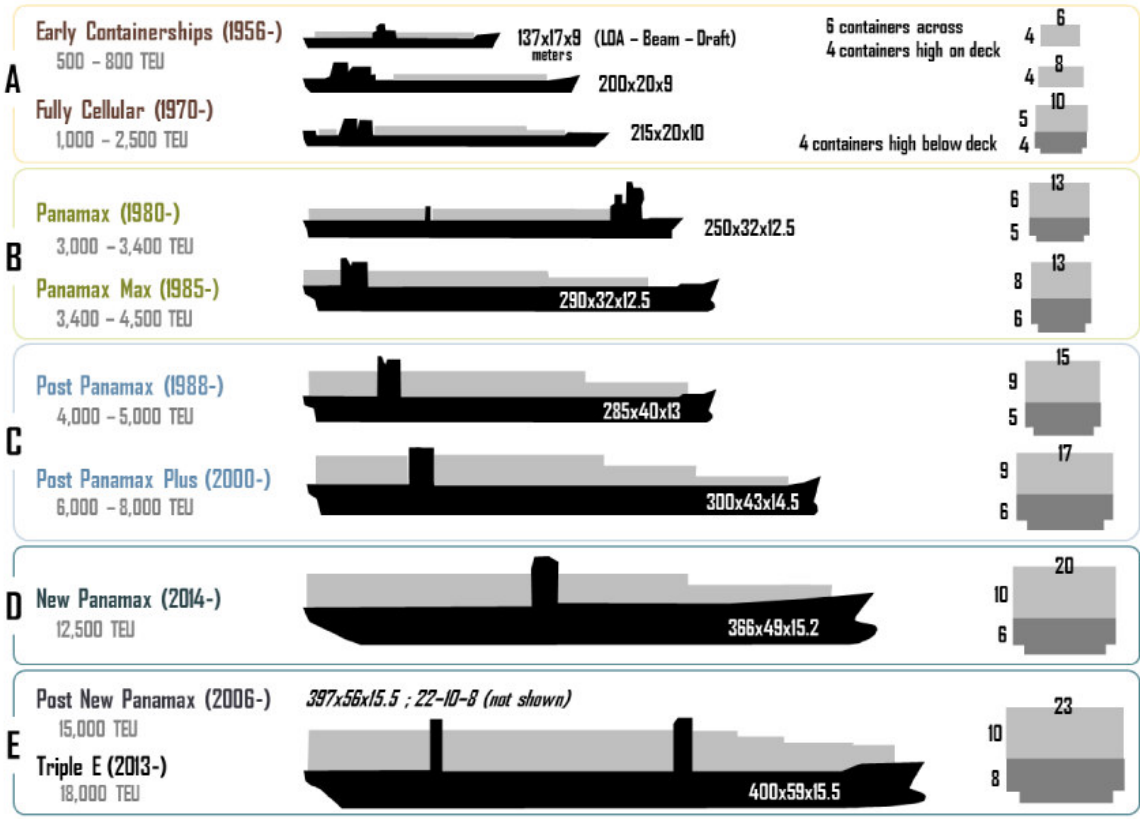
Figure 2-10 Vessel size evolution





The evolution in larger vessels is displayed here below.

Figure 2-11 Vessel size evolution Container Vessels



The new dimensions of ships are illustrated in next table.

Container ships are distinguished into 7 major size categories: small feeder, feeder, feedermax, panamax, post-panamax, new panamax and ultra-large. As of January 2014, there are 265 container ships which are larger than 10,000 TEU.

Figure 2-12 Current Container vessel dimensions

Container vessels	TEU capacity	LOA (m)	BEAM (m)	DRAUGHT (m)
Small Feeder	<1,000	70-160	13-25.5	4-8.4
Feeder	1,000-1,999	146-205	22-32.2	8.3 -11.0
Feedermax	2,000-2,999	189-237	22-32.2	11.5-12
Panamax	3,000-4,999	237-294	32.2	12.4
Post Panamax	5,000-9,999	300 - 366	49	15.2
New Panamax	10,000 – 14,000	336-365	48.7	15.5
Ultra Large Container vessel	14,000 and larger up to 22,000	366-400	49-59	15.2-16

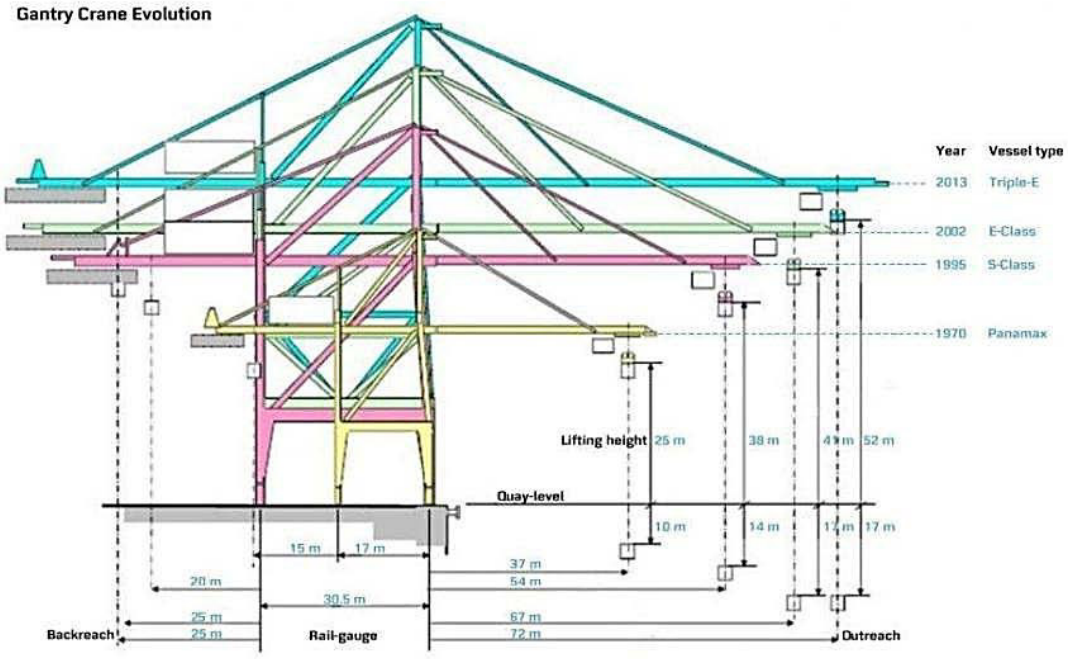
Source: Clarksons / MTBS

Larger vessels also have implications for the port design as larger depths are required and bigger and more cranes are needed to maintain a competitive level of efficiency. Also, the stacking area and the hinterland connections faces new challenges as huge quantities have to be moved in short time frames.

Larger ships have also implications for the type and size of quay cranes. As such the vessel size evolution also generated a ship-to-shore size crane evolution.

The graphic below shows the crane developments over time.

Figure 2-13 Ship to Shore Crane evolution



Years	Typical ship-to-shore Cranes	indicative lift above quay / below	Rail gauge	Indicative Backreach	indicative outreach	containers wide	Typical maximum vessel (in TEU)
1970-	Panamax QC	25/ 10	17.0	0.0	30-40	11-13	3-5,000
1995	Post-panamax QC	38/ 14	30.5	20.0	45-55	17-19	9-11,000
2002	Super-post panamax QC	42/ 17	30.5	25.0	60-70	21-23	13-16,000
2013	Ultra Large Container vessel QC	52/ 17	30.5	25.0	68-72	25	18-20,000

Several ports world-wide upgrade their super-post panama cranes through heightening or enlargements or order new Super or Ultra Large Container Vessel cranes to allow the newest and largest container vessels.

Cascading Effect & Freight Rates

The cascading trend (the newest, largest vessels replace the current vessels on the main trade lanes, the vessels being replaced will in turn replace smaller vessels on other trade lanes), also impacts the Sri Lankan ports. The Indian West coast has seen massive improvements in vessel sizes as more direct trades became feasible due to available ships. The vessel size increased from 3,000 TEU to 4,000 TEU towards 7,000 TEU. In Colombo vessel sizes also increased rapidly. The port accommodates the world largest vessels in South Port up to 22,000 TEU and has noted increased feeder vessel sizes as well.

Moving towards larger vessels goes hand in hand with declining freight rates. As Figure 2-14 shows, the China Container Freight Index and the Shanghai Container Freight Index, indicators of the freight rates charged on the main global Far East – Europe trade lane, have been in decline since 2012, with a particularly strong fall happening in the last year. The decreased revenues for shipping lines accelerates the need for further cost reductions such as through further consolidation.

Figure 2-14 Far East - Europe Container Freight Rates

Source: Alphaliner

The industry has a drive towards cost-efficiency and driven by prolonged financial losses. The shipping industry can be characterised by continuous changes, acquisitions and bankruptcies due to its high competitive environment. A drive towards cost-efficiency has also lead to the formation of several high profile shipping line alliances and, to a lesser extent, acquisitions on the primary Far East – West trade. In essence, it is a cost-sharing mechanism whereby shipping lines are focusing on cutting operating expenses.

The East-West container routes, including the North Europe and the Mediterranean - Far East trades, are dominated by the so-called East-West Alliances. Several years ago, there were more than six alliances including the New World Alliance and the Grand Alliance. Presently there four major alliances left, their carriers are (short names, in alphabetical order), all visualised here below:

- 2M Maersk Line, MSC;
- CKYHE Alliance COSCON, Evergreen, Hanjin, "K" Line, Yang Ming;
- G6 Alliance APL, Hapag-Lloyd, Hyundai, MOL, NYK, OOCL; and,
- Ocean Three China Shipping, CMA CGM, UASC.

Due to recent industry consolidation affecting six of the mentioned sixteen carriers, the alliances are bound to be further re-organised. These developments comprise:

- Merger between China Shipping and COSCON under the new holding China Cosco Shipping Group (CoscoCS), with COSCON as the surviving liner shipping brand;
- CMA CGM taking over APL effective June 2016;
- Hapag-Lloyd and UASC to amalgamate before the end of 2016;
- The bankruptcy of Hanjin by August 31st 2016; and,
- New Japanese container shipping line through a merger between NYK, MOL and "K"-Line by July 2017 named ONE (operational by 2018).

Figure 2-15 – Shipping lines mergers and acquisitions

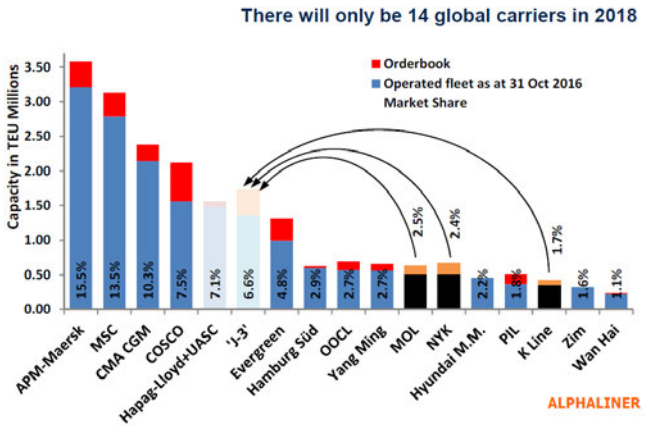


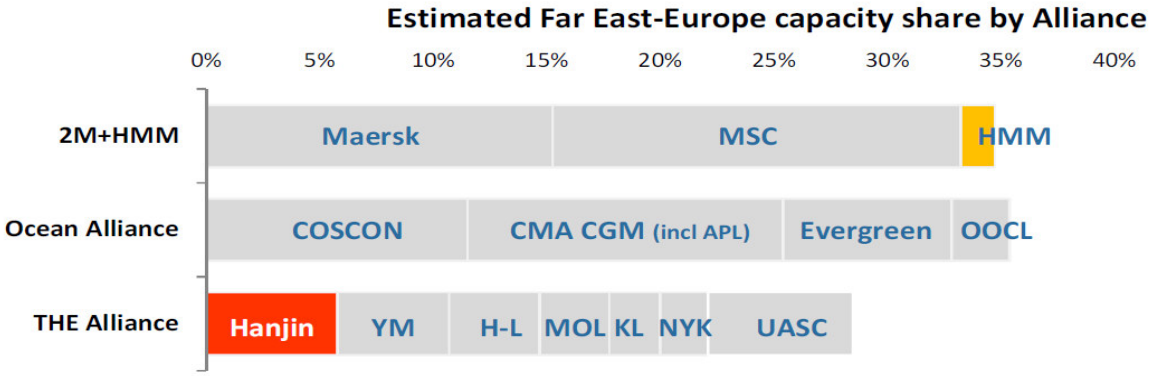
Figure 2-16 lists the recent mergers and acquisitions. In all, the consolidation combines vessel capacities of major liners having in more ships for increased network options. Each of the major alliances has Ultra Large Container Vessels on order, further highlighting the industry-wide movement towards large vessels.

Thus, effective July 2017, the now 10-carrier Alliances scene (instead of 16 in 2014) will look as follows:

- 2M+ Hyundai, Maersk Line, MSC
- Ocean Alliance CMA CGM/APL, COSCON, Evergreen, OOCL
- THE Alliance Hapag-Lloyd/UASC, Hanjin*, Yang Ming and ONE ("K" Line, MOL, NYK)

** Hanjin Shipping went into financial default at 31st of August 2016. Prospective bidders on the assets are rumoured to be Hyundai and Maersk Line.*

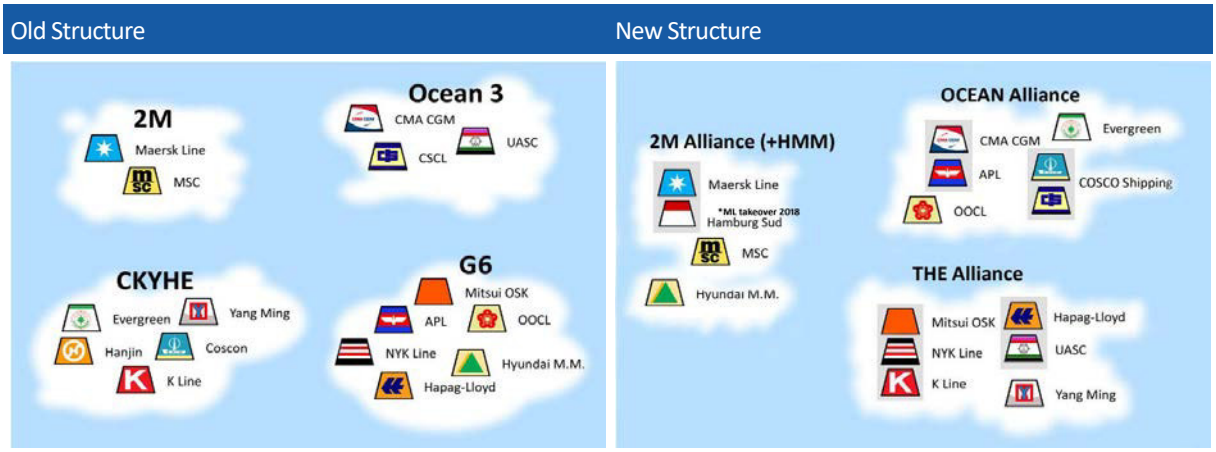
Figure 2-16 - Far East - Europe Capacity Share by Alliance



Source: Alphaliner

The old situation versus the new situation effective from July 2017 is presented in the picture below.

Figure 2-17 Old and New East-West Shipping Alliance Structures



Source: Alphaliner

Next to the 10 Alliance members on the East West trades there still exist four shipping lines outside the alliances namely; Hamburg Süd (acquired by Maersk), PIL, Wan Hai and ZIM.

Finally, there is a stronger relationship between the shipping lines and the global port operators than in the past. Many shipping lines have (through their parent) a tie with a network of terminals. For example, the AP Møller group owns APM Terminals and Maersk Line, CMA CGM owns Terminal Link, and COSCO owns Cosco Pacific as terminal group. Next to these shipping line terminal operators there are independent terminal operators such as for example PSA, DP World, Eurogate and ICTSI.

For Sri Lankan ports the consolidation of shipping lines is important as each alliance like to concentrate its shipping network at selective terminals in order to optimise their network costs.

Reducing turn-around time

Next to the main global trend of attaining economies of scale by increasing vessel sizes, a second major development is the focus on reducing the idle time of vessels. In order to reduce the idle time of vessels, the total turn-around time of the vessel need to be improved. The turn-around time of a vessel depends on three factors:

- Anchorage;
- Towage (in and out of the port);
- Berthing.

By reducing the turn-around time in ports, shipping lines can achieve significant efficiency advantages resulting in a reduction of the number of vessels that is required to provide daily services, as is further explained in the economic due diligence.

2.5.6 Changing port management structures

Globally the trend towards more specialisation of cargo handling, combined with larger vessels, and capital constraints at Port Authorities, have changed the land scape for port authorities to allow more private involvement in cargo operations. The trend supports the general perspective that private companies are better equipped and more efficiently organised. Meanwhile large labour forces in traditional ports have been restructured to address the change towards privatisation.

Generally, speaking this trend has continued since the 1990s and resulted into a move from central led and operated port authorities in a "service port concept" to a "landlord model" in which a split was made between regulation, facilitation of trades and the operational function of cargo handling.

This is illustrated in next graphic.

Port management model	Private Sector	Regulation	Infra	Super-structure	Equipment	Labour	Nautical services
0. Public service port (as is)	Zero	Public	Public	Public	Public	Public	Public
1. Landlord + private terminal	Medium	Public	Public	Private	Private	Private	Public or private

Figure 2-18 Public Service Port and Landlord Port model

The main advantage of landlord models compared to service ports is that the State often has no influence on the day to day operations or regulations. The landlord port authority acts as landowner (mandated by the state) and as regulator through a port act (mandated by the state). Another advantage of landlord models is that private investors can develop and operate specialised terminals under concession contracts. In this way the industry specialists become active in the port and the Port Authority has the ability to own and create the land, set the port regulations and national tariff on marine services and perform the auxiliary functions when they are not outsourced to private sector as well.

Moreover, Government controlled port authorities have moved into corporatisation and even privatisation as well. In the latter, often the Government shareholding is still majority but the Port Authority has become a company under the state companies acts.

Sample of port reform in The Netherlands.
Traditionally port authorities in the Netherlands have been government agencies of the municipal government of the city or town in which the port is located. As part of a wider trend of privatisation, the Dutch national government and local governments have retreated from performing port related activities themselves in the belief that enterprise-based port management would allow for greater flexibility and efficiency through more competition and a better response to consumer's demands. Due to reforms during the last 20 years the landlord port authorities are now public limited companies and no government agencies anymore. Although legal title to the land in the port areas rests with the municipal government,

the port authorities have leased this land in perpetuity for free and may generate revenue through sub-leases and concessions with private parties, such as private port operators. The master lease agreements with the municipal governments therefore allocate the economic ownership of the land to the Port of Rotterdam respectively Port of Amsterdam. Despite the fact that several public service obligations have been delegated to the harbourmaster division of these independent port authorities ('Port of Rotterdam' and 'Port of Amsterdam'), these are highly commercialized entities. The Port of Rotterdam was privatised in 2004 and the Port of Amsterdam was privatised in April 2013.

It should be noted that Singapore is an exceptional case where centralisation prevailed and the Port Authority emerged into a large group of Government controlled entities. However, they too moved into specialisation where the cargo handling is performed by a separate company within the group of Authority controlled companies.

Samples from Port Authority models and reform statements:

Ports	Country	Type of models
Rotterdam	Netherlands	Municipality port as landlord → changed in to commercialised and corporatized entity to **Privatised port authority** (2004) with shares hold by the municipality and the government.
Amsterdam	Netherlands	Municipality port as landlord → changed in 2013 to **Privatised port authority** with shares hold by municipality and the government.
Le Havre	France	Ports in France were for long classified as **Tool port.** This means that since 2008 the port authority and port operator responsibilities have been split. Later they developed HAROPA a common coordination platform between ports (Le Havre, Rouen and Paris).
Singapore	Singapore	Central State Controlled Company established in 1997.
Port Klang	Malaysia	Port Klang was privatised in 1985 when the container terminal was given under 21yr concession contract. Costs of repair, maintenance and administration was reportedly halved and tonnage handled increased by 75% whilst wages also increased by 85%.
Port of Shanghai	China	The port of Shanghai was decentralised in 1994 and container terminals were operated through a JV between HIT Hong Kong and port of Shanghai. Between 1994 and 1997 the terminals output and dockers wages doubled whilst costs were reduced and

		productivity increased by 30%. Average ship time in port was in 1997 around 30% of the average measured in 1994.
Southampton	UK	Controlled by Associated British Ports **(Private port)** Formed in 1983, now controlling 21 ports. Employees got part of the shares. Reportedly the labour productivity increased by 40%. ABP followed the example of Port of Felixstowe (1980s) changing trust ports into private ports.
Lagos	Nigeria	National port authority has **reformed to land lord** allow private concessions to run cargo terminals since 2005. The container terminal at Apapa was the first.
Cape Town	South Africa	The National Port Authority Portnet **reformed itself to a landlord,** creating a national authority and cargo specific entities (1999-2003)
Djibouti	Djibouti	A **management contract** was provided to DP World to run and operate port and terminals under a management agreement. CM Ports took over this management contract in 2012 after which DP World continued with its concession on the Doraleh container terminal.
Sohar	Oman	A new port was developed in JV as "**Port Management Company"** between Port of Rotterdam and the Government according to a landlord port model.

The examples above shows following common type of ownerships for Port Authorities:

Type of ownerships	Description
State ownership	State owns the port authority, often traditional service ports but also modern state controlled companies like Port of Singapore. The state owned company is often controlled by the minister of transport and or minister of ports & shipping.
Autonomous	Public trust ports like applied in the UK were autonomous before they went into privatisation.
Private ownership ports	A private owned port is a limited company acting under the company acts of the country. It has shares and it controlled by the board of directors.

	UK ports were fully privatised during the 1990s, several ports followed the same directions in the next two decades.
Municipality ports	From history many (European) ports were operated under the ownership of the municipality. As the role from ports changed for local interest to national importance, many of these ports either became under national umbrellas (national co-operations) or developed into private ports today.
Port management company	A port management company is often a JV between public and private companies. The advantage is that company can be a JV with the private sector (for capital or for know-how) whilst acting under the central port authority rules.
Port manager	The refers often to a management contract to a knowledgeable entity to run the port or the terminal for a limited period of time to ensure continuity (often during transitional phases)
Hybrid ports	These ports are regarded in transition for service port to landlord port and still have features of a service port whilst allowing private concessions in ports

Source: MTBS and P. Alderton (Port Management and Operations)

The most common port management models are presented in next table.

Figure 2-19 Institutional Port Models

Port management model	Private participation	Regulation	Infra	Superstructure	Equipment	Labour	Nautical services
Public service port	Zero	Public	Public	Public	Public	Public	Public
Tool port	Very low	Public	Public	Public	Public	Private	Public or private
Landlord + Public-private terminal	Medium	Public	Public	Public Private JV	Public Private JV	Public Private JV	Public or private
Landlord port	Medium	Public	Public	Private	Private	Private	Public or private
Landlord + DBFM	High	Public	Public & Private	Private	Private	Private	Public or private
PDMC	Very high	Public	Public Private JV	Private	Private	Private	Private
Private port	Maximum	Public or private	Private	Private	Private	Private	Private

The table illustrates the level of private sector involvement which is small at the top and large in the bottom of the table.

- Public service port model. In this structure the organistion is in one central public controlled entity which performs all functions in the port including cargo handling (shown as equipment in it table). (often port authorities with an British background were structured like this)
- Tool port model. In the tool port private labour is requested to operate with public provided infrastructure and equipment to operate on cargo handlings.
- Landlord port model. In this model the regulation function (public) and the cargo function (private) are often separated through providing concessions to the private sector for operational activities.
- Landlord plus DBFM. The Landlord plus the Design, Build, Finance and Manage. Newly infrastructure is provided under a DBFM concession in which the private entity is involved from design till end of the concession contract and hand over back to the Land Authority.
- Port Development Management Company. This company is normally established in a public – private joint venture.
- Private port. The fully private port is an concept which is used often by industrial sectors wher the port is part of the industry (liquid bulk port for refineries, dry bulk prot for the mining sector etc). For common ports including many different types of commodities the private port is not common due to te strategic importance to the nation.

2.5.7 Digitalisation in the port industry

Digitalisation in the port industry is the upcoming trend. Many ports in the world have implemented either Electronic Data Exchange **(EDI)** for transfer of point to point communication. The FAL convention makes it mandatory by 2018 to implement digital communication between ships and port authorities under the **FAL convention**. Several ports have implemented a **Port Community system** which allows EDI communication in a single window between multiple parties simultaneously and sharing data amongst parties. Samples are Port of Singapore, South Korea, The Netherlands and so on.
The next focus is to increase digitalisation across the supply chain. Port Authorities like Port of Rotterdam develop the "SMART port" concept in with port users are connected through SMART applications on mobiles phones, tablets etc., through the use of **Internet of things**. Related this are the latest developments around **Blockchains.** The latter reflects keeping data on the cargo in a secured chain to which allows full control on status, quality information and payments along the chain.

Additional information on Port Community Systems is displayed in a separate chapter.

2.5.8 Technical changes in the maritime shipping industry

Through conventions of the International Maritime Organisation and SOLAS several important changes are faced by the shipping industry.

1. Ballast water management
2. Emission reduction
3. Verified Weight Measurements

Ballast water management
IMO's Ballast Water Management will come into force in September 2017. This convention enjoys the accession of 52 parties and involvement of 35 percent of the global merchant shipping tonnage. It requires all ships of 400 gross tonnage and above (including all existing vessels except floating platform, FSUs and FPSOs) to possess International Ballast Water Management Certificate (IBWMC). The time consumed in terms of ballasting and deballasting are considered as unproductive times for ships.

Moreover, the installation, cleaning and maintenance of Ballast tanks will cost millions of Dollars per ship. Similar regulations are also mandated in some non-contracting states like US with some discrepancies in approval of BWM equipment. The discrepancies include the range of approved systems (currently more than 60 available types) and the approving authorities.

Emission reduction
IMO's regulation for reduction of air pollution (including SOx, NOx, Particulate Matter, and Green House Gases) is another influential trend that has the potential to develop restrictions and incur huge costs in the industry level. These regulations are
mainly derived from chapter IV and Annex VI of MARPOL convention, and include:

- Reduction of SOx, and Particulate Matter in Ship Emissions- Reduction of SOx, and Particulate Matter are seen as harmful components in ship emissions and IMO is targeting their reduction in the industry. The trend can have significant influences on the maritime fuel production, bunkering, shipbuilding, and most importantly the freight industry. There are two general approaches in the industry: lowering the sulphur content in the maritime fuels or using exhaust scrubbers to clean the gas emissions from the ship. According to IMO announcement in MEPC70 (Oct.2016) the 0.5% Sulphur cap in the marine fuels will take effect from 2020. This implies a necessary shift in the marine fuel supply from Heavy Fuel Oils to Marine Gas Oil.
- Reduction of NOx in Ship Emissions- by increase of MGO, reduction of NOx emissions from ships will find more significance. The NOx emission control is based on a 3-tiers scheme that establishes the NOx emission limits in ships based on the date of the engine design. Tier I and Tier II limits are global, while the Tier III standards apply only in NOx Emission Control Areas.
- Green House Gas (GHG) Emission Abatement – The 'Comprehensive IMO Strategy on Reduction of GHG Emissions from Ships' is being developed between 2017 and 2022 and the needed GHG reduction requirements will be concluded for entering into force from 2023. The results will entail several capital-intensive modifications and/ or utilization of technologies in the ships. Also consult the annex Appendix XI

Verified Weight measurements
The International Maritime Organization (IMO) has amended the SOLAS (Safety of Life at Sea) convention under regulation 2 of chapter VI which mandates the declaration of the Verified Gross Mass (VGM) of a packed container before loading on board vessels within a prescribed cut-off date / time to the shipping line and / or port terminal authorities. Effective 1st July 2016, the regulation stipulates the use of two approved methods to declare the VGM for each container by the shipper or his representative. The first is through weighing the box including content or alternatively the content is weighed and the tare of the container is added. This regulation has increased the demand for weighing points in the port and terminals.

Aside from the technologies that serve the regulatory compliance purposes, the industry is also the scene of technological developments towards enhancements in the industry's productivity. These developments are seen as the hopes of the industry to overcome the myriads of issues and challenges that are troubling her businesses. The Smart Ship concept is one of the prominent instances of such technological development.

2.5.9 International Port Competition

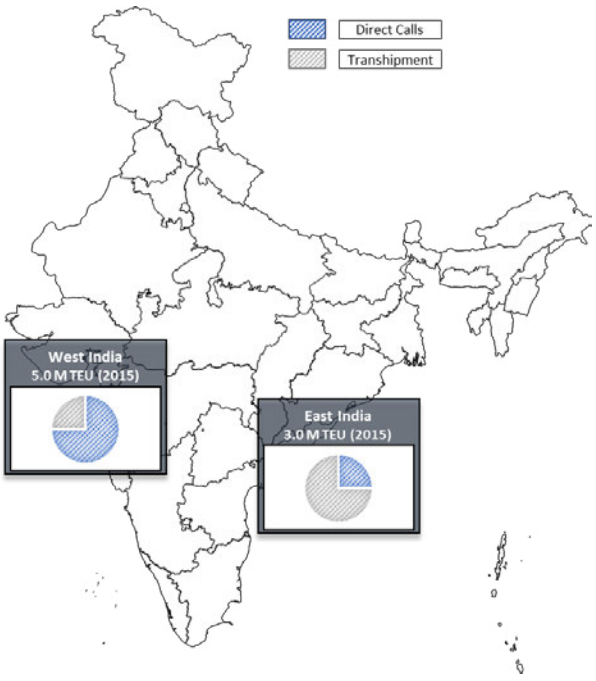
Sri Lanka is an important regional maritime hub, due to its strategic position near the East-West trade routes. Currently, Sri Lanka – through the port of Colombo – mainly serves as a hub for cargo destined for other nations in the Indian Sub-Continent. However, several recent and planned developments put pressure on Sri Lanka as a maritime hub. The table below provides an overview of Sri Lanka's key strengths, weaknesses, opportunities, and threats concerning its competitiveness as a maritime hub.

Strengths	Weaknesses
• Geographically strategic situation near the main East – West trade routes • Strategically situated to serve countries in the Indian Sub-Continent • Substantial water depths near the coastline • Transhipment tariffs at Colombo are competitive compared to other regional hub ports	• Broad maritime sector and related services are less developed than competitors, such Singapore
Opportunities	**Threats**
• Rapid growth of demand in Indian Sub-Continent countries • FDI on maritime silk route • Consolidation point for draft limited ports in Bay of Bengal • Attract new industries through FDI	• Development of deep-water ports in India and Bangladesh • Development of transhipment hubs in South East Asia and the Middle East • Improvement of Maritime Policies in India

The three identified threats are further discussed below.

Development of Ports in India and Bangladesh

India and Bangladesh are Sri Lanka's main transhipment destinations, as their ports traditionally have not been able to accommodate mainline vessels due to lagging port infrastructure. However, ports in India and Bangladesh are slowly being developed, posing a threat to Sri Lanka's position as regional hub.



In 2015, total containerized throughput in Indian ports amounted to approximately 8.0 M TEU, of which 5.0 M TEU was handled at Western Indian ports.

With the development of Jawaharlal Nehru Port (JNP; also known as Nhava Sheva), which handled approximately 4.5 M TEU in 2014-2015, and the second largest port, Mundra (1.75 M TEU), the dependence of Western Indian states on transhipment has substantially declined. Consequently, the share of transhipped containers handled at Western Indian ports dwindled to 25% in 2015.

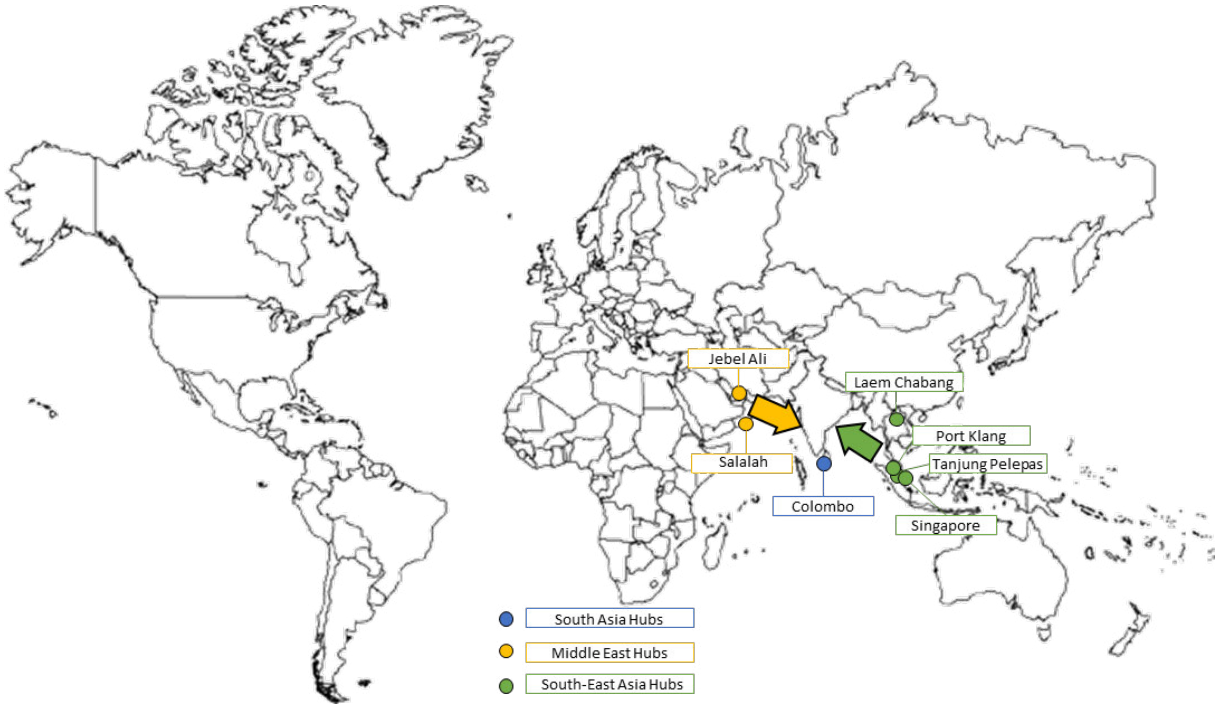
Currently, East India and Bangladesh are still dependent on transhipment, as adequate deep-water port infrastructure is lacking. However, with several port projects planned in India and Bangladesh, transhipment potential for the Indian Sub-Continent may further deteriorate. Inter alia, the following Greenfield deep-water port projects have been identified:

- India
  - Colachel / Enayam port
  - Vizhinjam port
- Bangladesh
  - Sonadia port
  - Payra port

Development of Regional Transhipment Hubs

Sri Lanka's competitive field for serving the Indian Sub-Continent has developed substantially over the last decade. The figure below provides an overview of Sri Lanka's competitive field; the following can be observed:

- Broadly speaking, there are 3 hub port groups in the region; the Middle East hub group, consisting of Jebel Ali and Salalah; the South Asia hub group, consisting of Colombo; and the South-East Asia hub group, consisting of Singapore, Tanjung Pelepas, Port Klang, and Laem Chabang.
- Due to the strong development of the Middle Eastern hub ports, Sri Lanka's market share for transhipment to Western Indian ports has declined.
- For East India's market share, Sri Lanka mainly competes with Southeast Asian ports, such as Singapore, Tanjung Pelepas, and Laem Chabang. Currently, Sri Lanka is the most dominant player for serving the East Indian market. However, several large-scale development plans, such as Singapore's new Tuas Terminal project, may put further pressure on Sri Lanka's status as a regional hub.



The table below presents the throughputs of the hub ports depicted above, as well as the ports' compound annual growth rates for the period from 2011 to 2015.

Table 2-7 Competitive Container Hub Ports

Port	Unit	2011	2012	2013	2014	2015	CAGR (%)
Middle East hub ports							
Jebel Ali	M TEU	13.0	13.3	13.6	15.3	15.6	4.66%
Salalah	M TEU	3.1	3.6	3.3	3.0	2.6	(4.30%)
Khalifa	M TEU	-	0.8	0.9	1.1	1.5	n/a
South Asia Hubs							
Colombo	M TEU	4.3	4.2	4.3	4.9	5.2	4.87%

Port	Unit	2011	2012	2013	2014	2015	CAGR (%)
South East Asia Hubs							
Singapore	M TEU	29.9	31.6	32.2	33.9	31.0	0.91%
Port Klang	M TEU	9.6	10.0	10.4	11.0	11.9	5.52%
Tanjung Pelepas	M TEU	7.5	7.5	7.4	8.2	9.1	4.95%
Laem Chabang	M TEU	5.7	5.9	6.0	6.6	6.8	4.51%

Subsequently, the table below presents several identified expansion plans for Colombo's current competing hub ports, as well as plans for Greenfield ports aimed at handling transhipment cargoes to Colombo's main feeder markets. In the South Asia Hub Ports, besides Hambantota, 11.4 M TEU capacity shall be added. In the South East Asia Hubs around 38.5 M TEU is expected to be added (of which Singapore adds 30 M TEU capacity). Finally, the Middle East Hub Ports plan to add 12.5 M TEU of capacity.

Table 2-8 Competitive Container Hub Port Development Plans

Port	Unit	Current Capacity	Future Capacity	Capacity Increase
Middle East Hub Ports				
Jebel Ali	M TEU	19.0	22.1	3.1
Salalah	M TEU	5.0	7.5	2.5
Khalifa	M TEU	2.5	15.0	12.5
South Asia Hub Ports				
Vizhinjam	M TEU	-	3.4	3.4
Colachel	M TEU	-	8.0	8.0
South East Asia Hubs				
Singapore	M TEU	35.0	65.0	30.0
Port Klang	M TEU	16.6	18.6	2.0
Tanjung Pelepas	M TEU	10.5	17.0	6.5

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3 Sri Lankan Ports and Their functions

3.1 Introduction

This chapter introduces the Sri Lankan Ports and their functions. For each main port the following information is described:

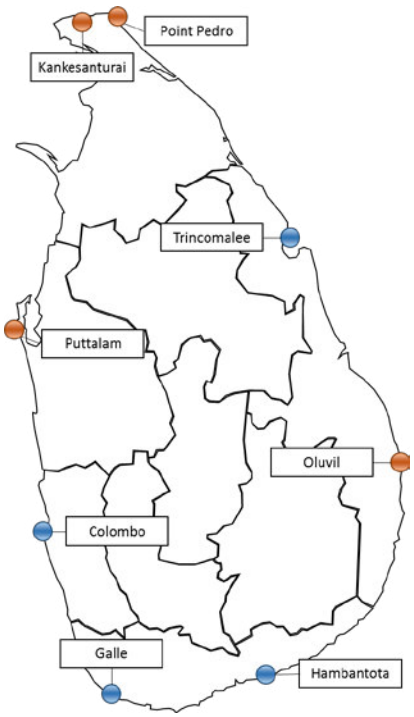
- Port layout and functions
- Hinterland connectivity
- Marine Traffic
- Cargo traffic
- Container terminals
- Dry Bulk handling
- Liquid bulk handling and
- General Cargo handling / RoRo Handling

For smaller ports like Kankesanthurai and Oluvil only basic information is displayed.

The main ports are Port of Colombo in the west, Port of Trincomalee in the east and Hambantota in the south.

The following approach has been used for this chapter:

- Paragraph 3.2 provides the sector overview
- Paragraph 3.3 details the Port of Colombo
- Paragraph 3.4 shows Port of Trincomalee
- Paragraph 3.5 details the port of Hambantota
- Paragraph 3.6 provides information on the port of Galle
- Paragraph 3.7 provides information on the port of Kankesanthurai (KKS)
- Paragraph 3.8 provides information on the port of Oluvil
- Paragraph 3.9 provides information on the Puttalam Coal Jetty



3.2 Port Sector Overview

Sri Lanka's port sector comprises several ports around the island, including Colombo Port, Galle Port, Trincomalee Port, Hambantota Port, Oluvil Harbour, Puttalam Jetty, Point Pedro Port and Kankesanthurai Harbour.

The country's three largest ports (shown in the figure on the right) are:

- Colombo Port, situated on the West coast of Sri Lanka;
- Hambantota Port, situated on the South coast of Sri Lanka; and
- Trincomalee Port, situated on the East coast of Sri Lanka.

The country's other ports[9] include:

- Galle Port, situated on the South-West coast of Sri Lanka;

[9] Fishery ports in Sri Lanka comes under the Ministry of Fisheries & Aquatic Resources and do not fall under SLPA, hence they are not mentioned here.

- Puttalam Coal jetty, a small port on the West coast;
- Kankesanthurai (KKS) and Point Pedro on the Northern coast; and
- Oluvil on the East coast.

These ports are further elaborated in the sections below.

The Sri Lanka Ports Authority (SLPA) acts as the national port authority and has a hybrid role in the country's port sector. The SLPA simultaneously fulfils the following 6 roles:

7. Landlord – The SLPA has conceded several terminals in Colombo port under a landlord PPP structure.
8. Service Port – The SLPA provides port services, such as warehousing, support services, and administration.
9. Cargo handler – SLPA is cargo handler or stevedore and owns and operates container terminals and multi-purpose or common terminals in the ports of Sri Lanka.
10. Regulator – As regulator, the SLPA provides licensing services and sets the regulations for the ports.
11. Harbourmaster and marine service provider in all Sri Lankan ports
12. Port planner and port developer – SLPA plans, constructs and develops ports in Sri Lanka

The table below shows the current usage in Sri Lankan ports with respect to cargo- and passenger handlings.

Table 3-1: Functional Overview Ports Current usage

Port	Container Transhipment	Containers	RoRo	Break Bulk / General Cargo	Dry Bulk	Liquid Bulk	Passengers
Colombo	X	X	X	X	X	X	X
Trincomalee				X	X	X	X
Hambantota			X	X		X	X
Galle				X	X	X	X
KKS				X			
Oluvil				X			
Puttalam					X		

In terms of port throughputs on gateway cargoes, Colombo Port is the most important port with 77% of all cargoes handled.
Including transhipment, the Port of Colombo has a total market share of 88% within Sri Lanka.

Table 3-2: Port Gateway Throughput (Tons)

Port	Gateway Container	Coal	Wheat Maze	Cement / Clinker / Fertilisers	Crude Oils	Refined Oils	Other Liquid	Vehicles*	General Cargo	Total Per Port	*Share of Total*
Colombo	14.20	-	.19	2.19	.31	1.69	2.87	.19	.05	.71	**22.39**	*77.7%*
Trincomalee	-	.10	.87	2.24	-	-	.28	-	-	-	**3.49**	*12.1%*
Hambantota	-	-					.03			.33	**.35**	*1.2%*

Port	Gateway Container	Coal	Wheat Maze	Cement / Clinker / Fertilisers	Crude Oils	Refined Oils	Other Liquid	Vehicles*	General Cargo	Total Per Port	*Share of Total*
Galle	-	-	-	.77	-	-	-	-	-	**.77**	*2.7%*
KKS	-	-	-	-	-	-	-	-	.03	**.03**	*0.1%*
Oluvil	-	-	-	-	-	-	-	-	-	**-**	-
Puttalam	-	1.79	-	-	-	-	-	-	-	**1.79**	*6.2%*
Total Per Commodity	**14.20**	**1.89**	**1.06**	**5.20**	**.31**	**1.69**	**3.17**	**.19**	**.05**	**1.06**	**28.83**	*100.0%*
Share of Total	*49.3%*	*6.6%*	*3.7%*	*18.0%*	*1.1%*	*6.0%*	*11.0%*	*0.7%*	*0.2%*	*4.7%*	*100.0%*	

*Transhipment of containers and vehicles are not considered in the total port throughput.
Source: SLPA

The number of vessels at the port of Colombo is 88% of all vessel arrivals in Sri Lanka. These vessels are dominantly commercial traded vessels handled by the cargo terminals. The ship repair segment only handled 50 vessels in 2016 or 1%. The total number of ships that took bunkers is around 35. The table illustrates that ship repair and bunkering are today relatively small markets.

Table 3-3: Ship Arrivals 2016

Port	Cargo Ships	Ships for Repair	Ships-bunkering	Other Ships	Total Arrivals
Colombo	4,280	46	29	50	**4,405**
Trincomalee	207	1	4	4	**216**
Hambantota	273	1	-	7	**281**
Galle	83	2	2	9	**96**
KKS	25	-	-	-	**25**
Oluvil*					
Puttalam*					
Total Arrivals	**4,868**	**50**	**35**	**70**	**5,023**

Source: SLPA
*No data available

Technical Assistance Consultant's Report

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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

(Financed by the Japan Fund for Poverty Reduction)

The National Port Directions – Volume 1 (Part 3)

Prepared by

Maritime & Transport Business Solutions B.V. (MTBS)

Rotterdam, The Netherlands

For Sri Lanka Ports Authority

Asian Development Bank

3.3 Port of Colombo

General

Colombo is located on the West coast of Sri Lanka and is country's principal city and port. The port handles containerized cargoes, liquid bulk (crude oil and refined products), dry bulk (mostly grain and cement), general cargoes (mainly steel products, timber and RoRo) and cruise passengers. It is located near the main East West shipping routes and has become a major port for gateway cargo and transhipment of containers. The port covers three large containers terminals and has another one under development. Transhipment of containers accounts for approximately 75% of Colombo's total container traffic; the remaining 25% comprises local containerized cargo, driven mainly by exports of garment, tea, and rubber, and imports of consumer products, industrial and agricultural equipment. Whilst there is almost no effective competition for domestic cargo, Colombo competes with several major hub ports for transhipment traffic. In this segment, the port has benefitted from its strategic location, both close to the main east-west trade and close to the large and strongly growing Indian market.

The port handled 81.8 million tons in 2016 including 5.7 million TEU of containers. In 2016 the port had about 4,405 ships arrivals and was ranked as 23rd largest container port in the world. The port handles the largest container vessels in the world having dimensions of 400m in length and a capacity of 21,500 TEU due to quays with ample water depths of CD -18m and state of the art terminals.

The port was developed along the natural bay at the city and the old basin covers about 201.5 ha. A major expansion program has resulted in the development of South Harbour which came into operation by 2013. The new port basin consists of one state of the art terminal container terminal (58ha) and another container terminal that soon will be launched. The basin has space for a third container terminal and a liquid terminal.

Additionally, to handling imports, exports and transhipment, the Port of Colombo offers non-cargo services including harbour master services, pilotage and tugging, bunkering, ship repair, warehousing, water supply, weighing and scanning services, firefighting, hospital services, financial services and ship chandlery. Also, the navy is situated within the port limits. To the north of the port a maritime training institute is situated.

The port of Colombo is important for the nation and facilitates the majority of the import and exports trades today. The city is under large developments with the erection of many new hotels and resident flats and rehabilitation of historic buildings. Further, a new city port development, south of the existing port, including hotels, conference centres, residential flats, shops and marinas is under development. The new port city will be connected through an elevated highway which also creates additional port access. The western region has several plans for city and urban developments and improvements. Combined, the western region developments and the city of Colombo generate high demands for the port of Colombo. This translates to required port improvements, a new cruise terminal, enlarged connectivity and major future port planning both for containers as well as for liquid bulk and multipurpose. Additional demand for warehousing and logistics needs to be captured in future planning as well.

Figure 3-1 Map of Colombo

	UCT	JCT	CICT	SAGT	PVQ	South Jetty	New North Pier	Colombo Dockyard	Slipway	JCT Feeder Berth	New Feeder Berth	Coastal Berths	Bandaranaike Quay	Sydney/Melbourne	Passenger Berth	Water Supply	Canal Berth	ECT	Dolphin Tanker Berth	Cement Storage	Warehouses	Weighing &	Hospital	Fire Brigade	Training Centre	Tug & Pilot Station
Number on Map	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*Not Indicated on Map*					
Containers	■	■	■	■						■	■							■								
Ro-Ro	■																									
Dry Bulk					■															■						
Liquid Bulk						■													■							
Gen. Cargo					■		■						■													
Passengers															■											
Ship Repair								■	■																	
Navy												■														
Auxiliary														■		■	■				■	■	■	■	■	■

Hinterland Connectivity

The port is characterised by an internal road network of four lanes (two lanes in both directions), leading to the main exit gate to the north. The port has a total of eight gates of which three are used for cargo. The maximum allowable height is limited (4.2m) by a bridge near the main administration building or 4.5m near main exit gate. Over-height cargoes are moved outside the port through customized route-solutions. A new elevated highway is planned on top of the existing port access road. The port will be connected to the highway with dedicated ramps.

The only rail connection with the port is a single track to Bandaranaike East Quay (13 on map). The rail connection is only used for the import of rail wagons into the country but currently this rail is not operational. The port has no rail connection to the Colombo South Port.

Marine Traffic

Table 3-4: Marine Traffic Port of Colombo

Ship type, no of ships	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Container	3,628	3,666	3,304	3,076	3187	3,092	3,142	3,239	3,643	3,804
Conventional	173	205	140	56	68	52	38	28	45	40
Other cargo	421	458	474	616	680	591	354	366	388	436
Ships for repairs	44	49	48	47	30	35	36	38	43	46
Ships-bunkering	12	21	106	68	65	51	50	25	30	29
Other ships	48	25	42	47	94	49	47	46	48	50
Total Ships Arrived	**4,326**	**4,424**	**4,114**	**3,910**	**4,124**	**3,870**	**3,667**	**3,742**	**4,197**	**4,405**

Cargo Traffic

The port of Colombo is the largest port in Sri Lanka with about 8 million tons handled per annum excluding containers. Between 2005 and 2015 the CAGR on "non-containerised cargo" was 1.1% per annum. Over the last ten years the dry bulk grew by 1.6%, and the liquid bulk by 1.3%. The non-containerised general cargo declined by 0.2%. The 2015 share of break bulk was 14%, the dry bulk represented 29% and the liquid bulk 57%. Imports of Ro-Ro and transhipment of Ro-Ro cargo in Colombo has been phased out towards Hambantota as the latter port has ample space available for this type of commodity.

Table 3-5: Throughput Bulk Colombo 2007-2016

Tons '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Non-containerised General Cargo	1,048	838	649	627	722	618	364	601	1,113	879
Dry Bulk	2,257	2,565	2,097	2,556	2,620	2,709	2,657	2,444	2,344	2,572
Liquid Bulk	4,264	4,068	4,026	4,159	4,565	4,839	4,265	4,420	4,579	4,746
Total	**7,568**	**7,471**	**6,772**	**7,341**	**7,906**	**8,165**	**7,286**	**7,465**	**8,036**	**8,197**

Table 3-6: Throughput RoRo Colombo 2007-2016

Vehicles in units	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic	30,047	21,875	6,732	45,779	90,824	38,886	6,651	21,296	71,738	31,888
Transhipment	10,065	2,154	4,973	2,455	993	183	466	-	13	778
Total	**40,112**	**24,029**	**11,705**	**48,234**	**91,817**	**39,069**	**7,117**	**21,296**	**71,751**	**32,666**

Containers are dominantly handled at Colombo port with so far only sporadic exemptions at other ports. Containers are the main cargo at the Port of Colombo in terms of volumes handled. In 2016 about 5.7 million TEU was handled. A large part of this volume is transhipment (about 75%) which means that these boxes are transferred between ships to reach their destination. The gateway containers amounted to 25% or 1.3 million TEU which consists of imports and exports. About 82% of all containers handled are laden containers. The remainder 18% are empty containers handled. In the past decade, the gateway throughput grew with 4.9% and transhipment throughput with 5.8 % (CAGR 2007 – 2016).

Table 3-7: Throughput Containers Colombo 2007-2016[10]

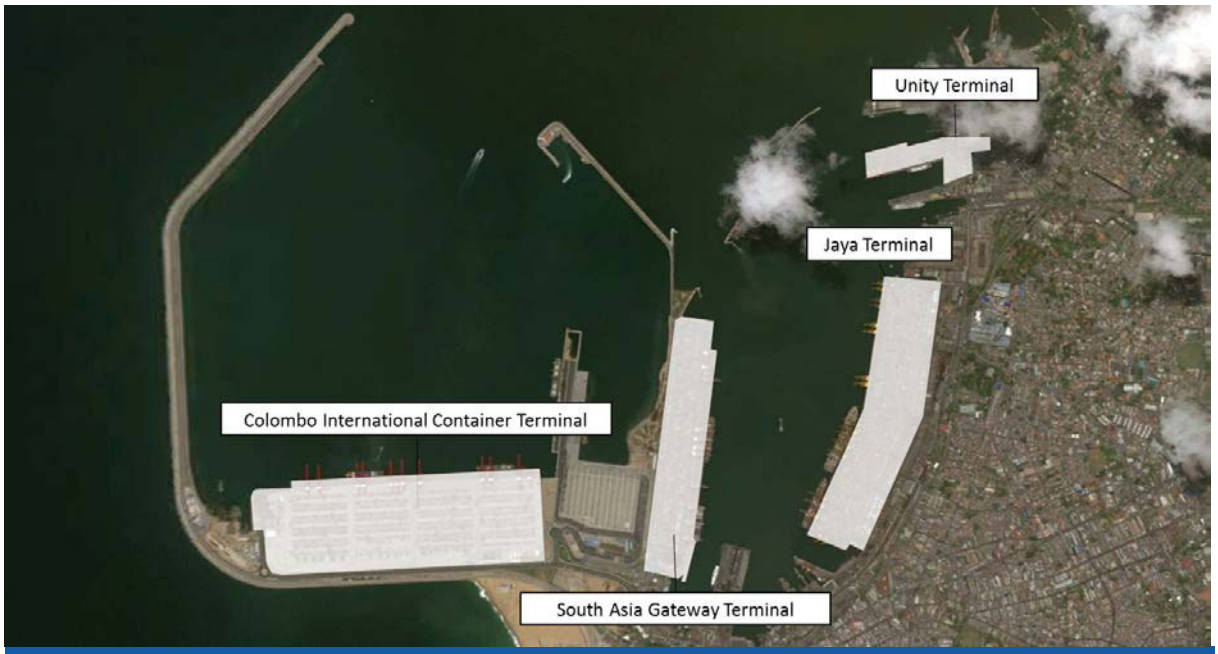
TEU '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Import Laden	*355*	*359*	*318*	*415*	*488*	*467*	*477*	*519*	*574*	*631*
Import Empty	*46*	*48*	*56*	*46*	*36*	*41*	*39*	*49*	*35*	*21*
Export Laden	*238*	*229*	*223*	*244*	*260*	*265*	*256*	*270*	*263*	*271*
Export Empty	*163*	*177*	*155*	*226*	*263*	*247*	*259*	*289*	*346*	*377*
Gateway	**803**	**813**	**752**	**932**	**1,047**	**1,020**	**1,032**	**1,127**	**1,218**	**1,300**
Transhipment	**2,469**	**2,785**	**2,633**	**3,096**	**3,124**	**3,065**	**3,208**	**3,700**	**3,888**	**4,355**
Total	**3,272**	**3,599**	**3,385**	**4,028**	**4,171**	**4,085**	**4,240**	**4,827**	**5,106**	**5,655**
Tonnage Handled (million tons)	**35.9**	**40.5**	**39.6**	**51.4**	**54.1**	**53.5**	**56.2**	**63.3**	**65.7**	**73.7**

Container Terminals

To accommodate container demand, the port currently has 4 container terminals: the Jaya Container Terminal (JCT); the Unity Container Terminal (UCT); the South Asia Gateway Terminal (SAGT); and the Colombo International Container Terminal (CICT). The terminals' combined capacity has reached approximately 7.5 M TEU p.a., since CICT operations commenced in 2013. The UCT and the JCT, both the oldest terminals in the port are operated by SLPA whereas the CICT and SAGT are privately operated terminals. In Colombo South Port a new container terminal ECT is ready to be commissioned. The terminals are further elaborated on in the sections below.

[10] Data is excluding re-stowage

Figure 3-2: Colombo Container Terminals



Terminal	Quay Length (m)	Depth (m)	Berths (#)	Design Capacity (M TEU)	Area (ha)
UCT	590	-9 to -11	2	-	1.5
JCT	1240	-13 to -15	4	2.7	45.5
SAGT	940	-15	3	1.8	20
CICT	1200	-18	3	2.8	58

Dry Bulk Handling

Dry bulk is mainly handled in the north-eastern corner of Colombo port at the Prince Vijaya Quay (PVQ) and new north pier. Mainly grain, cement and fertilisers are handled. At the PVQ berths, Prima Flour operates the Grain Elevators facility with a capacity of 40,000 tons of wheat and 20,000 tons of milling capacity per month. It is equipped with four truck loading bays to load bagged flour whilst it also can load truck in bulk. The Private cement companies have storage silos connected by pipelines to the New North Pier. The silos have loading facilities for cement trucks. Figure 3-3 presents an overview of the terminals available

Figure 3-3: PVQ & North Pier

Terminal	Commodity handled	Operators	Quay	Quay length (m)	Depth (m)
Animal Feed & Grain Elevator	Wheat / Maize / Corn	Prima Group / Serendib	PVQ New North Pier	330 200	-9.45 -11.0
Cement Silos	Cement	Tokyo Cement Group & INSEE Cement Group	New North Pier	200	-11.0
No dedicated Terminal	Fertilisers	Various	New North Pier & BQ	200	-11.0

Liquid Bulk Handling

The liquid bulk handling consists mainly of imports of crude oil for the refinery and imports of refined fuels for storage and distribution facilities. Also bunkering of marine fuel, gas and diesel oils are available by barge. The liquid bulk at Colombo is handled through the following facilities:

- SBM1 – located offshore. Mainly used for import of crude oil pumped into Sapugaskanda refinery, Orugodawatta tank farm
- SBM2 – located offshore. Mainly used for import of refined oils pumped into Muthurajawela tank farm or Kollonnawa tank farm
- Dolphin jetty at mid-breakwater of the old port basin. – Mainly used for import of refined products (Fuel Oil, Diesel Petrol and lube oil). Most crude oil is handled at the SBMs. Lube oil is connected to Kollonnawa tank farm and Muthurajawela tank farm and the Bloemendhal Lanka Marine Service depot. Bunkering at the Dolphin jetty is also possible.
- South jetty – located near UCT pier is used for bunkering of ships.

Figure 3-4: Oil Supply Chain Overview

Facility	Capacity
Crude Oils	
SBM 1 Jetty	• Pump capacity: minimum 1,406 tons/hr • 180,000 DWT • LOA 298m, beam 43m • Draughts 18.9m
Sapugaskanda Refinery	• 2.5 M tons / annum distilling capacity • 0.54 M tons' crude storage capacity
Orugodawatta Tank Farm	• 0.16 M tons' storage capacity
Refined Oils	
Dolphin Jetty	• Pump capacity: minimum 278 tons/hr • 40,000 DWT • LOA 210m • Draught 11.8
SBM 2 Jetty	• Pump capacity: minimum 2500 tons/hr • 60,000 DWT • LOA 210m • Draught 11.8m
Sapugaskanda Refinery	• 60,000 tons' storage capacity
Kollonnawa Tank Farm	• 248,000 tons' storage capacity
Muthurajawela Tank Farm	• 205,000 storage capacity
Gas	
Shell LPG CBM	• LOA 165m • Draught 7.0m • Gas capacity 20,000m^3

Source: Ceylon Petroleum Company

General Cargo / RoRo Handling

Currently, there is no dedicated general cargo terminal. Most of the general cargo is handled at the Bandaranaike Quay (BQ) but general cargo ships can also be moored at UCT, New North pier or guide pier. RoRo is mostly handled at Unity container terminal (UCT) where storage is possible for vehicles as container operations have diminished. The ECT berths are temporarily used for project cargoes up till the terminal is utilized for containers.

Figure 3-5: General Cargo and RoRo Handling

3.4 Port of Trincomalee

General

The port of Trincomalee comprises several scattered facilities in China Bay, a natural deep-water bay (up to 20m) on the North-Eastern side of the country. The port was originally used as a naval base. Additionally, the port comprised the country's main tea export facility (tea was handled at the Tea Traders Association (TTA) facility, as indicated on the map), after the institutional setting of Colombo port changed with the establishment of the Port Cargo Corporation (prior to the introduction of this port authority, the port was operated as a tool port). In the Northwest corner of China Bay a common fish port is located. Finally, the Mud Cove facility acted as a regional maintenance and repair facility, providing a slipway and workshops.

The naval base is operational and the SLPA managed TTA facility and Ashroff Jetty are currently used for imports of coal, clinker, and gypsum and general cargo, most of which are destined for a cement plant. Sometimes the Ashroff quay is also used a Cruise berth.

Besides SLPA managed facilities, the China Bay comprises several private waterfront facilities. The three main private waterfront facilities comprise:

- Tokyo Cement Milling Facility – a cement mill with a jetty that is used to import clinker to produce cement.
- Prima Flour Milling Complex – a flour milling complex with a production capacity of 3,600 metric tonnes per day, and a storage capacity of 200,000 tonnes.
- Lanka IOC Facility – Lanka IOC is the Sri Lankan subsidiary of Indian Oil Corporation (IOC), the Indian petroleum company. This facility includes several storage tanks west of the Flour mill and many unused oil tanks Northeast of the airport.

Table 3-8: Functions Port Facilities Trincomalee

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Tokyo Cement				X						
Mud Cove								X		X
Ashroff Quay				X		X	X			
TTA			X							
Lanka IOC					X					
Prima Flour				X						
Navy facilities									X	

Figure 3-6: Trincomalee Facilities

Item	Value	Unit
Harbour Basin	2,000	ha
Ashroff Jetty – Main Berth Length	250	m
Ashroff Jetty – Side Berth 1 Length	90	m
Ashroff Jetty – Side Berth 2 Length	90	m
TTA Quay – Berth Length	190	m
Ceylon Quay – Berth Length	50	m
Mud Cove Jetty – Main Berth Length	50	m
Mud Cove Jetty – Side Berth Length	40	m
Prima Flour – Jetty Length	150	
Tokyo Cement – Jetty Length	240	m

Hinterland Connectivity

The existing railway line currently reaches the private facilities of Prima Flour and Tokyo Cement heading west. The future expansion of the railway to Ashroff Jetty is essential for smooth operations at the jetty. The port is connected by road to the east coast of Sri Lanka through the A15 and heart of the country in the direction of Colombo through the A6. Currently, the area west of the port lacks sufficient connection for it to be developed. A road connection along the rail connecting it with the A15 and the A6 is proposed in case of further development of the area.

Non-Containerised Cargo

The dry bulk import covers majority of the throughput in Trincomalee. The throughput amounted to 3.2 M tons in 2016, which is less than half of the throughput in Colombo.

Dry bulk imports account for most of the throughput in Trincomalee. Below the table shows the Trincomalee Port throughput. The throughput is bundled per activity and commodity. The cargo on the Ashroff jetty is mostly destined for the Siam Cement facility in Puttalam and consists mainly of coal and clinker. There is a mid-stream operation to load clinker to vessels destined for Galle.

Table 3-9: Trincomalee Non-Container Throughput 2013-2016 per Operation

	Commodity	2013	2014	2015	2016
		('000) Tons	('000) Tons	('000) Tons	('000) Tons
Ashroff Jetty	Coal, Clinker, Gypsum, Slag	160	170	220	430
Mid-Stream	Clinker	-	-	270	535
Prima Jetty	Flour	820	950	1,030	860
Tokyo Jetty	Gypsum / Clinker	1,290	1,460	1,320	1,444
Oil Jetty	Gas Oil	170	170	180	280
Total		**2,440**	**2,750**	**3,020**	**3,549**

Source: SLPA

Below the table outlines the throughput per commodity. The main driver for growth in cargo handled can be attributed to the increased demand in clinker for both the Tokyo Cement facility and the Siam Cement facility in Galle (through mid-stream operations).

Table 3-10: Trincomalee Throughput 2010-2016 per Commodity

'000 Tons	2010	2011	2012	2013	2014	2015	2016
Discharged							
Wheat in bulk	911	1,090	901	676	825	868	714
Clinker in bulk	738	985	1,369	1,244	1,383	1,419	1,593
Gypsum in bulk	12	43	107	80	114	86	112
Coal in bulk	106	105	89	99	113	93	103
Other(slag)	-	-	-	10	14	-	22
Liquid bulk (fuel)	191	113	179	166	173	182	281
Total Discharged	**1,960**	**2,337**	**2,646**	**2,276**	**2,621**	**2,649**	**2,825**
Loaded							
Wheat bran pallets	-	-	-	140	127	162	153
Other (clinker)	-	-	-	-	-	217	536
Total Loaded	**194**	**237**	**213**	**159**	**127**	**379**	**689**
Cargo Handled	**2,154**	**2,574**	**2,859**	**2,435**	**2,748**	**3,027**	**3,514**

Source: SLPA

Cargo ships remain the main category of ships calling at Trincomalee port. Although the port today is limitedly called for repair or bunkering, the number of vessels is increasing, supported by higher throughputs and more lay-up/service vessels.

Table 3-11: Marine Traffic Port of Trincomalee 2010-2016

	2010	2011	2012	2013	2014	2015	2016
Cargo ships	0	0	0	113	120	158	207
Ships for repairs	0	0	0	3	1	1	1
Ships-bunkering	0	0	0	6	1	2	4
Other ships	0	0	0	12	5	3	4
Total ships arrived	**109**	**126**	**161**	**134**	**127**	**164**	**216**

Source: SLPA

3.5 Port of Hambantota

General

Hambantota port is situated just east of the southern tip of the country, approximately 10 nautical miles from the main east-west maritime trade lanes passing Sri Lanka. The port opened in 2011 and has a general cargo / RoRo quay (600m) operational. Further the port has a 315m liquid berth for bunkering and LPG. A container quay (835m), a feeder quay (470m), a (break) bulk quay (835m) to be delivered to the port operator in 2017. The port handled in 2016 0.35 million tons of cargo mainly consisting of vehicles and break bulk cargoes. It handled 281 vessels in 2016 of which 267 car carriers. The port is subject to a government agreement with port operator CMPort part of China Merchants Holdings International (CMHI). The concession contract with CMPort to operate and develop the port under a 99-years port management contract was finalised in July 2017. This deal would fit within the Chinese philosophy of building a maritime silk road with strategic nodal points along the route. Especially the available port areas (6070 ha) for industrial development in connection with the port makes the location ideal for large industries.

The port project was initially proposed in 2006, to accommodate expected demand growth fuelled by economic growth in the Asian continent. For this capacity expansion project, the following 2 factors led to Hambantota being preferred over Colombo:

- Proximity to the main maritime trade routes – Hambantota is more conveniently situated, as vessels on the main trade routes only require a minimal deviation to call at the port.
- Available land – Due to the port-city interface in Colombo, the port of Colombo had limited expansion potential. Conversely, there was ample land available in Hambantota.

Currently, the first phase of the Hambantota port project, which was developed by China Harbour Engineering Company (CHEC), is operational. This first phase consists of the following facilities:

- Two Ro-Ro berths of in total 600m for transhipment/imports – in 2012, the entire Ro-Ro operations were relocated from Colombo port to Hambantota port, due to the available space in Hambantota. The Ro-Ro operation covers approximately 11 ha and mainly comprises transhipment of vehicles and vehicle parts to East Africa and the Gulf region. The RoRo berth is equipped with two post panamax STS cranes.
- A small craft berth with a length of 205m.
- Bunkering berth of 315m and a LPG mooring location. –. The facility is connected to a tank farm which includes 8 tanks for marine fuel, 3 tanks containing aviation fuel and 3 for Liquid Petroleum Gas (LPG). The total storage capacity is approximately 70,000 tons, located approximately 1.2 km east of the oil terminal. Bunkering operations commenced in 2014; however, bunkering operations were halted shortly after, in February of 2015. It is envisioned that bunkering operations will recommence once a suitable operator has been selected.

Phase II consists of:

- A 15-floor administrative complex which has been constructed.
- A (break-) bulk cargo terminal is under construction with 835 m of quay and water depth of 17 m.
- A container terminal with two main line berths (835m quay in total) and two feeder berths (470 m of quay) with water depths of 17m are under construction.
- 15,000 acres for a special economic zone for industry and logistics
- An island constructed at the western breakwater provides space for real estate and marina developments

Phase II was due for finalisation by mid-2017.

Entrance and Breakwaters

The mouth of the natural harbour at Hambantota has a 22m depth. When completed, the port has a 1.5 km long breakwater, with a minimum basin depth of 17m. This is compared to the 15.5m depth of the Port of Colombo in the old port and CD -18 m in South Harbour. The turning basin inside the port is 600m. A dam will also be built to prevent flooding in nearby areas, and a seawall made of interlocking concrete blocks will protect the port from high seas.

A USD 550 million tax-free port zone was set up outside the port consisting of 15,000 acre SEZ project. The land area was sourced from several communities including 5,000 acres from Hambantota and the rest from Monaragala, Ambilipitiya and Matara. The finished project is expected to provide indirect employment to over 50,000 people. Recently, the Board of Investments (BOI) indicated that additionally a new refinery, a sugar plant and grain terminal are projected.

Figure 3-7: Hambantota Facilities

Item	Berth Length	Water Depth	Cargo / Purpose
Multi-purpose quay	600m	CD -17.0m	RoRo
Oil berth	315m	CD -17.0m	100,000 DWT Oil Vessels
Small Craft Jetty	205m	CD -17.0m	Small crafts
(Break-) Bulk	835m	CD -17.0m	Under construction
Container berths	835m	CD -17.0m	Under construction

Container feeder berths	470m	CD -17.0m	Under construction

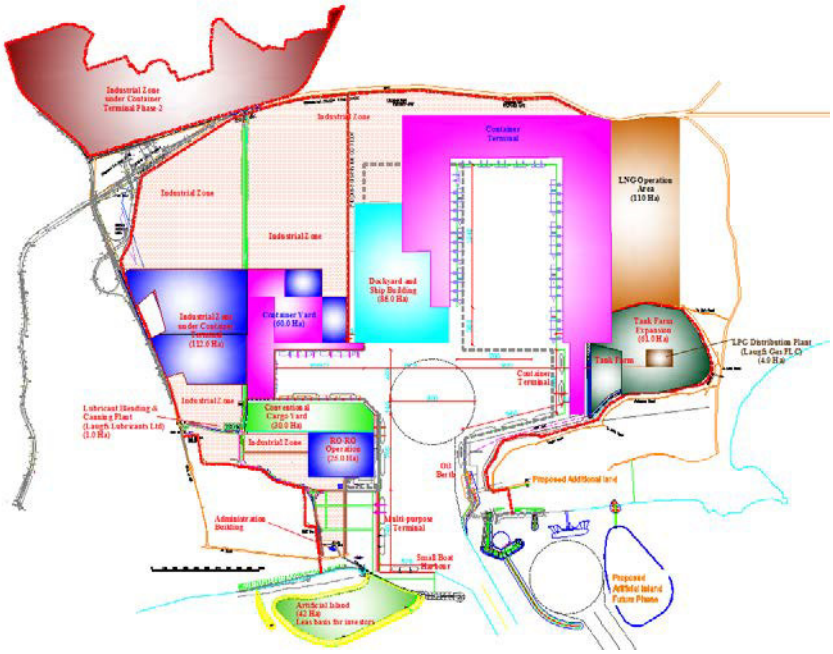
Table 3-12: Function Port Facilities Hambantota

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Multi-Purpose Terminal			X	X						
Container terminal	X									
Oil Terminal					X					
Tank Farm										X

Further Expansion

Phase 3 and 4 for the Hambantota port expansion are planned until 2030 subject to demand growth. The exact details of the plan might change due to negotiations taking place by government and Chinese investors.

Figure 3-8: Development Phase II & IV



Hinterland Connectivity

Hambantota is connected to coastal roads to Colombo and to the east of the country. The hinterland roads are congested during the day and not suited for heavy and frequent Container transport. Mattala airport has been constructed to the north of Hambantota. It is envisioned to be an international airport which makes the port ideal for an air-sea combination.

The port of Hambantota is not linked with the national Expressway but construction is planned. The distance to the expressway is approx. 96 km. The port has no railway line connection. Internal port roads are available and constructed based on two lanes.

Non-Containerised Cargo

Table 3-13: Throughput Non-Containerized Hambantota 2011-2016

Tons '000	2011	2012	2013	2014	2015	2016
Break Bulk	15	20	119	305	280	330
Dry Bulk	-	-	-	-	-	-
Liquid Bulk	-	-	-	169	12	25
Total	**15**	**20**	**119**	**474**	**293**	**355**

Table 3-14: Throughput RoRo Hambantota 2011-2016

Vehicles	2011	2012	2013	2014	2015	2016
Domestic	-	6,411	26,458	37,923	69,195	31,519
Transhipment	-	4,338	38,064	160,502	116,257	150,143
Total	**-**	**10,749**	**64,522**	**198,425**	**185,452**	**181,662**

Table 3-15: Marine Traffic Port of Hambantota 2010-2016

	2010	2011	2012	2013	2014	2015	2016
Cargo ships	0	0	34	136	269	278	273
Ships for repairs	0	0	0	1		2	1
Ships-bunkering	0	0	0		63	7	0
Other ships	0	0	0	2	3	8	7
Total ships arrived	**0**	**0**	**34**	**139**	**335**	**295**	**281**

Source: SLPA

3.6 Port of Galle

General

Galle port is Sri Lanka's oldest port, situated near the southern tip of the island. Galle has a strong position in services to main line vessels on the East-West trade route, due to its convenient location near the maritime trade lane. However, the port has limited draft and is not able to handle large vessels. In 2016 Galle had a throughput of 0.77 million tons and handled about 96 vessels in 2016 of which 83 cargo vessels the remainder arriving for repairs, bunkering or other activities. The port handles import of rice, flour, fertilisers, cement and clinkers. The cement related imports are typically transhipped by small bulk vessels, as the larger mother vessels are unable to enter the port of Galle. Additionally, Galle is the only Sri Lankan port that offers dedicated facilities for pleasure yachts, since the completion of a marina complex in 2015. The port also receives cruise vessels during the cruise season and it is a port in which often crew changes on main line vessels are organised with fast passenger vessels. Finally, the port houses navy vessels (these vessels often occupy SLPA berths as the dedicated navy berths provide insufficient space). and the port is used for cement related imports.

Figure 3-9 Port of Galle

Berth	Berth Length	Water Depth
Closenburg Jetty 1	130m	CD -9.0m
Closenburg Jetty 2	130m	CD -9.0m
New Jetty 1	160m	CD -9.0m
New Jetty 2	86m	CD -9.0m

Table 3-16: Functions Port Facilities Galle

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Closenburg Jetty				X			X			
New Jetty			X							
OPL & crew services										X
Marina										X
Fishery Berths										X

Hinterland Connectivity

Currently, Galle is accessible by a two-lane coastal road and inland roads making it accessible for minimum amounts of traffic. Port of Galle is located at 5.8 km from the Expressway E01.

Non-Containerised Cargo

Galle currently handles break bulk and dry bulk cargo (mainly clinker for the cement power plant). The port also receives cruise vessels albeit the quays and water depths at the existing port are limited. The ancient city has a large attraction to tourism and future cruise demand can be expected. Further, the port provides crew and other services to shipping lines through fast service boats. Ships pass Galle on their East-West Voyage and crew, stores and or spares can be brought to the ships without having them to stop sailing and call at a port. The port of Galle also has a yacht marina. The cement manufacturer has expansion plans at its facility at the port. When this development has reached approval from the authorities, the annual bulk volumes would increase to 1.5 million ton of which 95% would consist of clinker and 5% of gypsum. It should be noted that both commodities require additional attention with respect to dust and quay/water pollution during operations. Through suction systems dust and pollution can be controlled effectively.

The cargo details below concern cargo discharged as there is no cargo loaded in Galle.

Table 3-17: Galle Non-Container Throughput 2007-2015

Tons ('000) Discharged	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cement in Bags	-	-	-	-	-	2	3	-	2	-
Clinker in bulk	324	310	162	284	392	322	144	356	486	719
Gypsum in bulk	19	19	-	10	9	14	36	29	35	40
Slag in bulk	-	-	-	-	-	-	-	-	8	-
Cement in bulk	277	124	-	24	63	82	17	8	9	12
Total	**620**	**452**	**162**	**318**	**463**	**421**	**200**	**393**	**540**	**771**

Source: SLPA

3.7 Kankesanthurai (KKS)

Kankesanthurai and Point Pedro are the small ports which provide a sea entrance to the populated northern strip of Sri Lanka. Cargo operations in both ports are limited to 26 thousand tons of break bulk cargo in 2016 for the local market. In 2016 about 25 vessels were handled. The ports also have fishery berthing at shallow drafts and a navy facility. Kankesanthurai was closed during the civil war years in until, in 2011 Indian parties financed ship wreck removal and dredging to 8 m to ensure smooth operations. It is also home to an old cement factory which was shut down in 1991.

Figure 3-10: Facilities KKS

Item	Berth Length	Water Depth
General Cargo	100 m	CD - 7.3 m
Fishery Berth	2 x 60m	-
Navy Berths	-	-

SLPA has formulated three objectives to develop KKS port:

4. To operate a commercial berth
5. To operate a passenger terminal
6. To initiate port related businesses (including navy) to strengthen the region

To do this several projects have been identified to strengthen the port infrastructure:

- Constructing a new 1,400 m breakwater
- Constructing multi-purpose berth to accommodate passenger vessels and imports and exports to India.
- Connecting the port with KKS railway station 1.2 km to the east of the port.
- A possible economic zone for food related industries.

The throughput statistics for KKS show a significant demand in 2009 followed by years of differing throughputs of break bulk / general cargo.

Table 3-18: KKS Non-Container Throughput 2007-2016

Tons ('000) Discharged	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Containerized	-	-	15	-	-	-	-	-	-	-
Break bulk	-	-	166	11	28	60	49	21	32	27
Dry bulk	-	-	-	-	-	-	-	-	-	-
Liquid bulk	-	-	59	-	-	-	-	-	-	-
Total	**-**	**-**	**240**	**11**	**28**	**60**	**49**	**21**	**32**	**27**

Source: SLPA

3.8 Oluvil

Oluvil is a small port with a 4 hectares' general cargo yard having a 330m quay with a depth of 8 m. No throughput data has been reported. The port is mainly used for fishery which SLPA sees as its prime development goal along with the development of food related industries. The detailed plans for Oluvil include:

- Inorganic Fertilizer & Agro Chemical Packing/ Storage Facilities
- Organic Fertilizer Manufacturing, Packing and Storage Facilities
- Dedicated Economic Centre
- Livestock Sector
- Milk Related Value Adding

In stage two of the commercial port development, SLPA plans to construct a general cargo berth with a length of 360 m and a depth of 11m to handle 16,000 DWT vessels.

Figure 3-11: Oluvil Port

Item	Berth Length	Water Depth
General Cargo	330 m	CD - 8.0 m
Fishery Berth	200 m	CD - 3.0 m

3.9 Puttalam Coal Jetty

Puttalam Coal jetty is a small landings jetty for the 900-megawatt (MW) coal power station located near the coast called Norochcholai Power Station or the Puttalam Coal Plant in the Puttalam District of the North-western Province in Sri Lanka. The annual coal requirement for the plant is around 1.4 million tons. Due to the monsoon period about 2.2 million tons is imported during the period mid-September to mid-May. The power station has a coal stock yard of 19.7 ha. The jetty has a total length of 590m but barges can only berth at the outer end of about 230m on each side of the jetty at water depth of CD -4.0m. The jetty is equipped with four coal discharge cranes to discharge coal from seven available barges (LOA 65m). The mother vessels are discharged at open sea through vessel gear into barges which sails to the jetty. Ceylon Shipping Corporation Ltd (CSC) organises the coal transportation from various countries to the outer anchorage of Puttalam with the MV Ceylon Breeze and MV Princess (63,000 DWT LOA 200m, Beam 32.2m and draught at 13.3m) and other chartered vessels.

Figure 3-12: Puttalam Coal jetty

Item	Berth Length	Water Depth
Jetty	230m berth on one side (total length jetty 590m) Berthing 65m barges on both sides	CD - 4.0 m

The supply of coal is cumbersome as coal needs to be transferred from main ship (mother vessels) to small barges at open sea. Due to monsoon periods the ship-to ship operation in open sea is postponed leading to higher stock pile requirements then normal. The plant has no additional investment planned for the coal transfer.

PART B: Demand Analysis & Port Development Directions

4 Demand analysis for the Port Sector

4.1 Introduction

This chapter introduces the demand analysis for the port sector. First the national trade and production is highlighted, Thereafter the forecasts on commodities and scenarios are presented. Thereafter the allocation and the required capacity is analysed providing the port development needs for each of the ports.

The following approach has been used for this chapter:

- Paragraph 4.2 provides the national trade and production review;
- Paragraph 4.3 provides the forecasts on each of the commodities;
- Paragraph 4.4 shows the commodity level allocation; and
- Paragraph 4.5 provides capacity development needs per commodity.

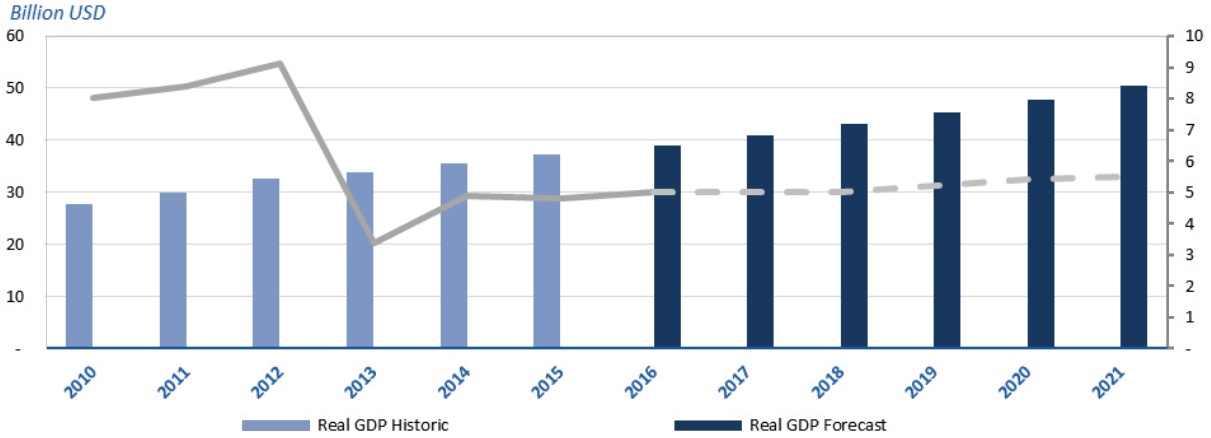
4.2 National trade and production

4.2.1 Macro-Economic Overview

GDP Development

Sri Lanka can be considered a 21st century economic success story, with more and more people relieved from poverty every day through an impressive macro-economic development, which is leading to higher employment rates. With the end of the civil war in 2009, the country embarked on a new phase of stable development. Consequently, GDP growth reached an average rate of 6.0% p.a. over the past 5 years.

Figure 4-1: GDP Constant Prices Development 2010-2021 (Base year = 2002)



Source: IMF 2016

General Overview

With a positive macro-economic outlook, the country does face several major challenges in the years to come. The significant trade deficit causes an outflow of international monetary funds, leading to lower exchange rates. Government finances are negatively impacted by this development; as external debt is in foreign currency.

The population of Sri Lanka has been relatively stagnant over the past decade. The last census, which was carried out in 2011, revealed a population of approximately 20.5 M people, and forecasted a population of 22

M for 2021. Additionally, the population is aging: The country's working age population reached its peak in 2006, while the number of people aged 60+ is expected to double in 2041, as compared to the last census in 2011. (World Bank, 2016)

Foreign direct investments (FDI) in Sri Lanka have been low despite several fiscal measures, as can be seen in table 1.1. These investments are a good measure of a country's ability to sustain a favourable investment climate.

Table 4-1: Macro Indicators 2005-2015

Indicator	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP	Current Billion USD	28.27	32.37	40.72	42.04	49.55	59.16	59.38	67.34	74.92	81.25
GDP per Capita	Current USD	1,430	1,624	2,027	2,077	2,429	2,880	2,874	3,234	3,574	3,849
Inflation consumer prices	%	10.0	15.8	22.6	3.5	6.2	6.7	7.5	6.9	3.3	3.3
Government Debt	% / GDP	87.9	85.0	81.4	86.1	81.9	78.5	79.2	78.3	75.5	76.0
FDI inflow	Million USD	479.7	603.0	752.2	404.0	477.6	955.9	941.1	932.6	893.6	681.2
FDI inflow	% / GDP	1.7	1.9	1.8	1.0	0.8	1.5	1.4	1.3	1.1	0.8
Population	Millions	19.8	19.9	20.1	20.2	20.4	20.5	20.7	20.8	21.0	21.1
Labour Force	Millions	8.4	8.3	8.3	8.3	8.3	8.3	8.4	8.5	8.6	NA
Unemployment rate	%	6.6	6.2	6	5.9	5	4.1	4	4	4	4
Urbanisation rate	%	18.4	18.4	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3

Source: IMF 2016 and World Bank 2016

Overview Local

The western province, which includes Colombo, has the biggest share of GDP development (41.6% in 2014) and the biggest population (28.6%) as can be seen in the tables below. The population distribution has apparently flat lined in between 2009 and 2014, but in the GDP development one can note a slight increase in the shares of other provinces other than Colombo.

Table 4-2: GDP Shares Development per Region 2009-2014 (percentages)

Date	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabaragamuwa	Total
2009	45.8	9.8	10.5	3.2	5.8	9.6	4.6	4.5	6.1	100
2010	44.8	10	10.7	3.4	6	9.5	4.8	4.5	6.3	100
2011	44.2	9.8	11	3.7	5.8	10	4.7	4.5	6.2	100
2012	42.8	10.2	11	3.7	6.3	10	5	4.8	6.2	100
2013	42.5	10.5	10.4	3.5	5.9	10.5	5	4.9	6.8	100
2014	41.6	10.4	10.9	3.6	6	10.7	5.1	5	6.7	100

Source: Sri Lanka National Bank, 2016

Table 4-3: Population Development per Region 2009-2014 (percentages)

Date	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabaragamuwa	Total
2009	28.53	13.03	12.06	5.59	7.52	11.39	5.98	6.43	9.47	100
2010	28.49	13.04	12.07	5.56	7.55	11.38	5.99	6.45	9.48	100
2011	28.36	13.03	12.07	5.76	7.59	11.34	6.01	6.43	9.40	100
2012	28.72	12.64	12.17	5.21	7.64	11.70	6.22	6.22	9.47	100
2013	28.65	12.65	12.18	5.21	7.65	11.69	6.23	6.24	9.48	100
2014	28.58	12.67	12.19	5.22	7.67	11.67	6.25	6.26	9.48	100

Source: Sri Lanka National Bank, 2016

4.2.2 Trade & Production

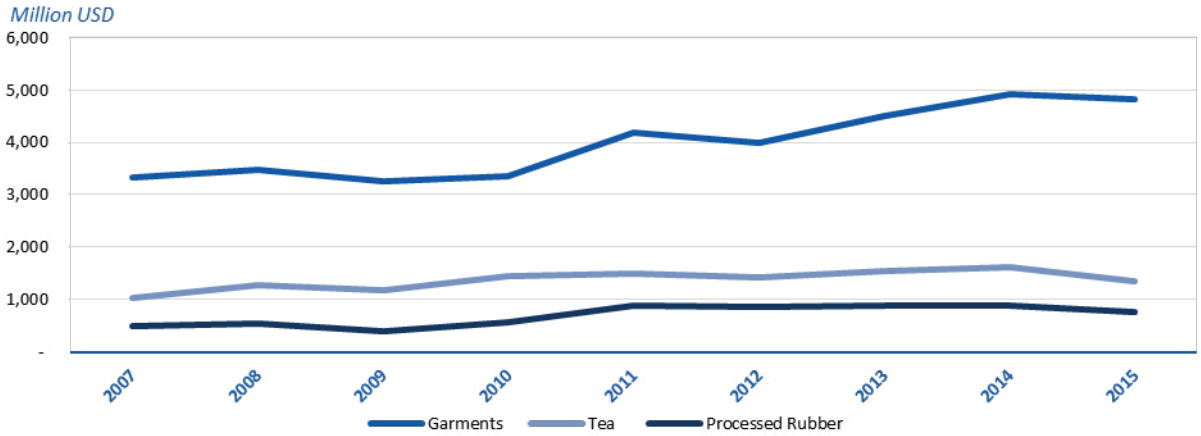
The Sri Lanka exports are reliant on garments, tea and rubber, which are relatively low in value. The focus on exports of low value commodities results in a structural trade deficit, which is hurting the economy. Additionally, whereas rubber can be sustained as a competitive commodity, tea and garments face international competition from low-wage countries. Hence, the country should invest in manufacturing and diversification of its economy to maintain its strong economic growth. The shift to a more open economy will facilitate growth of manufacturing and industrial demand.

The development of value-added downstream activities in the manufacturing and industrial sectors will boost imports of raw materials and exports of end products.

Tea and Rubber Industry

Garment, tea and rubber together formed more than half of the USD 10,500 M export value in 2015. The export values seem to have flat lined, as can be noted from Figure 4-2. The tea and garment industry have low income competitors on a global scale (Haussmann, 2016). Sri Lanka is responsible for 28.0% of the global tea exports, facing also competition from countries like Kenya and India, that have a lower GDP per capita. The lower GDP per capita implies lower labour costs and consequently lower wages. This same analysis holds for the garment industry in which Sri Lanka may further develop itself focussing on quality whilst low cost competition is provided by countries like Cambodia and Bangladesh. The rubber exports show a different trend where the global main competitors like China and Thailand have a higher GDP per capita than Sri Lanka, thus the country is in a better position to compete in this industry.

Figure 4-2: Garment, Tea and Rubber Exports 2007-2015



Source: Sri Lanka Central Bank 2016

Garment Industry

Sri Lanka's garment export industry experienced substantial growth during the 1980's, as an alternative to the Indian garment exports. Currently, Sri Lanka's garment export industry is one of the nation's main GDP contributors, accounting for over 40% of total exports, with a value of USD 4.8 B in 2016. Additionally, the sector is a substantial social contributor, providing for approximately a third of the total manufacturing employment. The Government of Sri Lanka envisages further developing the garment industry, to position Sri Lanka among the top 10 high quality garment exporting countries in the world by 2020.

Currently, the EU and the US are the primary destinations for Sri Lanka's exports; the table below presents the value of exports towards the EU and US for the years 2015, 2016, and 2017. Sri Lanka's garment exports towards the EU experienced strong growth after receiving the GSP+ status in 2005; however, the growth rate decelerated when the GSP+ status was revoked in 2010. However, Sri Lanka regained GSP+ status on the 19th of May 2017, resulting in better access to the EU market for Sri Lankan exports. This could have a substantial positive impact on the garment industry, as it accounted for over 60% of total exports to the EU in 2016.

Table 4-4 Sri Lankan Garment Exports to EU and US

	Unit	2015	2016	2017
EU	M USD	181.1	202.8	155.0
US	M USD	171.6	186.4	170.0

Source: Sri Lanka Apparel Exports Association

Origin Destination Analysis and Developments

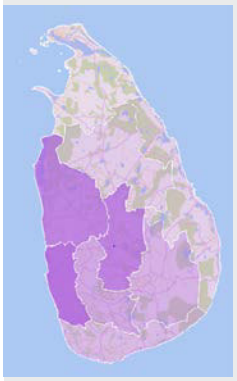
An estimation of destinations of container cargo can be made by looking at regional GDP of Sri Lanka in lack of accurate data as displayed in the table below. Cargo origin data is available from a survey conducted for the ADB multimodal transport study in 2012 and from export board data. The difference in origin between these two can be attributed to the fact that the export data details cargo origin in the region, and the multimodal survey focussed on the origin of the containers, which is mostly stuffed in the Western province.

Figure 4-3: Destination Data

Province	GDP - Division 2014 (%)	TEU Imports Destination Division 2014	GDP- Division 2014
Central	10.4%	65,627	
Eastern	6.0%	37,862	
North Central	5.1%	32,183	
North Western	10.7%	67,520	
Northern	3.6%	22,717	
Sabaragamuwa	6.7%	42,279	
Southern	10.9%	68,782	
Uva	5.0%	31,552	
Western	41.6%	262,509	
Total	**100.0%**	**631,032 TEU**	

Source: Sri Lanka National Bank Statistics

Figure 4-4: Origin Data

Province	Export Board Data 2011	Multimodal Study Export Boxes	TEU Export Origin based on Export Board Data 2011	Export Board Data origins (picture)
Central	21.1%	0.5%	57,088	
Eastern	1.6%	14.2%	4,329	
North Central	2.6%	-	7,035	
North Western	21.0%	5.6%	56,818	
Northern	1.2%	-	3,247	
Sabaragamuwa	11.5%	0.9%	31,115	
Southern	7.3%	1.4%	19,751	
Uva	9.0%	0.1%	24,350	
Western	24.9%	77.3%	67,370	
Total	**100.0%**	**100.0%**	**271,102 TEU**	

Sources: ADB – Export Board

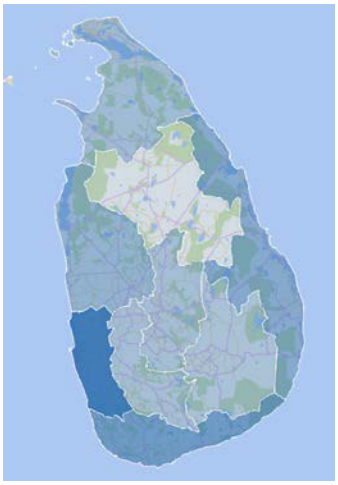
Currently, Sri Lanka has an underdeveloped industry and manufacturing sector. However, it is expected that these sectors will be substantially developed. Specifically, the following broad developments can be noted:

- Overall, manufacturing and industrial activities will increase substantially.
- Medium manufacturing and industrial activities will be forced out of densely populated areas.
- Light manufacturing and industrial activities will be concentrated in and near the main metropolitan areas.
- Manufacturing and industrial areas will develop in central Sri Lanka, in line with currently proposed industrial estates.

- Manufacturing and industrial activities will develop in southern Sri Lanka, due to the establishment of a large FTZ in Hambantota.

The development of manufacturing in Sri Lanka has several effects on the origin and destination of goods. The agricultural exports from the hinterland still form a basis of export, but the growth in export (containers) will come from manufacturing closer to consumption areas of Sri Lanka. Thus, the gravity of the exports will shift from the agricultural to the consumption areas. The following forecast is an example of this shift with expected boxes for 2050.

Table 4-5: Forecast 2050 per District (Origin and Destination)

Province	Forecast 2050 - Im/Ex	Forecast TEU	Forecast Origin & Destination (Picture)
Central	6.0%	223,772	
Eastern	13.0%	484,840	
North Central	4.0%	149,181	
North Western	10.0%	372,954	
Northern	7.0%	261,068	
Sabaragamuwa	6.0%	223,772	
Southern	19.0%	708,612	
Uva	5.0%	186,477	
Western	30.0%	1,118,861	
Total	**100.0%**	**3,729,537 ***	

4.2.3 Tourism & Cruise

The tourism sector is an area of focus for the government as it is underdeveloped and has a lot of potential to bring foreign currency and foreign exposure to the country of Sri Lanka. The tourism sector is increasing in size and revenues. Port-related tourism is expected to grow substantially over the short to medium period, as general and port-specific Cruise facilities are further improved and created.

The government of Sri Lanka made tourism development a key focus point by instating the Sri Lanka Tourism Development Authority in 2005. The authority identifies special tourism zones where investments and coordination can take place to attract people to the country. Table 4-6 demonstrates that tourist arrivals, employment and receipts have been picking up for the past years, and this trend is expected to continue due low current foreign tourist expenditure per capita.

Sri Lanka's tourism sector has grown substantially over recent years, as tourist arrivals increased from 0.56 M in 2006 to 1.80 M in 2015. The Sri Lanka Tourism Development Authority intends to foster further rapid growth, to increase the annual number of tourists to 2.20 M by 2016, and 4.00 M by 2020.

Table 4-6: Tourism Overview 2006-2015

Item	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tourist Arrivals	1000 People	559.6	494.0	438.5	447.9	654.5	856.0	1,005.6	1,274.6	1,527.2	1,798.4
Total Employment	1000 People	133.6	145.2	123.1	125.0	132.1	138.7	162.9	270.2	299.9	319.4
Direct Employment	1000 People	55.6	60.5	51.3	52.1	55.0	57.8	67.9	112.6	129.8	135.9
Indirect Employment	1000 People	77.9	84.7	71.8	72.9	77.0	80.9	95.0	157.6	170.1	183.5
Gross Tourist Receipts	USD M	410	385	342	350	575	830	1,039	1,715	2,431	2,981

Source: Sri Lanka Central Bank, 2016

Sri Lanka has several touristic features all available in one island with limited distances from major cruise ports and airports. The cruise touristic values of the nation are:

- Sri Lankan social and cultural heritage
- Flora and Fauna
- Beaches
- Friendly people

Cruise industry shall also increase especially due to:

- Global interests in cruises due to widening of target groups.
- Cruise in Asia is new and fast-growing market.
- Vessels must travel between seasonal cruise markets (Caribbean/Europe/Asia) and Colombo is strategically located in the middle with ample tourism features.

The cruise industry gains a lot of attention by the Ministry which aims to create sustainable tourism development in Sri Lanka by:

- Focus on Colombo, Galle/Hambantota and Trincomalee
- Economics (gain revenues)
- Socially (integrate society, peace/ harmony)
- Environmental friendly (do not damage the environment)
- Above translates to the following needs assessments in ports:
- More common cruise berths near the city (walking distance)
- Marketing strategy needed
- Terminal building for the main cruise port of Colombo
- Develop home port concept (attract cruise passengers who start the cruise by flying-in)
- The cruise terminal focus on safe transit and shopping

4.3 Forecast on Commodities

4.3.1 Introduction to forecasts

This chapter details the forecasting methodology used per commodity including the key assumptions. Some general trends of economic development, population development and energy sector developments are described in Appendix IV to state the external environment affecting the forecasts. The table below summarises the forecasts.

Table 4-7: Summary Forecasts and Growth

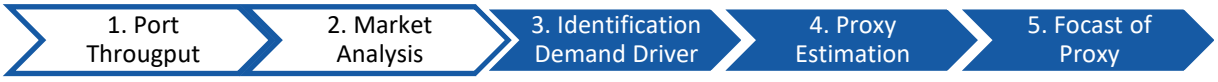
Commodity	Demand 2016	Demand 2025	Demand 2030	Demand 2050	Difference 2016 -2050	CAGR
Containers ('000 TEU)						
Gateway	1,300	2,197	2,630	3,737	2,437	3.15%
Transhipment	4,355	5,873	6,433	12,671	8,316	3.19%
Total	5,655	8,070	9,063	16,408	10,753	3.18%
Dry Bulk ('000 Tons)						
Coal	1,932	2,400	2,400	2,400	468	0.64%
Wheat / Maize / Corn	1,057	1,714	2,012	2,279	1,222	2.29%
Cement / Clinker / Gypsum	3,890	5,742	6,399	7,782	3,891	2.06%
Fertilizer	314	1,536	1,536	1,536	1,222	4.78%
Biomass	-	325	500	500	500	-
Ilmenite	-	700	700	700	700	
Total	*5,364*	*12,317*	*13,447*	*15,097*	*9,733*	*3.09%*
Liquid Bulk ('000 Tons)						
Crude Oil	1,685	2,512	7,512	7,512	5,826	4.49%
Refined Oil	3,059	5,322	1,691	4,527	1,468	1.16%
LNG	-	1,561	1,991	3,988	3,988	
Total	*4,744*	*9,395*	*11,193*	*16,027*	*11,282*	*3.65%*
Break Bulk ('000 Tons)						
General Cargo	1,287	1,743	1,834	2,547	1,261	2.03%
RoRo ('000 Vehicles)						
Domestic	63	131	145	236	172	3.94%
Transhipment	151	100	113	222	71	1.14%
Total	*214*	*231*	*258*	*458*	*243*	*2.26%*

4.3.2 Methodology in Identifying Demand Drivers and Proxies

The Analysis Process

The goal of this chapter is to describe the main trades taking place and the auxiliary functions performed at the ports of Sri Lanka. Ports are an important node in supply chains, especially in large island economies like Sri Lanka where all international trade takes place through its ports. Of course, cargo flowing through the port is part of a larger international supply chain and understanding those is key in developing a forecast model. Thus, this chapter serves as the descriptive steps 1 and 2 in the forecasting methodology of the consultant highlighted in Figure 4-5 .

Figure 4-5: Forecasting Process Step 1 and 2



Commodities

To accurately go through step 1 and 2 of the forecasting process several commodities are identified in this chapter based on their relative share of current port throughput. Table 4-8 summarises the main information per commodity which are elaborated on in this chapter.

Table 4-8: Summary Commodities

Commodity	Origin / Destination	Throughput 2016	Port(s) of Entry / Exit
Containerised Cargo			
Gateway Containers	Export from Lanka Hinterland Import mainly South-East Asia	• 1.3 M TEU	• Colombo
Transhipment Containers	• Transhipment to East-India, Bangladesh, Myanmar, Maldives • Relay West-India, Pakistan, Middle-East • Relay on East-West Trades	• 4.4 M TEU	• Colombo
Dry Bulk			
Coal	• Indonesia and Russia to energy and cement industry	• 0.1 M Tons Trincomalee • 1.9 M Tons Puttalam	• Trincomalee • Private Jetty Puttalam
Wheat / Maze / Corn	• Imports mainly Canada and US to flour mills Colombo & Trincomalee • Exports pellets to Western Europe	• 0.9 M Tons Cereal Import • 0.2 M Tons grain pellets export	• Colombo • Trincomalee
Cement / Clinker / Gypsum	• Indian cement to Colombo bagging plant • Japanese clinker to grinding facility Trincomalee & Galle	• 2.2 M Tons Cement • 1.6 M Tons Clinker • 0.1 M Tons Gypsum	• Colombo • Trincomalee • Galle
Fertilisers	• China & UAE	• 0.3 M tons	• Colombo
Liquid Bulk			
Crude Oils	UAE & Oman to refinery Sapugaskanda	• 1.7 M Tons	• Colombo
Refined (white) Oils	Mainly SEA countries and UAE to storage facilities & energy industry	• 2.8 M Tons	• Colombo
General Cargo			

Commodity	Origin / Destination	Throughput 2016	Port(s) of Entry / Exit
Non-containerised General cargo	• Iron / Steel Various worldwide for construction industry • Other break bulk from various origins and destinations	• 0.65 M Tons	• Colombo • Hambantota • Galle • Trincomalee • KKS
RoRo			
Vehicles for Domestic Market	• Mainly Asian brands to domestic car dealers	63,407 Vehicles	• Colombo • Hambantota
Transhipment Vehicles	India to African & South American markets • Japanese used cars to Africa	150,921 Vehicles	• Hambantota
Cruise			
Cruise vessels	• Shorter cruises tour India, Sri Lanka & Maldives and originate from Singapore • Longer cruises originate from Europe and US	• 28 Vessels	• Colombo • Hambantota • Galle • Trincomalee

Source: MIT Commodity Database / SLPA

For each of these commodities the following elements will be highlighted and presented in this chapter:

- Available throughput figures going back 10 years if available.
- The description of the specific supply chain including origin and destination.
- The import and export split; and
- The port(s) at which the cargo flows.

Port demand is always a derived transport demand from economic activities. Ports have a role to play in facilitating a smooth turnover of goods from ship to shore and vice versa. Ultimately, a collection of individual commodity supply chains run through the port. These supply chains can have vastly different markets, which all have their unique market dynamics and characteristics. To predict cargo flows to ports, firstly the demand drivers need to be identified. For example, of a demand driver for passenger cars is a combination of consumer, purchasing power, preference supply of vehicles and market prices.

Demand drivers can be hard to identify simply because the data is not available or too complex to estimate. Container transport is the clearest example of this phenomenon: data on the number of containers is available, but data on the contents of these containers and ultimate destination of cargo is not available. Luckily, reliable proxies for demand exist to estimate it. The proxy used for container transport for example is the GDP per capita combined with specific industrial demand.

This chapter will explore and explain the port demand drivers for Sri Lanka through a five-step process as displayed below. Firstly, cargo data provided by SLPA indicates which commodity streams are currently the largest. Future commodities, not yet handled by the ports, like LNG or Biomass are also incorporated in the analysis. For the target commodities, a market analysis will identify demand drivers. The available data will govern which proxy to select. Sanity checks through comparisons of data with other countries will be a red line through the analysis.

Figure 4-6: Figure Demand Drivers

Commodity	Demand Driver	Proxy Used for Forecast
Containers		
Gateway	Domestic consumption & Production	GDP / Capita development
Transhipment	Geographical position, feeder markets demand growth and port limitations	Geographic position and distances to feeder markets, shipping lines network logics
Dry Bulk		
Wheat / Maize / Corn	Domestic food consumption	Kg / capita demand
Cement / Clinker / Gypsum	Domestic construction activity	Cement / capita demand
Coal	Energy & General industries	Energy generation
Fertiliser	Domestic consumption	Total arable land
Ilmenite & Biomass	Export demand	Private initiatives
Liquid Bulk		
Crude & Refined Oil	Domestic consumption	
LNG	Energy industry	Energy generation
RoRo		
Domestic	Domestic consumption	GDP / Capita
Transhipment	Shipping market	Indian car exports
Cruise		
Vessels	Number of cruise calls	Tourism expectation and cruise schedules

4.3.3 Container Forecast Results

The container forecast for Sri Lanka is presented in the Base Case and in the High Case. Under the Base case the total volume is expected to grow from 5.6 M TEU in 2016 to 16.4 M TEU in 2050. Under the High Case the traffic is expected to increase to 25.5 M TEU by 2050.

Table 4-9 Base Case Container Forecast

Base Case		2016	2020	2025	2030	2050
Gateway Demand	'000 TEU	1,300	1,660	2,197	2,630	3,737
TS Demand	'000 TEU	4,355	5,775	5,873	6,433	12,671
Total	'000 TEU	5,655	7,435	8,070	9,063	16,408

Table 4-10 High Case Container Forecast

High Case		2016	2020	2025	2030	2050
Gateway Demand	'000 TEU	1,300	1,660	2,252	2,855	4,549
TS Demand	'000 TEU	4,355	6,304	7,311	8,473	20,996
Total	'000 TEU	5,655	7,964	9,563	11,328	25,545

4.3.4 Gateway Container

Forecast Results

The forecasts show a strong growth prediction until 2025 after which the scenarios diverge more. This has to do with the GDP per capita development, as differences in the first 5 years are smaller. The growth does flatten after 2040 due to a decrease in industrialisation speed and a stagnant population.

Figure 4-7: National Gateway Throughput Forecasts

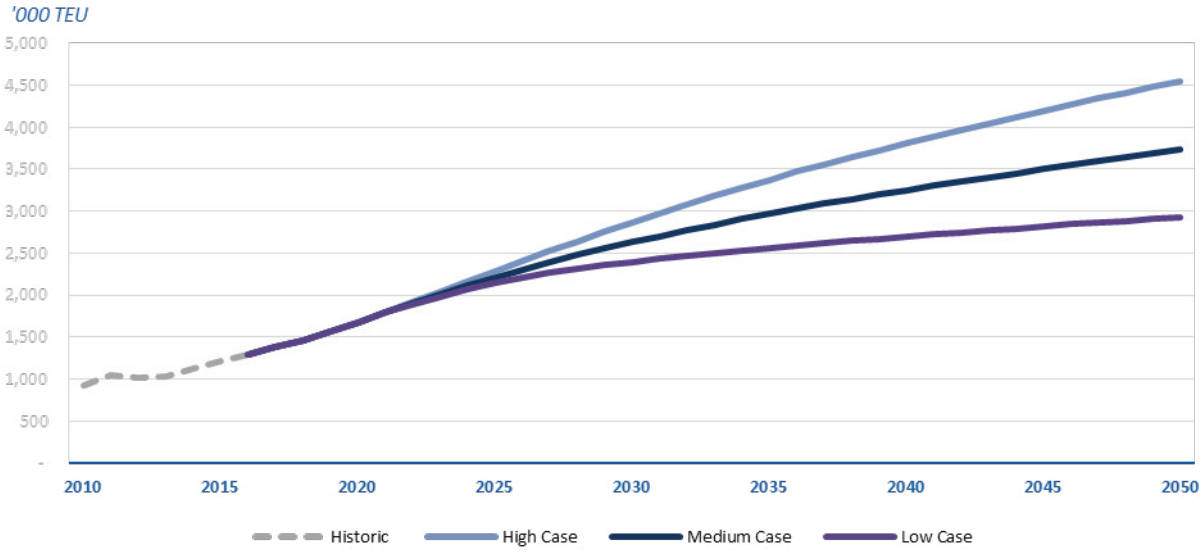


Table 4-11: National Gateway Throughput Forecasts Data Table

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050
High	1,218	1,660	2,252	2,855	3,368	3,802	4,192	4,549
5yr - CAGR		6.39%	6.29%	4.86%	3.36%	2.45%	1.97%	1.65%
Medium	1,218	1,660	2,197	2,630	2,969	3,254	3,508	3,737
5yr - CAGR		6.39%	5.77%	3.66%	2.46%	1.85%	1.51%	1.28%
Low	1,218	1,660	2,141	2,404	2,572	2,711	2,832	2,938
5yr - CAGR		6.39%	5.22%	2.34%	1.36%	1.06%	0.88%	0.74%

The breakdown for the medium scenario is displayed below. The division of export and import containers does not change over time, but the laden-empty split does.

Figure 4-8: National Gateway Throughput Base Scenario Forecast

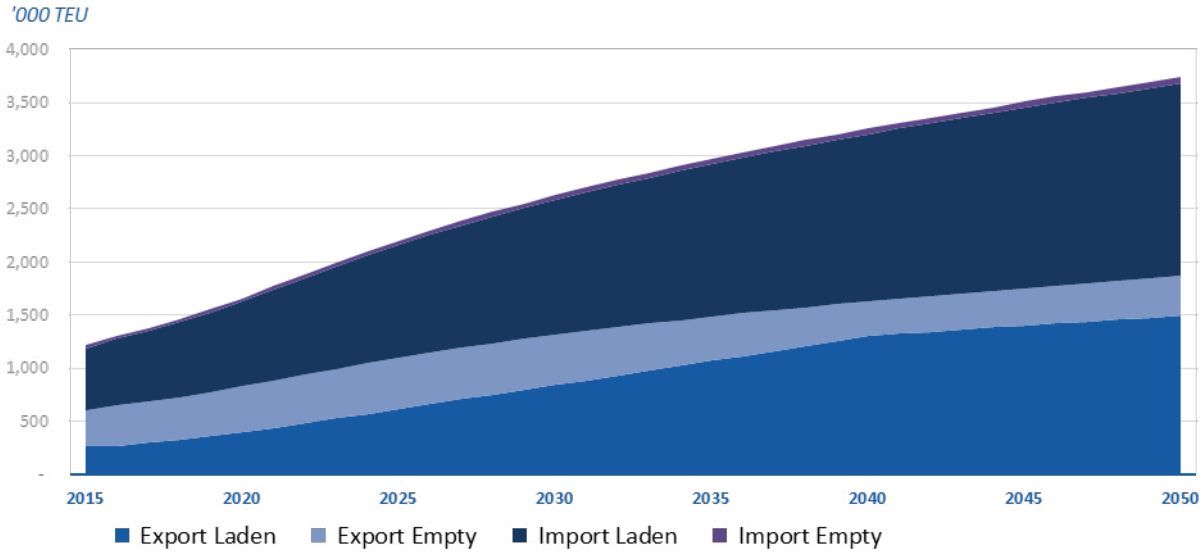


Table 4-12: National Gateway Throughput Base Scenario Data Table

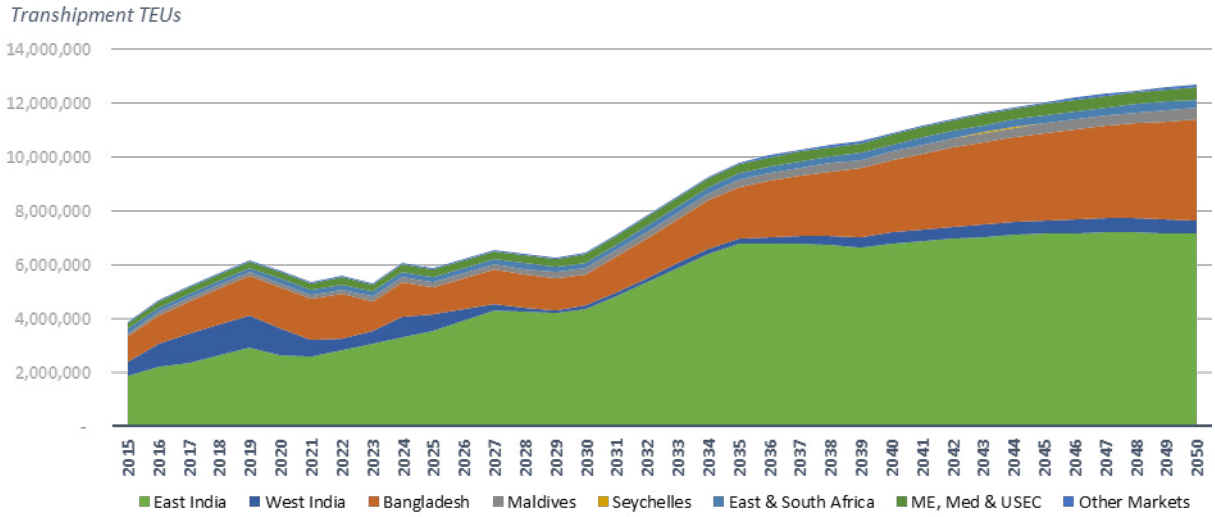
'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050
Export Laden	263	399	616	842	1,069	1,302	1,403	1,495
Export Empty	346	430	482	472	415	325	351	374
Import Laden	574	803	1,063	1,273	1,437	1,575	1,698	1,809
Import Empty	35	27	35	42	48	52	56	60
Total Gateway	**1,218**	**1,660**	**2,197**	**2,630**	**2,969**	**3,254**	**3,508**	**3,737**
5yr - CAGR		6.39%	5.77%	3.66%	2.46%	1.85%	1.51%	1.28%

4.3.5 Transhipment Container Forecast

The graph below shows Sri Lanka's total forecast transhipment container throughput, divided by transhipment market. The following observations can be made:

- Annual transhipment volumes are estimated to increase from 3.89 M TEU in 2015 to 12.69 M TEU in 2050.
- A dip in volumes can be observed towards 2030, due to the expected implementation of several competitive projects within the South Asia Hub (mainly Vizhinjam and Colachel) and South East Asia Hub (mainly Singapore, Tanjung Pelepas and Port Klang).
- East India, West India and Bangladesh will remain Sri Lanka's key markets for transhipment containers, accounting for an estimated 89.9% of throughput in 2050.
- Due to increasing direct trade shares and increasing pressure from competing transhipment hub groups, growth of transhipment volumes is expected to decelerate after 2035.

Figure 4-9: Transhipment Forecast



4.3.5.1 Base Case and High Case Scenario for Container Transhipment

As one of the major cargo segments, the forecast of transhipment container volumes is critical for port development planning. Given the footloose nature of the transhipment business, and the uncertainties concerning the development of transhipment markets, two scenarios have been developed:

- The *Base Case*, where transhipment market experience moderate growth in transhipment demand and Colombo's market share growth decelerates over time, due to pressure from other hub ports.
- The *High Case*, where transhipment demand in Colombo's main transhipment markets grows more rapidly and Colombo is able to retain its dominant position in the region.

As such, the Base Case and High Case scenarios are aimed at reflecting the impact of variations in external factors on transhipment demand, as the container transhipment business is strongly dependent on such external factors. This is in contrast to the economic Low Case, Base Case, and High Case scenarios, as introduced in the previous chapter, which focus mainly on Sri Lanka's internal (economic) development. The table and figures below present the estimated transhipment volumes for both the base and High Case scenarios.

The Base Case volumes, graphics and breakdown are illustrated in next tables. Under the Base Case scenario the following assumptions are assumed:

- The Indian ports additional capacity do reduce the transhipment at Sri Lanka due to more direct trades and local transhipment.
- The main markets of East India and Bangladesh show more moderate growth than in the High Case and generates markets shares for Sri Lanka by 2050 (resp. 56.4 % and 29.4%)
- The West India market has only limited market share (4%) by 2050 due to direct trades and transhipment performed with India.
- The transhipment at nearby competing ports (Vishinjam and Colachel) for India is stronger than in the High Case.
- The relay growth (2%) is more moderate than in the High Case.

Table 4-13 Base Case Container Transhipment Forecast

		2016	2020	2025	2030	2050
Base Case TS Demand	'000 TEU	4,355	5,775	5,873	6,433	12,671

Figure 4-10 Base Case Container Transhipment Forecast

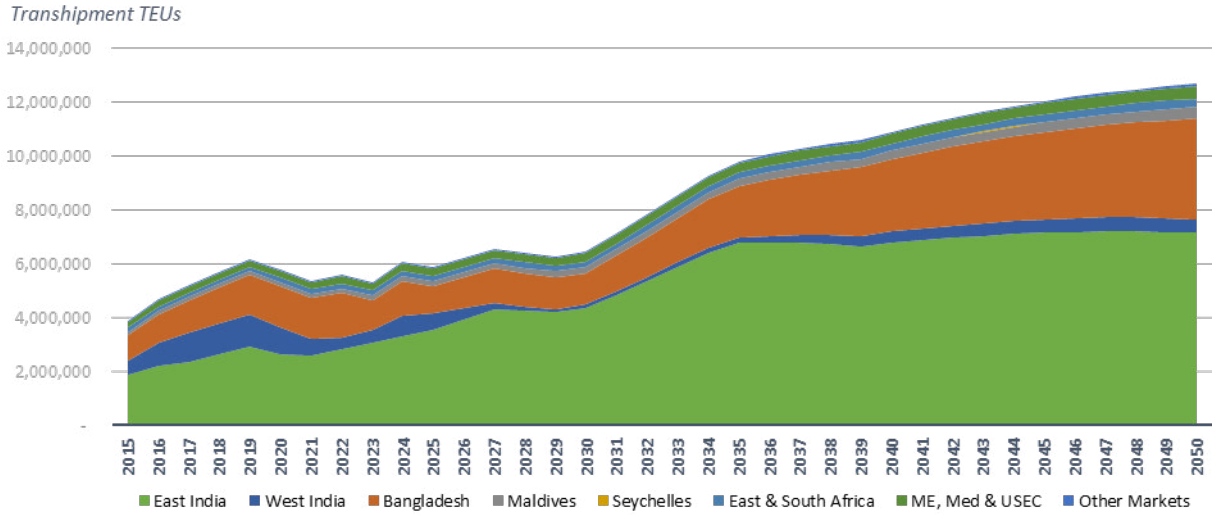


Table 4-14 Base Case Container Transhipment Forecast Breakdown

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050	CAGR	Share 2015 (%)	Share 2050 (%)
East India	1,876	2,619	3,557	4,353	6,777	6,778	7,151	7,142	3.89%	48.24%	56.37%
West India	524	1,045	627	130	173	418	500	521	-0.01%	13.46%	4.11%
Bangladesh	943	1,492	983	1,149	1,947	2,683	3,234	3,725	4.00%	24.24%	29.40%
Maldives	119	147	183	225	269	315	366	424	3.69%	3.06%	3.35%
Seychelles	4	5	6	7	8	9	11	12	3.28%	0.10%	0.10%
East & South Africa	157	174	192	212	234	258	285	314	2.00%	4.04%	2.48%
ME, MED & USEC	226	250	276	304	336	371	410	452	2.00%	5.82%	3.57%
Other Markets	40	44	49	54	59	66	72	80	2.00%	1.03%	0.63%
Total TS Forecast	**3,888**	**5,775**	**5,873**	**6,433**	**9,804**	**10,899**	**12,028**	**12,671**	**3.43%**	**100.00 %**	**100.00 %**

The High Case volumes, graphics and breakdown are illustrated in next tables. Under the High Case scenario the following assumptions are assumed:

- The Indian ports additional capacity does not threat the transhipment at Sri Lanka;
- The main markets of East India and Bangladesh remain strong and generates large markets shares for Sri Lanka (resp. 54.0 % and 24.8%);
- The West India market remains at a larger market share (13.4%) by 2050 than in the Base Case as Colombo hub remains competitive;

- The transhipment at nearby competing ports (Vishinjam and Colachel) is more moderate than in the Base Case; and
- The relay growth (3%) is stronger than in the Base Case.

Table 4-15 High Case Container Transhipment Forecast

		2016	2020	2025	2030	2050
High Case TS Demand	'000 TEU	4,355	6,304	7,311	8,473	20,996

Figure 4-11 High Case Container Transhipment Forecast

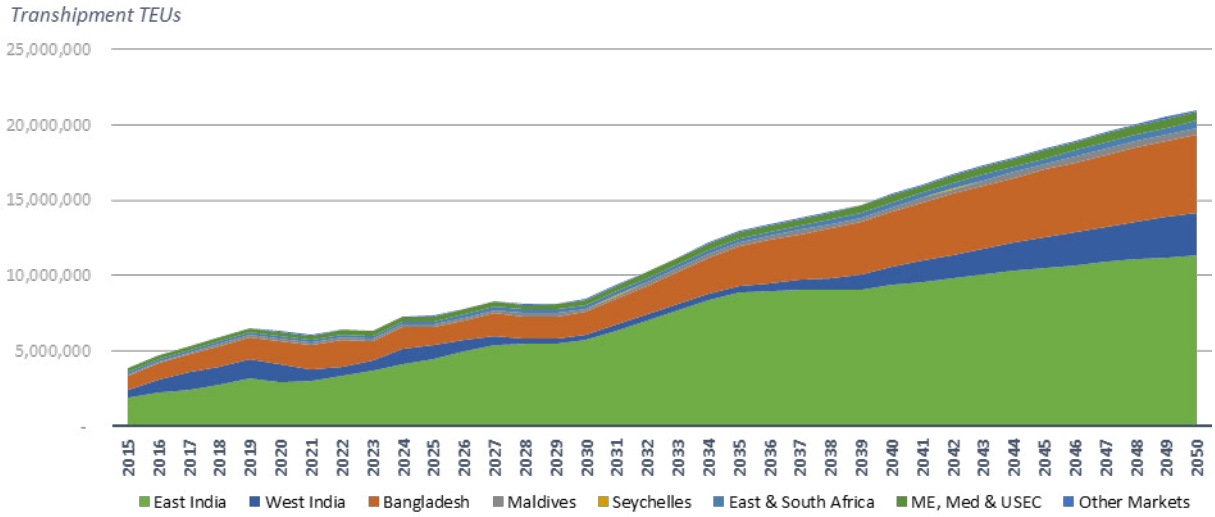


Table 4-16 High Case Container Transhipment Forecast Breakdown

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050	CAGR	Share 2015 (%)	Share 2050 (%)
East India	1,876	2,944	4,482	5,750	8,862	9,355	10,504	11,337	5.27%	48.24%	54.00%
West India	524	1,172	945	332	466	1,214	2,039	2,818	4.93%	13.46%	13.42%
Bangladesh	943	1,546	1,126	1,500	2,590	3,642	4,459	5,213	5.01%	24.24%	24.83%
Maldives	119	147	183	225	269	315	366	424	3.69%	3.06%	2.02%
Seychelles	4	5	6	7	8	9	11	12	3.28%	0.10%	0.06%
East & South Africa	157	182	211	245	284	329	382	442	3.00%	4.04%	2.11%
ME, MED & USEC	226	262	304	352	408	474	549	636	3.00%	5.82%	3.03%
Other Markets	40	46	54	62	72	84	97	112	3.00%	1.03%	0.54%
Total TS Forecast	**3,888**	**6,304**	**7,311**	**8,473**	**12,960**	**15,422**	**18,405**	**20,996**	**4.94%**	**100.00 %**	**100.00 %**

Opportunities and Threats

Transhipment cargo is known as footloose cargo, this means that shipping regard the activity as non-captive for the port and are able to transfer the cargo activity to other ports along the service routes depending on cost, geographical position to end-feeder markets, quality of port service and available quay and stack spaces and sufficient water depths.

The table below summarizes key identified opportunities and threats that may impact Sri Lanka's ability to attract transhipment cargo.

Opportunities	Threats
Maritime Hub concept route boosts industrial productivity in Sri Lanka	China developing a more internal focussed economy, resulting in less exports
Geographical position of Port of Colombo serves shipping lines network enlargements developments	A focus on land based silk route developments instead of the maritime silk routes, resulting in decreased maritime trade growth
	Development of the northern passage through the artic[11]
	India market to develop it ports faster, resulting in a more rapid decrease in dependency on transhipment
	Indian market becoming a real export market, which directly serves global markets
	War risks in the region, due to conflicts between nations.
	Liberalised cabotage regulations in India make cabotage more favourable, resulting in more competition from Indian ports.

4.3.6 Coal

Forecast Results

Due to changes in governmental energy policy, the coal imports related to power generation are limited to the maximum input capacity of the Puttalam coal power plant. There is no change in a high, medium or low scenario in energy consumption, as it is assumed that the power plant will operate at maximum capacity, irrespective of the economic conditions. The remainder of the nation's coal demand, which is used as an input by the cement plants, enters the country through Trincomalee and is limited to approximately 120,000 tons a year with potential additional volumes after the envisaged Ashroff jetty expansion.

[11] Exprerimental voyages with liquid bulk have been made by Russian flagged ships. In 2018 the first containership (Venta Maersk 3600 TEU ice-class) was sent through the artic route. The sailing distance is reduced by approx. one or two weeks compared with the suez route depending on the destionations. The route is nowadays three months per year open but with climate change this period is expected to become longer.

Figure 4-12: National SLPA Coal Imports Forecast

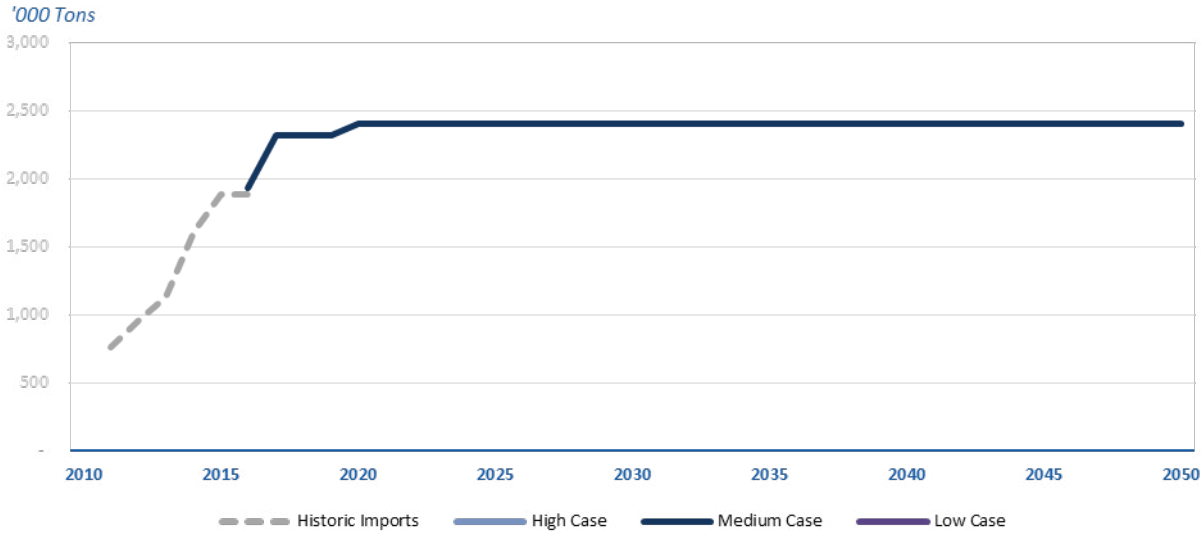


Table 4-17: National SLPA Coal Imports Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
Medium	1,955	2,400	2,400	2,400	2,400	2,400	2,400	2,400
5yr - CAGR		4.2%	-	-	-	-	-	-

4.3.7 Wheat / Maize / Corn

Forecast Results

The three scenarios do no differ until 2025, when the consumption level 70 kg per capita per annum is reached. The stagnation in 2040 presented in all three scenarios is related to shrinking population. The below forecast does include possible transhipment at Sri Lankan ports for foreign flour mills or industrial demands reaching 20% of normal demand in 2027. An example is that economies of scale can be reached for shipping lines when wheat is transported from the US and Ukraine/Russia for consumption regions in South East Asia in large panamax/mini cape vessels and redistributed in handysize vessels. Additional options are the soybean trade to produce bio-ethanol.

Figure 4-13: National Wheats Import Forecast

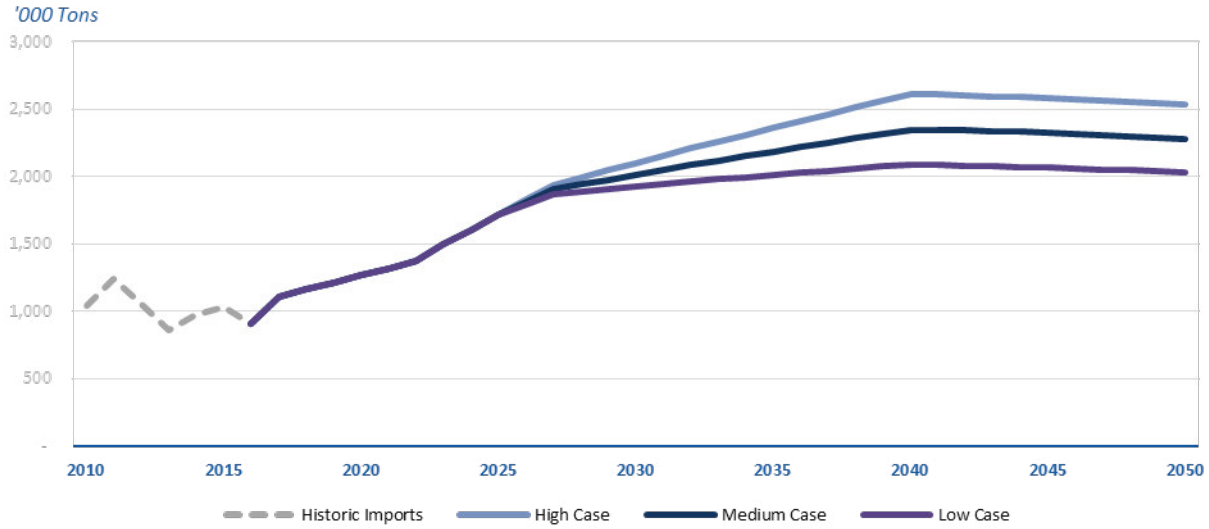


Table 4-18: National Wheats Import Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
High	1,025	1,265	1,714	2,099	2,360	2,609	2,582	2,532
5yr - CAGR		4.3%	6.3%	4.1%	2.4%	2.0%	-0.2%	-0.4%
Medium	1,025	1,265	1,714	2,012	2,185	2,348	2,324	2,279
5yr - CAGR		4.3%	6.3%	3.3%	1.7%	1.4%	-0.2%	-0.4%
Low	1,025	1,265	1,714	1,924	2,010	2,087	2,065	2,026
5yr - CAGR		4.3%	6.3%	2.3%	0.9%	0.8%	-0.2%	-0.4%

4.3.8 Cement / Clinker / Gypsum

Forecast Results

The import forecast is shown below. Acceleration of imports is expected in the short term (2018-2025) because of construction projects. The trend continues upwards until 2040 where the cement demand per capita is maximized, but the marginally shrinking population causes the imports to remain relatively stagnant.

Figure 4-14: National Cement Import Forecast

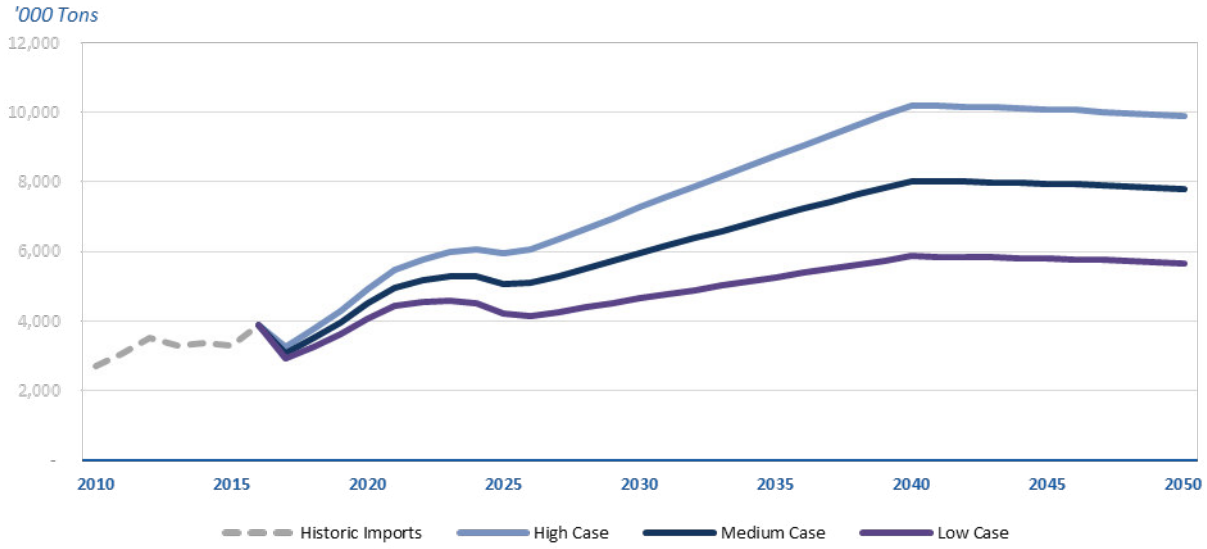


Table 4-19: National Cement Import Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
High	3,300	4,932	5,951	7,268	8,763	10,209	10,097	9,892
5yr - CAGR		8.4%	*3.8%*	*4.1%*	*3.8%*	*3.1%*	*-0.2%*	*-0.4%*
Medium	3,300	4,502	5,080	5,956	7,015	8,035	7,946	7,782
5yr - CAGR		6.4%	*2.4%*	*3.2%*	*3.3%*	*2.8%*	*-0.2%*	*-0.4%*
Low	3,300	4,072	4,210	4,644	5,267	5,861	5,794	5,671
5yr - CAGR		4.3%	*0.7%*	*2.0%*	*2.6%*	*2.2%*	*-0.2%*	*-0.4%*

4.3.9 Fertiliser

Forecast Results

The forecast is based on a private initiative to produce SSP fertiliser in Sri Lanka which includes the imports of sulfuric acid and exports of residual production for the international (mainly Indian) market. Sri Lanka has large pockets of phosphate rock, which can be used for production.

Table 4-20: Overview National Fertiliser and Sulfuric Acid Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
Fertiliser Imports	599	-	-	-	-	-	-	-
Fertiliser Demand	336	336	336	336	336	336	336	336
Fertiliser Production	-	480	1,440	1,440	1,440	1,440	1,440	1,440
Fertiliser Exports	-	144	1,104	1,104	1,104	1,104	1,104	1,104
Sulfuric Acid Imports	-	144	432	432	432	432	432	432

4.3.10 Crude & Refined Oil

Forecast Results

This figure clearly shows the relationship between crude imports and refined oil imports. Crude imports are defined by the refining capacity of the nation. Currently, the Sapugaskanda refinery has a capacity of 50,000 bbl/day. It is expected that additional capacity of 100,000 bbl/day will be added in Hambantota starting 2026 and at maximum capacity in 2030.

As crude imports increase, the demand for refined oil products drops, which can be observed from the imports figures. Adding to the refining capacity of Sri Lanka will reduce costly petroleum imports, for example.

Figure 4-15: National Crude & Refined Forecasts

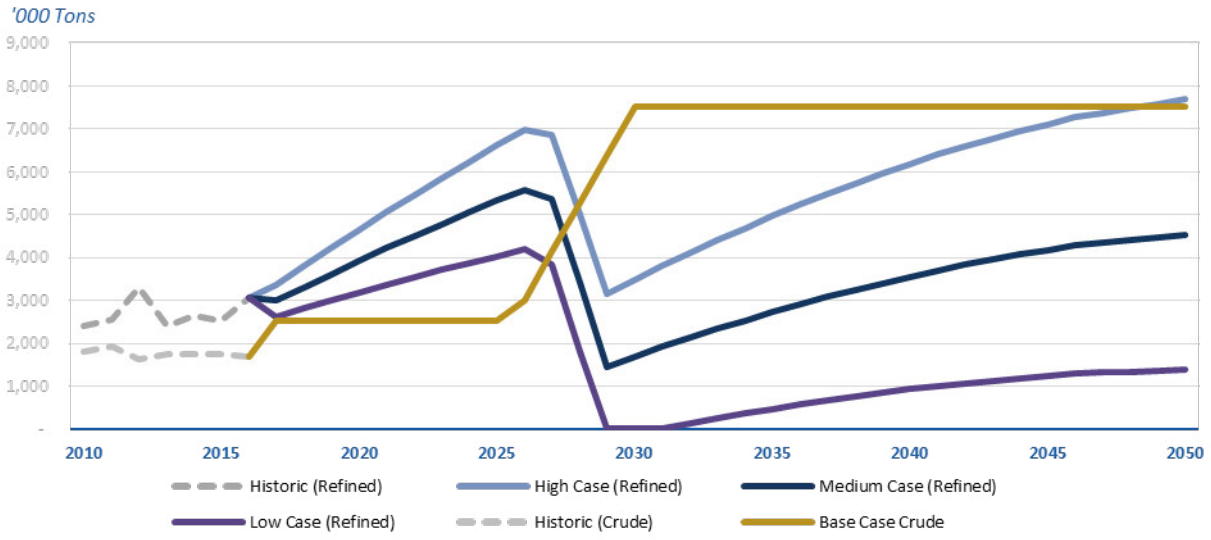


Table 4-21: National Crude & Refined Forecast

'000 Tons	2016	2020	2025	2030	2035	2040	2045	2050
Refined								
High Case	3,059	4,642	6,611	3,489	4,966	6,180	7,106	7,680
5yr – CAGR		*11.0%*	*7.3%*	*-12.0%*	*7.3%*	*4.5%*	*2.8%*	*1.6%*
Medium Case	3,059	3,916	5,322	1,691	2,722	3,556	4,174	4,527
5yr – CAGR		*6.4%*	*6.3%*	*-20.5%*	*10.0%*	*5.5%*	*3.3%*	*1.6%*
Low Case	3,059	3,189	4,033	-	477	931	1,241	1,374
5yr – CAGR		*1.0%*	*4.8%*	-	-	*14.3%*	*5.9%*	*2.1%*
Crude								
Base Case	1,685	2,512	2,512	7,512	7,512	7,512	7,512	7,512

4.3.11 LNG

Forecast Results

The LNG import terminal in the Colombo South Port break water will cater to the first imports of LNG in 2019, which result from the envisaged development of a gas fired power plant in the Colombo region. Subsequently, a ramp-up is expected of the production in Colombo. The forecast is based on the envisaged national energy generation from LNG.

Figure 4-16: National LNG Import Forecasts

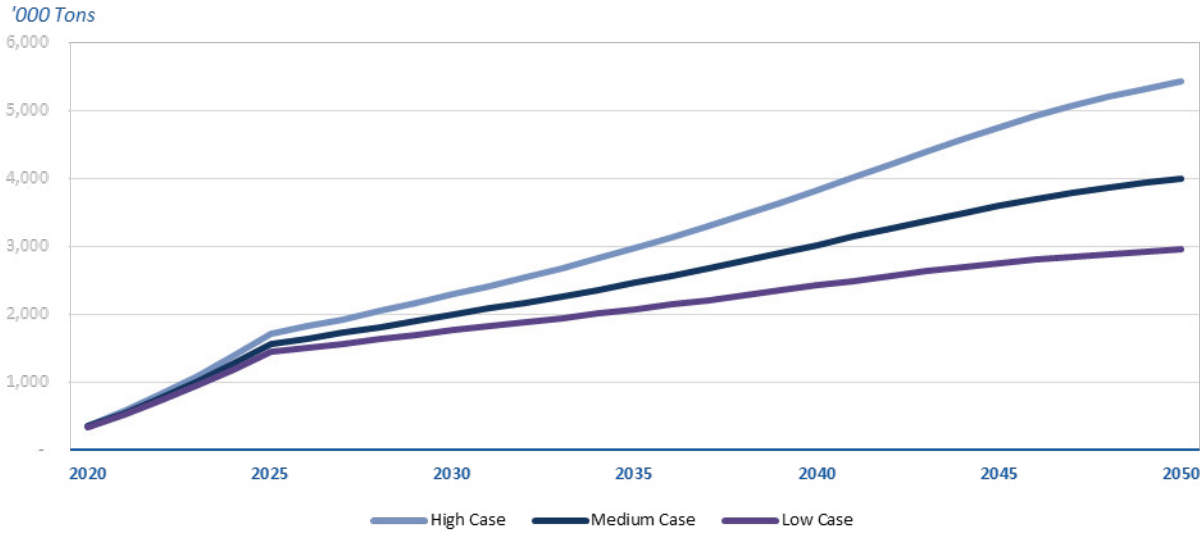


Table 4-22: National LNG Import Forecast

'000 Tons	2020	2025	2030	2035	2040	2045	2050
High	359	1,714	2,292	2,971	3,820	4,749	5,425
5yr – CAGR		*36.7%*	*6.0%*	*5.3%*	*5.2%*	*4.5%*	*2.7%*
Medium	343	1,561	1,991	2,460	3,016	3,594	3,988
5yr – CAGR		*35.4%*	*5.0%*	*4.3%*	*4.2%*	*3.6%*	*2.1%*
Low	333	1,446	1,758	2,070	2,418	2,747	2,951
5yr – CAGR		*34.1%*	*4.0%*	*3.3%*	*3.2%*	*2.6%*	*1.4%*

4.3.12 Ilmenite & Biomass

The ilmenite and biomass forecasts are based on market party initiatives and expectations for the port of Trincomalee. Both are export products destined for the South-East Asian market. The biomass is a cleaner alternative to coal that can be used in coal fired power plants; in order to reduce the carbon footprint, power plants in a growing amount of countries are required to switch from coal to other sources such as biomass.

Forecast Results

Table 4-23: National Export Forecasts Ilmenite & Biomass

'000 Tons	2020	2025	2030	2035	2040	2045	2050
Ilmenite	-	700	700	700	700	700	700
Biomass	150	290	500	500	500	500	500

4.3.13 Non-Containerised General Cargo

Forecast Results

General cargo sees an increase in the period until 2025 due to increasing construction works in Sri Lanka. Because, of the current high containerisation rate of Sri Lanka (exports and imports around 95%) no large effects are to be expected regarding that aspect.

Figure 4-17: National General Cargo Import and Export Forecasts

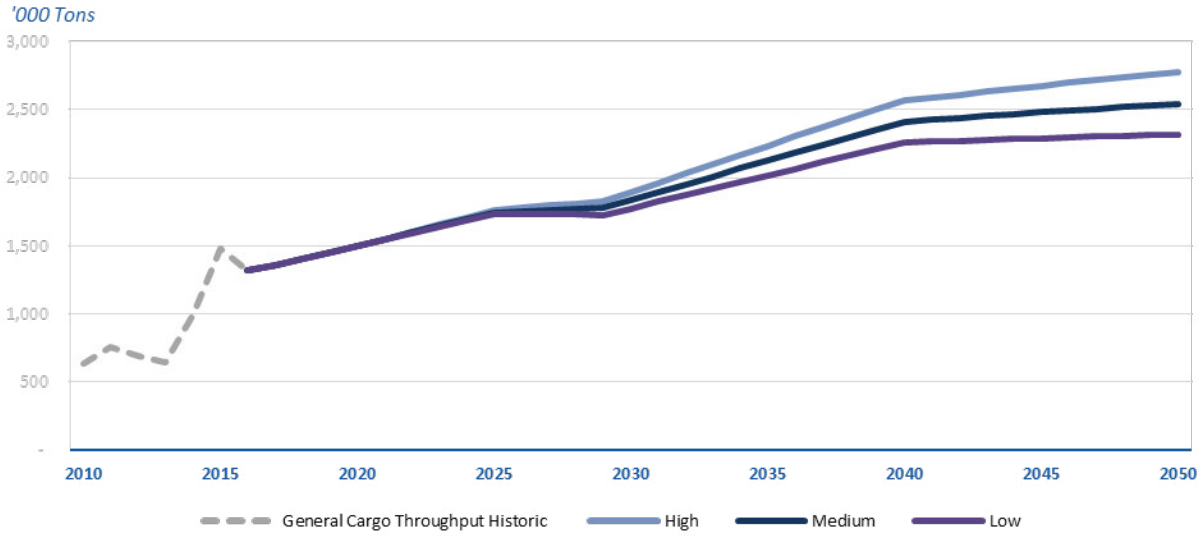


Figure 4-18: National Non-containerised general cargo

'000 Tons	2016	2020	2025	2030	2035	2040	2045	2050
High	1,301	1,497	1,764	1,894	2,235	2,567	2,675	2,774
5yr - CAGR		*3.6%*	*3.3%*	*1.4%*	*3.4%*	*2.8%*	*0.8%*	*0.7%*
Medium	1,301	1,497	1,747	1,834	2,126	2,411	2,481	2,545
5yr - CAGR		*3.6%*	*3.1%*	*1.0%*	*3.0%*	*2.5%*	*0.6%*	*0.5%*
Low	1,301	1,497	1,729	1,775	2,018	2,257	2,290	2,320
5yr - CAGR		*3.6%*	*2.9%*	*0.5%*	*2.6%*	*2.3%*	*0.3%*	*0.3%*

4.3.14 RoRo Domestic

Forecast Results

The three scenarios show significant differences as in the low scenario imports drop to around 90 thousand vehicles per annum whereas in the High Case it rises to 400 thousand.

Figure 4-19: National RoRo Import Forecast

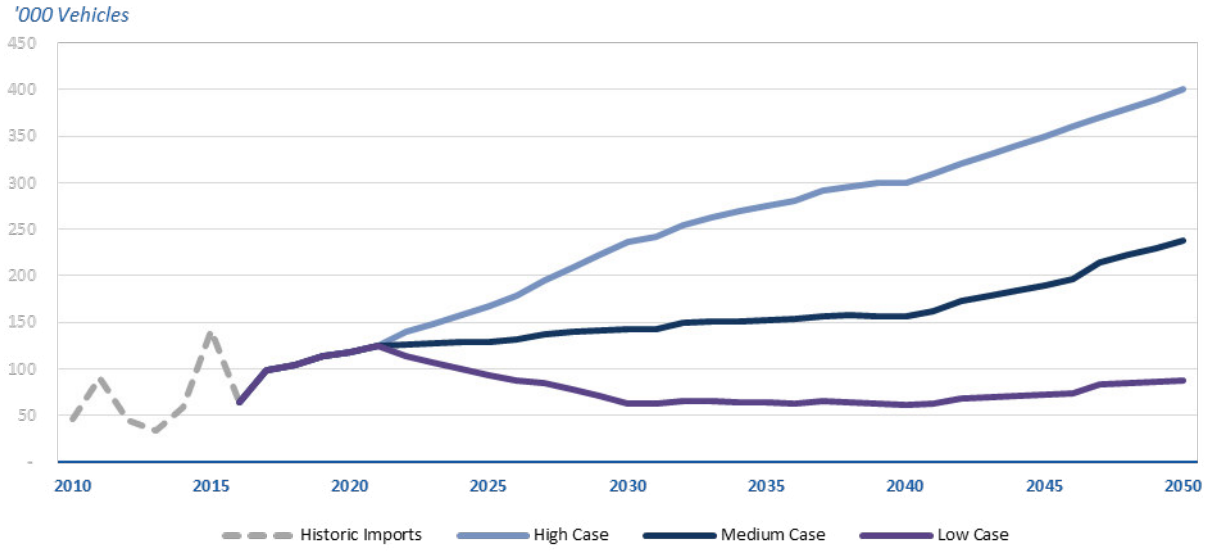


Table 4-24: National RoRo Import Forecast Data Table

'000 Vehicles	2016*	2020	2025	2030	2035	2040	2045	2050
High	63	117	167	236	275	300	350	400
5yr - CAGR		*16.7%*	*7.3%*	*7.2%*	*3.1%*	*1.7%*	*3.1%*	*2.7%*
Medium	63	117	129	142	152	157	190	238
5yr - CAGR		*16.7%*	*2.0%*	*1.9%*	*1.4%*	*0.5%*	*3.9%*	*4.6%*
Low	63	117	94	63	64	62	72	88
5yr - CAGR		*16.7%*	*-4.4%*	*-7.5%*	*0.1%*	*-0.5%*	*3.1%*	*4.1%*

*2016 is used because 2015 is a large outlier

4.3.15 RoRo Transhipment

Forecast Results

The forecast shows a stagnant relation in coming decade as the Increase in Indian exports is countered by the drop in Sri Lanka's market share for the roro transhipment. The market share is stable after that.

Figure 4-20: National RoRo Transhipment Forecast

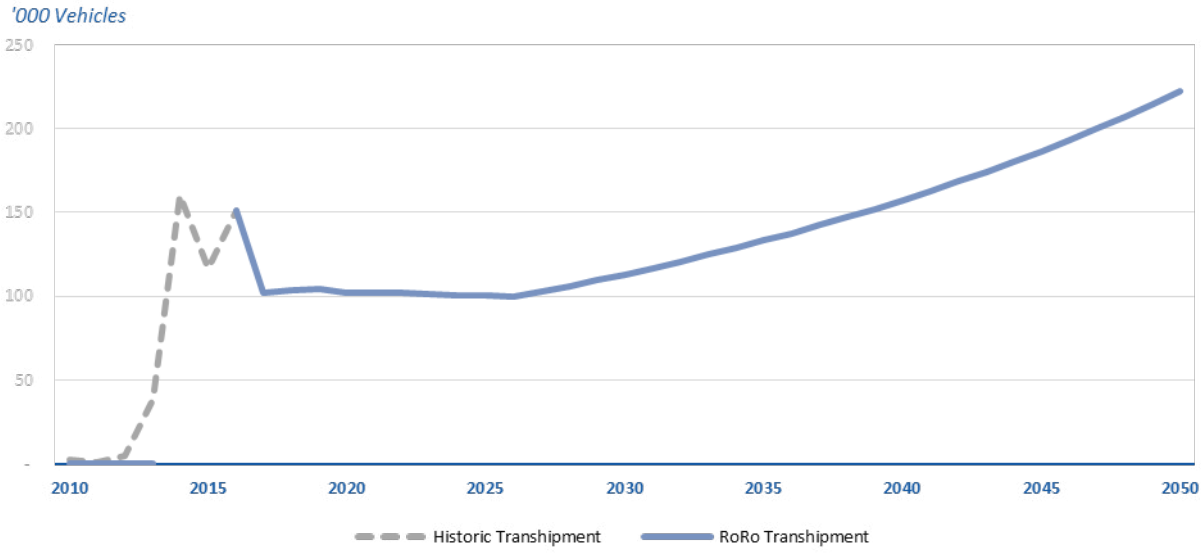


Table 4-25: National RoRo Transhipment Data Table

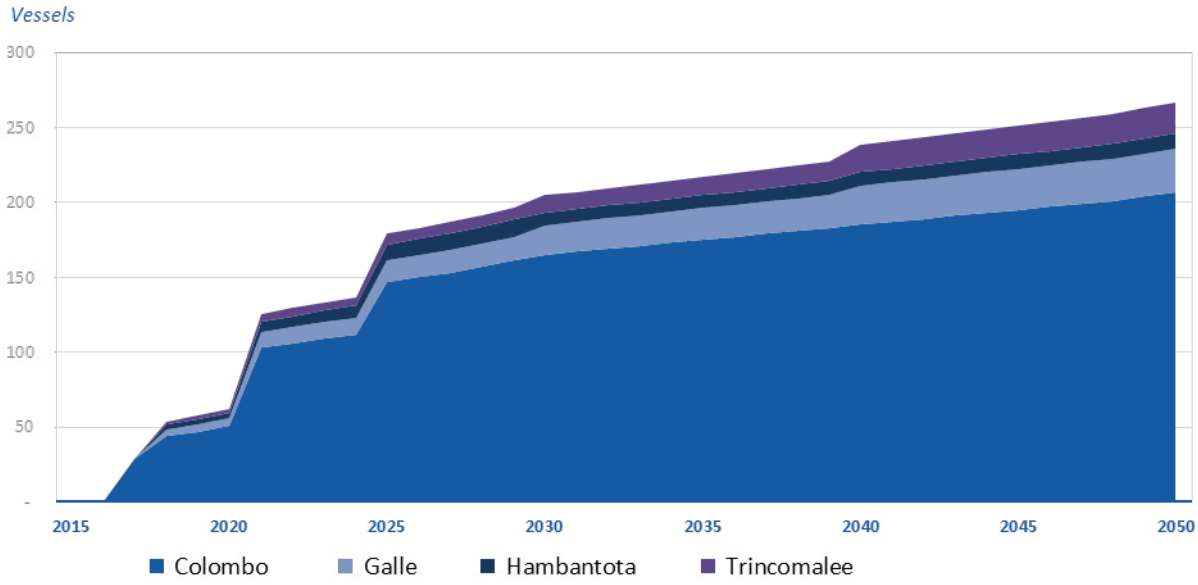
'000 Vehicles	2015	2020	2025	2030	2035	2040	2045	2050
Forecast	116	102	100	113	133	157	187	222
5yr - CAGR		*-2.6%*	*-0.4%*	*2.4%*	*3.3%*	*3.4%*	*3.5%*	*3.5%*

4.3.16 Cruise Vessel Arrival Forecast

Forecast Results

Colombo continues be the main port of call for cruise vessels, while other ports profit from its growth. The figure below presents the projected vessel arrivals. Several substantial increases in project vessel arrivals can be observed, as it is expected that several cruise loops with Colombo as the homeport are to be established.

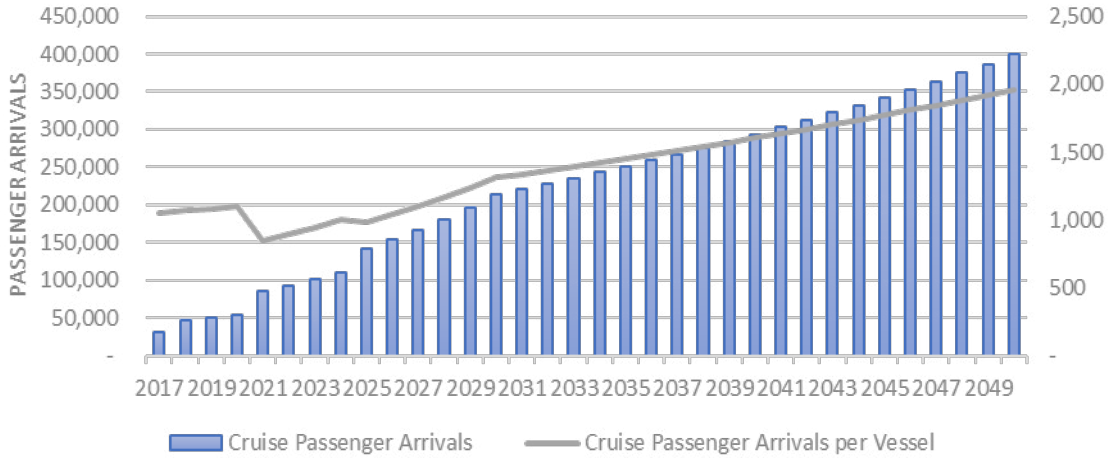
Figure 4-21: Forecast Vessel Arrivals per Port



The average number of passengers that disembark in Colombo is estimated to increase from 1,052 in 2017 to 1,960 in 2050 (CAGR: 1.9%). Figure 4-22 shows the forecast development of the total cruise passenger arrivals in Colombo port for the period from 2017 to 2050, as well as the average disembarking passengers per vessel. The following observations can be made:

- The average number of disembarking passengers per arriving cruise vessel experiences substantial dips in 2021 and 2025, due to the new low-utilisation services that are introduced.
- Despite the decrease in the average number of disembarking passengers in 2021 and 2025, a substantial increase in the total passenger arrivals can be observed for these years.
- Passenger arrivals in Colombo port are estimated to increase from 30,508 in 2017 to 0.4M in 2050 (CAGR: 8.1%).

Figure 4-22 Colombo Passenger Arrivals and Passenger Arrivals per Vessel - Forecast



4.4 Commodity-Level Allocation

4.4.1 Containers

Gateway Containers

- Of the total gateway demand, Colombo port is estimated to handle 98% in 2025, 95% in 2030, and 88% in 2050, due to the port's proximity to the consumer market.
- Hambantota port is estimated to handle 1% in 2020, 4% in 2030, and 9% in 2050, due to the envisaged logistics and industrial zone and the port's proximity to main trade routes.
- The remainder of gateway containers are expected to be handled at Trincomalee, which will solely serve its direct hinterland.

Transhipment

Transhipment container volumes are assumed to remain in Colombo during the forecasting period. While Hambantota is geographically better positioned to handle the transhipment cargo, several factors result in a favourable position for Colombo. These factors include Colombo's proximity to domestic consumer markets, which entails that vessels carrying gateway containers will already call Colombo, the presence of the port community in Colombo, the maximum water depth of 17.0m in Hambantota, and the higher number of berths in Colombo.

Under the Base Case, transhipment volumes are expected to increase to 12.7 M TEU by 2050; under the High Case scenario, which assumes stronger growth of destination markets and a stronger value proposition for the port of Colombo, transhipment volumes are expected to increase to 21.0 M TEU by 2050.

The table below presents the Base Case container forecast and allocation for the Sri Lankan ports.

Table 4-26 Sri Lanka Port Cargo Allocation - Containers

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Gateway								
Colombo	1,300	*100%*	1,643	*99%*	2,498	*95%*	3,289	*88%*

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Trincomalee	-	-	-	-	26	*1%*	112	*3%*
Hambantota	-	-	17	*1%*	105	*4%*	336	*9%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,300**	***100%***	**1,660**	***100%***	**2,630**	***100%***	**3,737**	***100%***
Transhipment								
Colombo	4,355	*100%*	5,775	100%	6,433	100%	12,671	100%
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**4,355**	***100%***	**5,775**	**100%**	**6,433**	**100%**	**12,671**	**100%**
Total								
Colombo	5,655	*100%*	7,418	100%	8,931	99%	15,960	97%
Trincomalee	-	-	-	-	26	0.4%	112	1%
Hambantota	-	-	17	0%	105	0.6%	336	2%
Other Ports	-	-	-	-	-	-	-	-
National Demand	**5,655***	***100%***	**7,435**	**100%**	**9,063**	**100%**	**16,408**	**100%**

** Excludes 79,812 TEUs that were re-stowed.*

The table below presents the High Case container forecast and allocation for the Sri Lankan ports.

Table 4-27 Sri Lanka Port Cargo Allocation -High Case Containers

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Gateway								
Colombo	1,300	*100%*	1,643	*99%*	2,713	*95%*	4,003	*88%*
Trincomalee	-	-	-	-	28	*1%*	136	*3%*
Hambantota	-	-	17	*1%*	114	*4%*	409	*9%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,300**	***100%***	**1,660**	***100%***	**2,855**	***100%***	**4,548**	***100%***
Transhipment								
Colombo	4,355	*100%*	6,304	100%	8,473	100%	20,995	100%

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**4,355**	***100%***	**6,304**	**100%**	**8,473**	**100%**	**20,995**	**100%**
Total								
Colombo	5,655	*100%*	7,947	100%	11,186	98.7%	24,998	98%
Trincomalee	-	-	-	-	28	0.2%	136	1%
Hambantota	-	-	17	0%	114	1.0%	409	2%
Other Ports	-	-	-	-	-	-	-	-
National Demand	**5,655***	***100%***	**7,964**	**100%**	**11,328**	**100%**	**25,543**	**100%**

** Excludes 79,812 TEUs that were re-stowed.*

Under the high case it is assumed that all transhipment is performed by Colombo port. Two scenario's have been drafted for the case that Hambantota also performs transhipment hampering the competitiveness of Port of Colombo. These scenario's are presented in the Colombo Port Development Plan.

4.4.2 Coal

Currently, the majority of coal volumes is handled at the Puttalam pier, as the coal is destined for the nearby coal fired power plant. The remainder of coal volumes is handled at Trincomalee port. This allocation is expected to remain constant, as other envisaged coal fired power plants near Trincomalee have been cancelled. The table below presents the coal allocation.

Table 4-28 Sri Lanka Port Cargo Allocation - Coal

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	-	-	-	-	-	-
Trincomalee	103	*5%*	120	*5%*	120	*5%*	120	*5%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	1,836	*95%*	2,280	*95%*	2,280	*95%*	2,280	*95%*
National Demand	**1,932**	***100%***	**2,400**	***100%***	**2,400**	***100%***	**2,400**	***100%***

4.4.3 Wheat / Maize / Corn

Grains are mainly handled at the port of Trincomalee; these grain volumes consist of wheat grain imports for the Prima Flour milling facility and exports of processed products and by-products. The remaining grain

imports are handled in Colombo, mainly at the Grain Elevators facility; these imports consist of products for local consumption.

It is expected that Trincomalee will remain the major port for grain handling, as the Prima Flour facility envisages further development in the Trincomalee area. Additionally, some grain volumes are foreseen for the Port of Hambantota, in order to serve the surrounding developments. The table below presents the Base Case allocation.

Table 4-29 Sri Lanka Port Cargo Allocation – Wheat / Maize / Corn

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	190	*18%*	211	*17%*	302	*15%*	342	*15%*
Trincomalee	867*	*82%*	1,054	*83%*	1,509	*75%*	1,709	*75%*
Hambantota	-	-	-	-	201	*10%*	228	*10%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,057**	***100%***	**1,265**	***100%***	**2,012**	***100%***	**2,279**	***100%***

**Includes 152,650 tons of wheat bran pallet (by-product of Prima Flour's production process) exports*

4.4.4 Cement / Clinker

Processed cement is handled in the port of Colombo, as the majority of cement is consumed by construction projects in the Colombo Metropolitan area. Additionally, clinker is handled at the ports of Trincomalee and Galle, due to the presence of cement processing facilities in and around these ports. Over the forecast period, the following development is foreseen for the allocation:

- Colombo's share of cement imports is expected to remain dominant in the short to medium term, due to substantial infrastructure projects. In the long term, Colombo's share of volumes is expected to decrease.
- Trincomalee's share of cement and clinker volumes is expected to remain relatively constant, as the nearby facilities envisage expansion in line with total demand growth.
- Galle's share of cement and clinker volumes is expected to remain relatively constant, as the nearby facilities envisage expansion in line with total demand growth.
- Some cement volumes are foreseen for the port of Hambantota, in order to facilitate the region's envisioned future development.

The table below presents the Base Case allocation.

Table 4-30 Sri Lanka Port Cargo Allocation – Cement, Clinker & Gypsum

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	2,179	*49%*	2,871	*50%*	2,560	*40%*	2,334	*30%*

Trincomalee	1,712*	*39%*	2,297	*40%*	2,560	*40%*	3,113	*40%*
Hambantota	-	-	287	*5%*	640	*10%*	1,556	*20%*
Other Ports	535	*12%*	287	*5%*	640	*10%*	778	*10%*
National Demand	**3,890**	***100%***	**5,374**	***100%***	**6,399**	***100%***	**7,782**	***100%***

**Excludes 535,962 tons of clinker that is loaded (transhipped) in Trincomalee for transport to Galle, as it is already counted as an import (unloading move).*

4.4.5 Fertiliser

Fertilisers are currently fully imported through the port of Colombo. It is expected that bulk fertiliser imports will fully diminish over time, as local production facilities are developed and the remaining volumes will be imported in containerised form. As such, bulk fertiliser imports through Colombo will diminish over time.

In order to develop the local fertiliser production, a SSP fertiliser plant is envisaged to be established in Trincomalee. This plant will import sulphuric acids for its production process and is envisaged to export any produced fertiliser in excess of domestic demand. Hence, Trincomalee is envisioned to become Sri Lanka's main fertiliser port. The expected Base Case allocation is presented in the table below.

Table 4-31 Sri Lanka Port Cargo Allocation – Fertiliser

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	314	*100%*	160	*56%*	-	-	-	-
Trincomalee	-	-	128	*44%*	1,536	*100%*	1,536	*100%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**314**	***100%***	**288**	***100%***	**1,536**	***100%***	**1,536**	***100%***

4.4.6 Crude Oil

Crude oil imports are currently fully handled at Colombo, as the imports are destined for the nearby Sapugaskanda refinery. It is expected that the old refinery, which is in a poor state, will be revamped or rebuilt in the Colombo region. As such, crude oil imports in the Colombo region will remain stable over the forecast period. Additionally, it is foreseen that a new 100,000 bbl/day refinery will be developed in Hambantota by 2025. The expected Base Case allocation is presented in the table below.

Table 4-32 Sri Lanka Port Cargo Allocation – Crude Oil

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	1,685	*100%*	2,512	*100%*	2,512	*33%*	2,512	*33%*
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	5,007	*67%*	5,007	*67%*

Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,685**	***100%***	**2,512**	***100%***	**7,512**	***100%***	**7,512**	***100%***

4.4.7 Refined Oil

The majority of refined oil imports are handled in Colombo, due to the port's proximity to the main consumption center. Colombo is expected to remain the country's primary consumption center over the forecast period; however, development of the southern and eastern regions of the countries are expected to result in a more even distribution of refined oil imports among the country's 3 major ports. The expected Base Case allocation is presented in the table below.

Table 4-33 Sri Lanka Port Cargo Allocation – Refined Oil

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	2,871	*90%*	3,010	*77%*	845	*50%*	2,264	*50%*
Trincomalee	238	*9%*	541	*14%*	507	*30%*	1,358	*30%*
Hambantota	25	*1%*	365	*9%*	338	*20%*	905	*20%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**2,639**	***100%***	**3,916**	***100%***	**1,691**	***100%***	**4,527**	***100%***

4.4.8 LNG

The first gas fired power plant is envisaged to be developed in the Colombo region; subsequently, it is expected that a gas fired power plant will be developed in the Hambantota region to further increase the country's share of LNG based power generation. The expected Base Case allocation is presented in the table below.

Table 4-34 Sri Lanka Port Cargo Allocation – LNG

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	343	*100%*	995	*50%*	1,994	*50%*
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	995	*50%*	1,994	*50%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**-**	**-**	**343**	***100%***	**1,991**	***100%***	**3,988**	***100%***

4.4.9 Ilmenite

Sri Lanka has pockets of ilmenite which is used as a metal in titanium production. Currently, they are already exporting the ilmenite in small vessels, using a facility north of Trincomalee. In the future, the exports are

envisaged to be handled at the port of Trincomalee. The expected Base Case allocation is presented in the table below.

Table 4-35 Sri Lanka Port Cargo Allocation – Ilmenite

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	-	-	-	-	-	-
Trincomalee	-	-	-	-	700	*100%*	700	*100%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**-**	**-**	**-**	**-**	**700**	***100%***	**700**	***100%***

4.4.10 Biomass

Biomass is being produced by a private company for which a bulk export location is needed. Trincomalee is the preferred export location due to the possibility to load into bulk carriers and the availability of land near the Ashroff quay. The expected Base Case allocation is presented in the table below.

Table 4-36 Sri Lanka Port Cargo Allocation – Biomass

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	-	-	-	-	-	-
Trincomalee	-	-	150	*100%*	500	*100%*	500	*100%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**-**	**-**	**150**	***100%***	**500**	***100%***	**500**	***100%***

4.4.11 Non-Containerised General Cargo

Non-containerised general cargo is currently mainly handled at the port of Colombo, as the majority of the general cargo volumes are inputs for the construction projects in the Colombo region. It is expected that Colombo's share of non-containerised general cargo volumes will decrease in the medium and long term, as the construction boom in the Colombo region recedes and increasing amounts of development projects are carried out in the southern and eastern regions of the country. The expected Base Case allocation is presented in the table below.

Table 4-37 Sri Lanka Port Cargo Allocation – Non-Containerised General Cargo

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	801	*62%*	948	*64%*	733	*40%*	509	*20%*
Trincomalee	-	-	-	-	183	*10%*	832	*30%*
Hambantota	399	*31%*	477	*32%*	697	*38%*	1,054	*38%*
Other Ports	86	*7%*	101	*7%*	220	*12%*	333	*12%*
National Demand	**1,287**	***100%***	**1,492**	***100%***	**1,834**	***100%***	**2,774**	***100%***

4.4.12 RoRo

All transhipped vehicles are currently handled at the port of Hambantota, following a political decision to move the vehicle transhipment away from the busy Colombo area. It is expected that all vehicle transhipment activities will remain at Hambantota. As Colombo is expected to remain the main consumption center for vehicles imported for local use, it is foreseen that Colombo will keep handling a share of domestic vehicles; however, Colombo's share of domestic imports is expected to decrease due to space constraints. The expected Base Case allocation is presented in the table below.

Table 4-38 Sri Lanka Port Cargo Allocation – RoRo

	Current (2016)		2020		2030		2050	
	Volumes (Vehicles)	Allocation (%)	Volumes (Vehicles)	Allocation (%)	Volumes (Vehicles)	Allocation (%)	Volumes (Vehicles)	Allocation (%)
Gateway								
Colombo	31,888	*50%*	40,048	*37%*	21,770	*15%*	23,569	*10%*
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	31,519	*50%*	68,694	*63%*	123,361	*85%*	212,125	*90%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**80,307**	***100%***	**108,742**	***100%***	**145,130**	***100%***	**235,695**	***100%***
Transhipment								
Colombo	778	*0%*	-	-	-	-	-	-
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	150,143	*100%*	102,076	*100%*	113,033	*100%*	222,031	*100%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**101,019**	***100%***	**102,076**	***100%***	**113,033**	***100%***	**222,031**	***100%***

4.4.13 Cruise

- Cruise development in Sri Lanka is expected to increase due to the attractiveness of the country (nature, culture, beaches, wildlife) and the still relatively under developed touristic sector.
- Colombo is currently the main cruise destination in Sri Lanka; due to the envisaged development of a dedicated passenger terminal in Colombo, Colombo will remain the primary passenger port of the country.
- Trincomalee, Hambantota and Galle will benefit from the significant cruise development in Colombo. Cruise liners will add these ports to their Sri Lankan schedule for their specific touristic value propositions.

Table 4-39 Sri Lanka Port Cargo Allocation – Cruise

	Current (2016)		2020		2030		2050	
	Vessels	Allocation (%)	Vessels	Allocation (%)	Vessels	Allocation (%)	Vessels	Allocation (%)
Colombo	43	*100%*	51	*82%*	165	*81%*	207	*78%*
Trincomalee	No data	*0%*	3	*4%*	12	*6%*	21	*8%*
Hambantota	No data	*0%*	4	*6%*	8	*4%*	10	*4%*
Other Ports	No data	*0%*	5	*8%*	20	*10%*	29	*11%*
National Demand	**43**	***100%***	**63**	***100%***	**205**	***100%***	**267**	***100%***

4.5 Capacity development needs

The capacity gap is based on the current capacities calculated using actual and benchmark productivities. The 2016 capacity is deducted from the 2050 capacity to uncover potential future capacity gaps. Container capacity is calculated in more detail, especially the development options which are already on the table at Colombo.

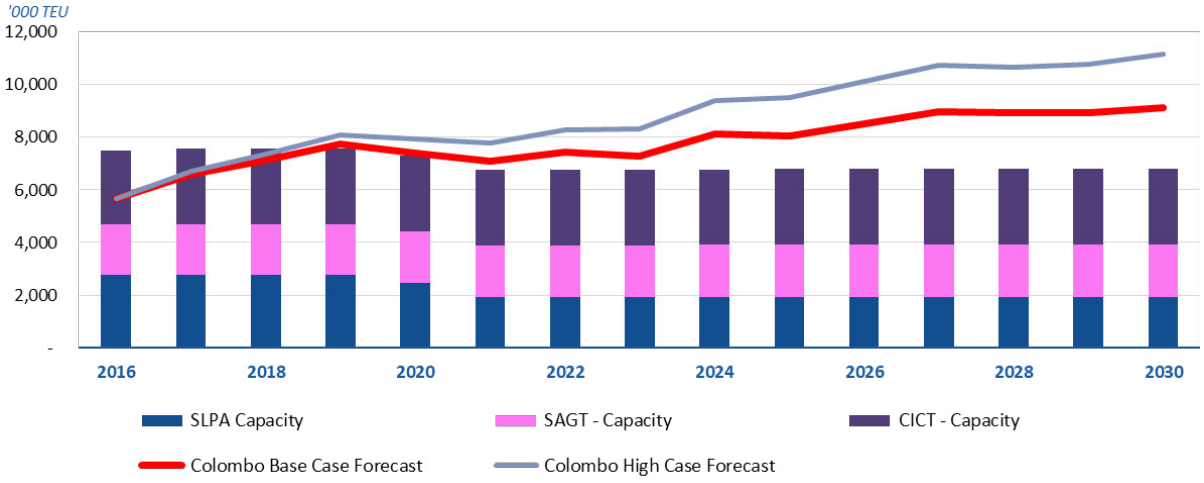
In the tables, the following colour code is adhered to: red indicates a capacity shortage; orange indicates a deficit within the margin of error of 10%; and green indicates a capacity surplus.

4.5.1 Containers

Port of Colombo in 2030

Figure 4-23 displays the expected 2030 container volumes demand under the Base Case and High Case, in relation to the existing capacity in the Port of Colombo. This shows a clear and urgent demand for development.

Figure 4-23 2030 Container Demand and Existing Capacity Supply – Colombo Current Facilities



The capacity gaps in TEU (2030) are illustrated in next table.

Table 4-40 Container Capacity Supply Gap

		2016	2020	2025	2030
Base Case					
Demand	'000 TEU	5,655	7,418	8,026	8,931
Capacity	'000 TEU	7,500	7,294	6,789	6,806
Capacity Gap	'000 TEU	1,845	(124)	(1,237)	(2,125)
High Case					
Demand	'000 TEU	5,655	7,947	9,518	11,186
Capacity	'000 TEU	7,500	7,294	6,789	6,806
Capacity Gap	'000 TEU	1,845	(653)	(2,729)	(4,380)

Subsequently, Table 4-41 displays the envisaged development options of Colombo. Under the Base Case forecast, the nearly completed ECT Phase I should provide adequate capacity. Under the High Case forecast, the second phase of the ECT terminal is required; alternatively, the first phase of the WCT could be developed.

Table 4-41 2030 Container Capacity Development Options - Colombo

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2030)		
SLPA	1,928	1,292
SAGT I	1,999*	940
CICT	2,880*	1,200
Development Options (2030)		
WCT I	3,360	1,400
WCT II	3,360	1,400
ECT I	2,880	1,200
ECT II	1,440	600
SAGT II	2,640	1,200

*Assuming an increase in productivity.

Port of Colombo in 2050

The following tables illustrate the situation in 2050.

Table 4-42: 2050 Container Capacity Development Scenarios - Colombo

Facility	SAGT I	CICT	WCT I	WCT II	ECT I	ECT II	SAGT II	North Port	Capacity ('000 TEU)	Quay (m)
Capacity Development Scenarios										
1. Current Facilities	x	x							4,948	2,140
2. Current & Planned	x	x	x		x				11,188	4,740
3. Current, Planned & Extended ECT + SAGT	x	x	x		x	x	x		15,268	6,540
4. Current, Planned & North Port	x	x	x		x			x	16,588	6,990
5. Full Port Development	x	x	x	x	x	x	x	x	24,028	10,190

Table 4-43 displays the container capacity gap analysis based on the estimated 2050 container volumes and the capacity development scenarios presented above. Red indicates a capacity shortage; orange indicates a deficit within the margin of error of 10%; and green indicates a capacity surplus.

The following table shows the TEU capacity gap by 2050 and is an indicator for the capacity required to be developed.

Table 4-43: TEU Gap Analysis Colombo 2050

	Unit	Base Case	High Case
1. Current Facilities	'000 TEU	(11,726)	(20,050)
2. Current & Planned	'000 TEU	(4,772)	(13,810)
3. Current, Planned & Extended ECT + SAGT	'000 TEU	(6,92)	(9,730)
4. Current, Planned & North Port	'000 TEU	628	(8,410)
5. Full Port Development	'000 TEU	8,068	(970)

The main conclusions from the analysis are:

- The future capacities of SAGT, WCT I, CICT and ECT (scenario 2: current and planned facilities) are insufficient for Colombo under the Base Case.
- Under the High Case scenario, which entails higher transhipment volumes for the Port of Colombo, the north port expansion is required to accommodate all container volumes.
- For both scenarios, the expansion capacities are based on improved handling efficiencies in the future.

Hambantota

Phase II of the Hambantota port development, which includes a container terminal, is nearing completion. Expansion options still exist for the port. Table 4-44 provides an overview of the forecasts, including the quay wall requirement given an assumed 2,400 TEU per metre per annum throughput capacity.

Table 4-44 Container Demand in TEU and Quay Metres for Base and High Case Hambantota

Scenario	2050 Capacity Requirement ('000 TEU)	2050 Quay wall Requirement (m)
Base Case Scenario	336	330
High Case Scenario	336	330

Subsequently, Table 4-45 displays the envisaged or planned development options at the port of Hambantota. Table 4-46 identifies the development scenarios that comprise several of the facilities planned.

Table 4-45 2050 Container Capacity Development Options - Hambantota

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2050)		
Phase II Container Terminal	3,116	1,299
Development Options (2050)		
Phase IV Container Terminal	9,240	3,850

Table 4-46 2050 Container Capacity Development Scenarios - Hambantota

Facility	Phase II Container Terminal	Phase IV	Capacity ('000 TEU)	Quay (m)
3. Current	x		3,116	1,299

4. Full Port Development	x	x	12,356	5,149

Table 4-47 presents the gap analysis for Hambantota for the Base Case and High Case scenarios, based on estimated 2050 container volumes. The gap analysis yields the following conclusion:

- The current Phase II container terminal is sufficient to handle expected demand under both the Base Case and High Case scenarios. Based on this gap analysis the Phase II container development is not required as it would provide unwanted overcapacity, hence part of phase II container terminal may be used for other purposes in the future.

Table 4-47 2050 TEU Gap Analysis Hambantota

	Unit	Base Case	High Case
1. Current Facilities	'000 TEU	2,854	2,854
2. Full Development	'000 TEU	12,094	12,094

Trincomalee

Table 4-48 presents the estimated 2050 container volumes and quay wall requirement. The following is concluded:

- A single berth in Trincomalee is sufficient to accommodate estimated future demand.
- No detailed plans for container terminals are considered as projected demand is low.

Table 4-48: Container Demand in TEU and Quay Metres for Base and High Case Trincomalee

Scenario	2050 Volumes ('000 TEU)	2050 Quay Wall Requirement (m)
Base Case	112	300 m
High Case	112	300 m

4.5.2 Coal

Table 4-49 presents the current coal capacity and estimated 2050 Base Case demand. The following can be concluded:

- Projected coal volumes do not show strong growth, as recent coal fired power plant projects have been cancelled. As such, only volumes for the Puttalam power plant and small volumes for the cement plants need to be accommodated.
- The current capacity in Puttalam is sufficient to handle its estimated future demand.

Table 4-49 Coal Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	-	-	-
Trincomalee	347	103	120
Hambantota	-	-	-
Puttalam	2,500	1,836	2,280

Other Ports	-	-	-

4.5.3 Wheat, Maize, and Corn

Table 4-50 presents the current wheat, maize and corn capacity, as well as estimated 2050 Base Case demand. The following can be concluded:

- Colombo's capacity is sufficient in the future, as the majority of bulk cargoes is allocated to Trincomalee.
- Due to its capacity to handle large bulk vessels, Trincomalee is the ideal point of entry for grain products; it is assumed that an efficient transport corridor to the western part of the country will be developed, which will further strengthen Trincomalee's position.
- Trincomalee will need additional grain processing capacity if it is to accommodate the projected throughput.

Table 4-50 Wheat, Maize & Corn Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	710	190	342
Trincomalee	1,161	867	1,709
Hambantota	-	-	228
Other Ports	-	-	-

4.5.4 Cement, Clinker, and Gypsum

Table 4-51 presents the current cement, clinker and gypsum capacity, as well as estimated 2050 Base Case demand. The following can be concluded:

- The private facilities in Colombo and Trincomalee are operating at or near maximum capacity.
- Galle cement handling capacity will remain sufficient over the forecasting period, but will need modernisation.
- Future expansion is best accommodated in Hambantota in case of large scale developments; alternatively, the port of Colombo also offers suitable access for deep-water vessels.

Table 4-51 Cement, Clinker & Gypsum Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	2,250	2,179	2,334
Trincomalee	2,200	1,712	3,113
Hambantota	-	-	1,556
Galle	1,000	535	778
Other Ports		-	-

4.5.5 Crude Oils

Table 4-52 presents the current crude oil capacity and estimated 2050 Base Case demand. The following can be concluded:

- The crude pumping and storage capacity in Colombo is sufficient to handle future demand.
- As crude oil imports are foreseen in Hambantota, to serve the envisaged 100,000 bbl/day refinery, substantial crude oil handling capacity will need to be developed in the port.

Table 4-52 Crude Oil Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	6,570	1,685	2,512
Trincomalee	-	-	-
Hambantota	-	-	5,007
Other Ports	-	-	-

4.5.6 Refined Oils

Table 4-53 presents the current refined oil capacity and estimated 2050 Base Case demand. The following can be concluded:

- Colombo has sufficient capacity to handle estimated refined oil demand.
- Trincomalee is expected to retain refined oils handling capacity, if (a share of) the dilapidated storage tanks are rehabilitated. However, a new deep sea jetty will be required to accommodate larger vessels and enable more efficient operations.
- Refined oil handling facilities are required to support the expected future imports in Hambantota.
- A swing factor in the forecast is the new location of a new refinery should the existing refinery not be revamped.

Table 4-53 Refined Oil Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	4,531	2,871	2,264
Trincomalee	10,692	238	1,358
Hambantota	-	21	905
Other Ports	-	-	-

4.5.7 Non-Containerised General Cargo

Table 4-54 presents the current non-containerised general cargo capacity and estimated 2050 Base Case demand. The following can be concluded:

- The current capacity of Colombo is sufficient, even if ECT and BQ will be given different functions in the future, as a substantial share of general cargo volumes will flow to other ports in the future.
- Trincomalee requires expansion of the Ashroff jetty (already planned for by SLPA).
- KKS requires an expansion of the general cargo berth (already planned for by SLPA).
- Hambantota requires additional handling capacity to accommodate the substantial general cargo volumes related to the region's development.
- Capacity in Oluvil is sufficient, following the recent expansion.
- Capacity in Galle is sufficient, if the new passenger berth is regarded as common berth whilst not occupied by cruise vessels.

Table 4-54 Non-Containerised General Cargo Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)

Colombo	2,000	801	555
Trincomalee	250	-	832
Hambantota	750	399	1,054
KKS	125	32	277
Oluvil	250	-	28
Galle	250	42	28

4.5.8 RoRo

Table 4-55 presents the current RoRo capacity and estimated 2050 Base Case demand. The following can be concluded:

- Capacity in Colombo is sufficient, as a result of the strategic decision to handle the majority of RoRo at Hambantota.
- Capacity in Hambantota is sufficient.

Table 4-55 RoRo Capacity Analysis

	2016 Capacity ('000 Vehicles)	2016 Throughput ('000 Vehicles)	2050 Forecast Base ('000 Vehicles)
Colombo	84	33	24
Trincomalee	-	-	-
Hambantota	515	182	434
Other Ports	-	-	-

4.5.9 Cruise Vessels

Table 4-56 presents the current cruise capacity and estimated 2050 Base Case demand. The following can be concluded:

- Colombo will need 3 berths and a passenger terminal building for which development plans are being written.
- Trincomalee is an attractive location for cruise passengers; as such, a dedicated cruise berth will need to be developed.
- Hambantota is close to wild parks in the southern region. No dedicated facilities are required; vessels can use common berths.
- Galle is attractive location for cruise passengers. A dedicated berth can service demand whereas a passenger terminal is only necessary when cruise vessel arrivals are further increased.

Table 4-56 Cruise Capacity Analysis

Port	Dedicated Facilities	2050 Forecast (vessels)	Berth Requirement	Passenger Terminal Requirement
Colombo	Small scale terminal	207	3 dedicated	Yes
Trincomalee	No	21	1 dedicated	No
Hambantota	No	10	1 multi-purpose	No
Galle	No	29	1 dedicated	No

4.5.10 LNG

Table 4-57 presents the current LNG capacity and estimated 2050 Base Case demand. The following can be concluded:

- Currently, none of the ports are able to handle LNG volumes.
- Capacity is required in Colombo and Hambantota, as gas fired power plants are envisaged near these ports.

Table 4-57 LNG Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	-	-	1,994
Trincomalee	-	-	-
Hambantota	-	-	1,994
Other Ports	-	-	-

4.5.11 Fertilizer

Table 4-58 presents the current fertilizer capacity and estimated 2050 Base Case demand.

Table 4-58 Fertilizer Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	314	314	-
Trincomalee	-	-	1,536
Hambantota	-	-	-
Other Ports	-	-	-

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5 Port Development Directions

5.1 Introduction

This chapter analyses the port development needs, based on scenario's and allocations. For each of the ports the port directions are explained summarized through each commodity segment.

The following approach has been used for this chapter:

- Paragraph 5.2 provides the Colombo port directions;
- Paragraph 5.3 provides the Trincomalee port directions;
- Paragraph 5.4 displays the Hambantota port directions;
- Paragraph 5.5 displays the Port of Galle directions;
- Paragraph 5.6 displays the Kankesanthurai port directions;
- Paragraph 5.7 displays the Oluvil port directions; and
- Paragraph 5.7 displays the Puttalam Coal Jetty port directions.

5.2 Colombo port directions

> Port of Colombo will be leader in the Indian Ocean, Middle East and East African hub ports, and is to become an efficient logistic hub to attract sustainable investment and trade, to facilitate the national import and export strategies and to become an international maritime centre.

As such a four tier focus applies to Port of Colombo:

- Maintaining a World Class Transhipment Hub, serving the Middle East, East Africa, India, Pakistan and the Bay of Bengal;
- Becoming an efficient logistic hub for imports and newly developed exports;
- Becoming a sustainable Port.
- Becoming an international maritime centre.

Colombo Port is leader in the Indian Ocean as Transhipment Hub port and should stay competitive with other national and international transhipment ports. To achieve this, focus should be on operational excellence both on the marine services, cargo handling services, auxiliary functions and on interterminal traffic. The marine activities and handling activities are one of the core activities of SLPA. Port designs are adjusted, and future capacity is planned for in order to stay ahead of demand. Innovations and new technologies will support this development.

The Port of Colombo should also become more efficient to facilitate the National Export Strategy on targeted exports sectors, as well as improving the logistics on import cargoes. As many trades are transported by containers, the container logistics chain is prime focus to become more efficient. This can be catered for through better infrastructure on port and hinterland connections as well as on administration and procedures. The latter can be achieved through a combination of digitalisation through a single maritime window as well as through trade facilitation and improved customs procedures. Further the development of cargo villages or Free Trade Zones (FTZ) connecting to the port should cater for demands on export manufacturers and foreign direct investment (FDI).

The above shows that the port sector needs to move fast on the innovation and efficiency improvements through investments to stay competitive both to support the transhipment Hub as well as the exports visionary. The port of Colombo will be a reliable partner in developing the nation and serving new clients.

Sustainability has become an important element in the global production chain. Global supply chains focus on partners which have a sustainability policy in place. Port of Colombo wants to align with modern practises of sustainability standards and green policies, innovation in the priority export sectors and integrate the logistics operation in the green supply chain.

Port of Colombo and the city are under massive development and together with the new Port City ideally situated to become an International Maritime Centre (IMC). The Port of Colombo is to become a well recognized as International Maritime Centre, a place in which efficient maritime services are provided and which various trade related services and maritime industries are vested. The strategy is to be developed over time. Development in three main "centres" have been identified such as trade, port and shipping industry and supporting industries. Examples of be be the establihment of corporate companies in the filed of shipping, classification societies, maintenance and repair and bunkering. Importantly is to increase the knowledge industry on training, research and development and concultancy. Several tasks are to be executed to create an international maritime centre:

- Profiling and branding Colombo Port
- Boosting Ease of Doing Business
- Creating a vibrant business and living environment
- Facilitate new business opportunities
- Provide incentives to attract business
- Partnership with other IMCs

Port role in the Country

The Port of Colombo is important for Sri Lanka and facilitates the majority of the import and exports trades today. The city is under large developments with the erection of many new hotels and resident flats and the rehabilitation of historic buildings. Furthermore, a new city port is under development, south of the existing port, including hotels, conference centres, residential flats, shops and marinas. The new port city will be connected through an elevated highway that also creates additional entrances to the port. The western region has several plans for city and urban developments and improvements. Combined, the western region developments and the city of Colombo generate high demands for the port of Colombo. This translates to required port improvements, a new cruise terminal, enhanced connectivity and major future port planning both for containers as well as for liquid bulk and multipurpose. Additional demand for warehousing and logistics needs to be captured in future planning as well.

5.2.1 General port overview

Colombo is located on the West coast of Sri Lanka and is the country's principal city and port. The port handles containerized cargoes, liquid bulk (crude oil and refined products), dry bulk (mostly grain and cement), general cargoes (mainly steel products, timber and RoRo) and cruise passengers. Colombo is located near the main East-West shipping routes and has become a major port for gateway cargo and the transhipment of containers. The port covers three large containers terminals and has a fourth under development. Container transhipment accounts for approximately 75% of Colombo's total container traffic; the remaining 25% comprises local containerized cargo, mainly driven by the export of garment, tea, and rubber, and imports of consumer products, industrial and agricultural equipment. Whilst there is almost no effective competition for domestic cargo, Colombo competes with several major hub ports for transhipment traffic. In this cargo segment, the

port has benefitted from its strategic location, both close to the main East-West trade lanes and close to the large and strongly growing Indian market.

The port handled 81.8 million tons in 2016 including 5.7 million TEU of containers. In 2016 the port had about 4,405 ships arrivals and was ranked as the 23rd largest container port in the world. The port handles the largest container vessels in the world having dimensions of 400 m in length and a capacity of 21,500 TEU due to quays with ample water depths of CD -18 m and state of the art terminals.

The port was developed along the natural bay at the city and the old basin covering approximately 201.5 ha. A major expansion program has resulted in the development of South Harbour which became operational in 2013. The new port basin consists of one state of the art terminal container terminal (58.0 ha) and another container terminal that soon will be launched. The basin has space for a third container terminal and a liquid terminal.

Additionally, to handling imports, exports and transhipment, the Port of Colombo offers non-cargo services including harbour master services, pilotage and tugging, bunkering, ship repair, warehousing, water supply, weighing and scanning services, firefighting, hospital services, financial services and ship chandlery. Also, the navy is situated within the port limits. To the north of the port a maritime training institute is situated.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Colombo, followed by the main conclusions from part B.

Figure 5-1: Colombo Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	1,300	3,289	2.7%	
Transhipment	4,355	12,671	3.2%	
Total	**5,735***	**15,960**	**3.1%**	**7,100**
Dry Bulk ('000 Tons)				
Coal	-	-	-	-
Wheat / Maize / Corn	190	342	1.7%	710
Cement / Clinker / Gypsum	2,179	2,334	0.2%	2,250
Fertiliser	314	-	-100.0%	-
Biomass	-	-	-	-
Ilmenite	-	-	-	-
Total	**2,683**	**2,676**	**-0.0%**	**2,960**
Liquid Bulk ('000 Tons)				
Crude Oil	1,685	2,512	1.2%	6,570
Refined Oil	2,871	2,264	-0.7%	4,531
LNG	-	1,994	-	-
Total	**4,556**	**6,770**	**1.2%**	**11,101**
General Cargo				
Non-containerised General Cargo	801	555	-1.1%	2,000

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
RoRo ('000 Vehicles)				
RoRo	33	24	-0.9%	84
Cruise				
Vessels	43	207	4.7%	

*Includes 79,812 TEUs that were re-stowed.

Containers

- There is adequate container capacity to handle the current and short-term projected container volumes under the condition that ECT is operational soon.
- A substantial share of JCT equipment is outdated and should be replaced in the short term, to avoid loss of container handling capacity.
- Phase 1 of the East Container Terminal development has been completed, adding 0.8 M TEU to the container handling capacity.
- 88% of gateway container volumes are estimated to be handled at Colombo port by 2050, due to the port's proximity to the consumer market.
- Under both the Base Case and High Case scenarios, all transhipment volumes are assumed to be handled at Colombo. However, a stronger transhipment market growth and stronger international competitive position of Colombo result in increased transhipment volumes under the High Case. As such, the North Port development is required to accommodate projected volumes under the High Case scenario, whereas the North Port development is not considered crucial under the Base Case scenario.

Dry Bulk

- Colombo shall not develop coal handling capacity, as no new coal fired power plants are foreseen and small coal volumes for the cement plants are handled at Trincomalee and Galle.
- Colombo port has ample grain storage and handling capacity in the short term. Having adequate capacity in Colombo is considered crucial, as Colombo is the largest consumption centre of the country.
- By 2050, an efficient transport corridor will have been set up between Colombo and Trincomalee, enabling low cost land transport of dry bulk from Trincomalee to the Colombo district. Due to the consequent shift of bulk cargoes from Colombo to Trincomalee, Colombo's grain capacity remains sufficient in the future.
- The Tokyo cement facility in Colombo is nearing maximum capacity considering the 2016 throughput and the estimated quay side capacity. Imports for the cement industry in Colombo mainly comprise finished cement.
- In contrast to many other commodities, a relatively high share of fertiliser volumes is destined for rural areas. As such, fertiliser does not have to be handled in Colombo and can be more adequately handled at other ports, such as Trincomalee for the northern and central regions and Hambantota for the southern regions.

Liquid Bulk

- Currently, Colombo has ample refined oil capacity based on both jetty and storage assessments for the Sapugaskanda refinery
- The Sapugaskanda facility needs either to be revamped or to be replaced by another facility. This will have serious consequences for storage and pipeline infrastructure.
- Colombo has enough capacity to handle future refined oils demand under the Base Case, should the refinery be revamped. However, facilities at the port should also be revamped in the future.

- The consultant envisions a new refinery to be developed north of Colombo. This refinery is to be constructed close to the main domestic consumption centre, but at distance from densely populated areas.
- The crude pumping and storage capacity in Colombo is sufficient to handle future demand as long as no plans for relocation arise. Once a new refinery is planned, a new pipeline connection with port facilities and or SBM buoys will have to be created.
- A gas power station is planned near Colombo using LNG as main supply. Similarly, a power station is planned at Hambantota using LNG as main supply. LNG handling facilities are required to accommodate LNG imports for the planned LNG power plant. Moreover, the LNG facilities at Colombo and Hambantota can also be used for supplying LNG to vessels in the future.
- Considering the assumptions posited above, it is assumed that 50% of LNG volumes will be handled at Hambantota port, and that the remaining 50% will be handled at Colombo.

General Cargo, RoRo & Cruise

- The current capacity of Colombo is sufficient to handle general cargo despite the fact that ECT and BQ will be used for different purposes than general cargo in the future, as a substantial proportion of general cargo will flow to other ports in the future.
- A substantial share of domestic vehicles is handled at Colombo port, due to the proximity to the end user market. Nearly all transhipment vehicles are handled at Hambantota port.
- 10% of gateway vehicles are assumed to be handled at Colombo port by 2050. This share is restricted by the port's lack of space.
- A new passenger terminal should be planned for, providing two additional berths due to increased cruise vessel demand. A multicriteria analysis has shown that the BQ quay could be a favourable location.

Other Port Functions

- The navy facilities at Colombo port lack sufficient (large) berths to accommodate new naval vessels. Hence, the facility may need to be relocated and or additional berths sought for. This could be at the existing port or at a new location.
- At Colombo, there is also need for one or more marina's. However, with Port City development it can be expected that the logical place for these marina's is Port City.

Observations Capacity & Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Colombo.

Table 5-1: Colombo - Port Issues

Category	Issue	Severity
Container Activities		
Infrastructure	CD -9.0m water depth is insufficient for large container vessels and therefore less suited for handling containers	High
Equipment	Investment in 2 mobile harbour cranes (newbuilt or second hand)	Low
Equipment	Three gantry cranes need to be upgraded and moved towards JCT terminal	Low
Operations	Terminal is underutilised for container vessels and often used for RoRo cargo Terminal can be used for general cargo more often	High
Logistics	Gate (with two in-lanes and two out-lanes) is sufficient	Low
Logistics	UCT has space available for warehousing when it is converted to General cargo berth	High
Infrastructure	Quay extension with 120 metres (currently, the planning phase is in progress)	High

Technical Assistance Consultant's Report

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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

(Financed by the Japan Fund for Poverty Reduction)

The National Port Directions – Volume 1 (Part 4)

Prepared by

Maritime & Transport Business Solutions B.V. (MTBS)

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For Sri Lanka Ports Authority

Asian Development Bank

Category	Issue	Severity
Equipment	Installation of 3 gantry cranes from UCT at JCT berths I-II	Medium
Equipment	Technical and financial assessment on the feeder cranes at JCT I-II	Medium
Equipment	Scrap/amortisation of old tractors and trailers	Medium
Equipment	Over a period of time, the RTG equipment fleet need to be upgraded when additional investment for new RTGs and/or replacement of RTGs is required	Medium
Operations	Truck flow direction should be changed back into a one-directional flow	High
Logistics	Expansion of the gate complex for import/export containers	High
Systems	Upgrade of the Terminal Operating System (TOS) to N4 version	High
Grain & Animal Feed Activities		
Infrastructure	Quay wall PVQ is deteriorated	Low
Infrastructure	CD -9.0m water depth is insufficient for large bulk carriers	High
Infrastructure	CGE Animal Feed quay warehouse is deteriorated (abandoned)	Medium
Equipment	Grain operations carried out with 2 suction cranes with substandard performance (240t/hr)	Low
Equipment	Animal feed operations carried out with an inefficient belt system to a newly developed warehouse (240 t/hr)	Low
Berth	Berth occupancy is too high, causing delays.	Medium
Cement		
Infrastructure	CD -11.0m water depth is insufficient for large bulk carriers	Low
Infrastructure	200m quay is insufficient for large bulk carriers	Low
Equipment	Discharge rate is substandard	Low
Berth	Berth occupancy is too high causing delays.	Medium
Fertilisers		
Equipment	Mobile equipment lacks efficiency	Low
Liquid Bulk		
Infrastructure	Maximum vessel LOA is insufficient to accommodate large liquid bulk vessels at Dolphin jetty	Medium
Infrastructure	Pipelines to refinery are outdated	Medium
Infrastructure	A connection between Kollonnawa tank farm and Muthurajawela tank farm should be created in future	Medium
Infrastructure	Sapugaskanda oil refinery outdated; needs to be revamped or demolished and newly built at more suitable location	High
Infrastructure	A LNG handling capacity for the envisioned Kerawalapitiya power plant should be planned for	High
Infrastructure	In case dolphin jetty is removed due to north port development new refined product jetties should be catered for	Medium
Warehousing Logistics		
Logistics	Inefficient use of gate infrastructure, due to a substantial number of manual handlings and lack of automation.	High

Category	Issue	Severity
Logistics	The complete logistic chain need to adapt a 24-hour operational scheme to better distribute truck arrivals	High
Infrastructure	Transit sheds are used as warehouses but are not adequately equipped to handle the MCC and LCL cargoes. Additionally, layout / spacing of the transit sheds is not suited for the current operations.	High
Operations	Operations are carried out through manual documentation.	Medium
Equipment	Equipment is outdated and in poor state.	Medium
Systems	There is a lack of an efficient automated warehousing system.	Medium
Environment		
Organisation	The organisation has no department which coordinates, monitors and controls environmental issues	High
Emission Measurements	SLPA has no emission measurement system installed, hence the actual emissions cannot be measured	High
Health and Safety	Occupational Health & Workers safety is very important but, safety guidelines are not adequately implemented, monitored and enforced. At the terminals no specific hats, jackets and shoes are being used. Several terminals can be regarded as unsafe as movement of personnel and heavy traffic often coincide.	High
Port equipment	The majority of SLPA equipment is diesel based. Hence the emissions from the organisation is subject to improvement.	High
IT systems on revenue stream		
General	Manual processes and paper based approvals cause high administration and time consumption	High
TOS	The TOS of JCT (Navis Sparcs 3.10 and Navis Express) are outdated and do not support modern yard utilisation, real time yard planning and web based applications, GPS and modern gate applications	High
TOS	TOS system to provide a dashboard management system with relevant management information (productivity and performances)	High
TOS	Ability to upload files and amend records within the permitted timeframe	High
TOS	System should be able for to bill activities directly on handlings and storage and share the invoice lines with the finance system.	High
TOS	Babplie files often have errors leading to communication, corrections by shipping agents	High
TOS/ harbourmaster	Berth planning system to be shared between container terminals and harbourmaster and linked to scheduling system of vessels on calendar planning	High
Gate automation	JCT has no gate automation, once TOS system is updated OCR gate systems become feasible (OCR and automated truck driver passes).	High
Damage control	Equipment Interchange Reports (EIR) are made manually. These reports lack photo's. Accident reports and claim handling is subject to become more efficient through OCR scanning.	Medium
Harbour master	Tug and pilotage recording and invoicing is subject to manual registration.	High
Harbour master	Ship registry, berth planning, mooring and de-mooring is not integrated with invoice recording. A Harbour Information Management System (HaMIS) is required integrating the ship registry file with actual ship history call records. The ship registry file is to be linked with the international ship file from IHS/Fairplay or Clarksons.	High

Category	Issue	Severity
Harbour master	HaMis system is lacking and planning on tugs and pilots including statistical data should be provided from HaMis to a management web based dashboard. Turnaround times to be integrated into the dashboard with information provided by the TOS systems (productivity & performances)	High
Warehouse	The warehouse LCL system is a manual driven process, no automation available (no barcodes scanning, no receipt alerts, no damage control systems, no track and trace)	High
Single window	There is no single data window for port users. Approvals in the information chain are based on manual procedures and stamped documents. Communication in the process consists of several rounds via phones and even by fax. System should share specific and allowed data between terminal operators and management information systems	High
Single window	Publications on procedures, rules and practices	High
Legal	Contract management system with alerts should be linked with TOS to respond effectively on disputes	Medium
Payment control	Systems to be linked with unrestricted Payment Gateway and Pay online and submit digital receipts.	Medium
IT systems on costs stream		
CRM	A Customer Relation Management system is lacking.	High
Manual document management	The manual document management system should be digitalised to avoid business based on hard copies.	High
Shift planning & rostering	Shift planning and rostering is done on a manual basis whilst services have to offered 24/7 optimisation is required in this respect.	Medium
WIFI networks	WIFI networks are lacking at various locations	High
Cable internet	Cable internet is often not reliable causing file transfer to fail	High
Customs		
IT	Asycuda World is able to handle E-declaration and uses HS classification codes for all commodities	Low
IT	They apply a Single Administrative Document (SAD) comparable to many developed countries	Low
IT	Asycuda World is able to handle electronic payments, yet the business is often still cash based	High
IT	Too limited consignees and shippers use the ability to do electronic declarations.	High
IT	Electronic clearance is not yet integrated in a Customs single window despite using the SAD	High
Gatepass	The Gatepass procedure is a manually intensive procedure which also involves wharf clerks to run around the trucks at main gate (safety issue). The original gatepass, the sealing and the issue of a new gatepass in all is rather a time consuming procedure.	High
Gate efficiency	The Main gate handles about 1 container each two to three minutes.	High
Logistics	High traffic queues of over 5 km are present at several days in the week. Next to manual procedures at the Main gate also the congestion in the city and in front of the inspections yards is causing this queue. Often the queue in front of the inspection area is all the way, from South Port to Grayline II.	High
Logistics	Inspection areas are scattered over several sites, often not easy accessible due to traffic. The scattered locations cause sub-optimal use of resources and planning. Customs is not	High

Category	Issue	Severity
	able to control the truck flow as consignees themselves plan the truck move to the inspection areas.	
Green line	A few shippers and consignees have been appointed to the green line which allows the container to pass directly without standard checks. Unfortunately, only a small part of the full container loads gets the green line label, resulting in many inspections still today.	High
Inspection	The total capacity on inspection is limited to about 1,000 containers per day.	High
Scanning	Customs likes to implement 100% scanning (today about 70%). Scanning would increase the daily capacity of inspecting containers which is today limited to about 1,000 Containers per day. Today the scanning at the port is limited by only two mobile scanning trucks	High
Detention	Customs has own detention areas near the inspection sites. Also, in the port there are warehouses with goods under detention. The issue is here that these goods are not moved our frequently. Sometimes as auction are planned. The storage space in the port occupied by is Customs is for them free of charge. This space is however very valuable for the port and should be cleared if possible.	High

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Colombo:

SP1. **JCT Modernisation Plan –** A modernisation plan must be developed for JCT, to enable the terminal to continue performing container handling operations safely and reliably over the coming years, after which the container activities are to be phased out from the JCT location.

SP2. **Dedicated berth for grains and cement –** The dedicated berth can solve immediate sea side operations bottle necks and the accompanying depth issues.

SP3. **PVQ Upgrade Plan –** To handle bigger vessel dredging works might dredging if possible is needed.

SP4. **Sapugaskanda oil refinery -** Sapugaskanda oil refinery is in poor state and operates near densely populated areas. As such, the oil refinery may need to be revamped and/or relocated.

SP5. **LNG Storage Facility -** An LNG handling and storage facility is to be developed, to serve the envisioned Kerawalapitya LNG power plant and enable LNG bunkering activities in the port. A floating LNG storage vessel with regassification units on board is recommended. Such a solution would reduce the need for LNG related structures ashore. The pipeline connection to the powerplant should take into consideration the future location of North Port.

SP6. **UCT Transformation Plan –** A plan should be developed to guide the transformation of UCT towards a general cargo facility, as it is expected that container activities will be phased out in the short term (2020).

SP7. **An adequate passenger terminal**, with adequate berthing space and a modern passenger building, is to be developed. The preferred location for this development is on the BQ (once the CFS activities have been relocated to the South Harbour). An adequate facility will also enable an efficient passenger arrival process.

SP8. **Port Gate Upgrade Plan**, including an expansion of the current main gate from 3 in-lanes and 3 out-lanes to 5 in-lanes and 5 out-lanes, and a new gate complex that directly connects the South Harbour to the PAEH.

SP9. **BQ Warehousing Relocation Plan –** Current Warehouses on BQ need to be relocated to ensure continuation of operations. Additionally, new equipment needs to be procured and a modern Warehouse Management System needs to be adopted.

SP10. **Mechanical and electric workshops. –** Due to the PAEH project, a number of buildings need to be relocated.

SP11. **The resettlement of underutilised buildings**

SP12. **Widening of the port access road -** Port road should be widened to a 6-lane road. In case the PAEH, which will run above the port road, hampers widening of the port road at a later stage, the widening should be carried out before the PAEH is completed.

SP13. **Port Gate Automation –** Automation of the gate process is an absolute necessity when dealing to achieve port efficiency and alleviation of congestion.

SP14. **PAEH Simulations –** Traffic simulations are required to help shape the design characteristics of the PAEH.

SP15. **PAEH Development -** Development should proceed as planned by RDA, with SLPA input on construction issues, ramp locations, and gates locations.

SP16. **Securing Future Rail Development Path –** A path for optional future rail development towards south port should be secured.

SP17. **Port Community System –** Port Community System to help data exchange and paperless environment in the port.

SP18. **North Port development –** A feasibility study on North Port development is required including the impacts on the Kelani river outlet.

Colombo Port development plan

In this document the information that follows is an abstract from the Port Colombo Development Plan, which can be assessed for more detailed information.
The table below summarizes the capacity requirements for each of the commodity groups, taking into consideration the forecasted demand and planned short-term capacity increases/decreases.

Table 5-2 Capacity Development Requirement Colombo

Commodity	Capacity Development Requirement
Containers	**2025** – By 2025, 883m of additional quay is required. **2030** – By 2030, 1,735m of additional quay is required, including the 883m that is required by 2025. **2050 –** By 2050, 8,075m of additional quay is required, including the 1,735m that is required by 2030
Dry Bulk	**2025 –** In the immediate future, cement operations need a dedicated berth with a depth of 13.5m, to accommodate a design vessel with a draft of 12.5m. **2030 & 2050 –** Stabilisation of demand, no additional capacity needed.
Liquid Bulk	**2025** – LNG handling and storage facilities are required immediately to avoid operational delays of the new gas-fired power plant. Additionally, new refining capacity is required and the old pipelines need to be renewed. **2030** – Possible relocation of the dolphin jetty, in case of North Port construction and operations. **2050 –** No additional capacity requirements.
General Cargo	**2025 –** Development of JCT berth 1 for general cargo. **2030 –** Dedicated multipurpose terminal to handle general cargo and RoRo. **2050 –** No additional capacity needed.
RoRo	**2025 –** UCT needs to be transformed into a dedicated general cargo and RoRo facility. **2030 –** Dedicated multipurpose terminal to handle general cargo and RoRo. **2050 –** No additional capacity needed.

In order to meet the future Base Case capacity demand, the following two port layouts have been developed:

- South Port Max – The South Port Max design is based on the SLPA concept of the current South harbour basin development. The "South Port Max" concept incorporates this design with a wave protection on the north side of the port. This wave protection can be expanded to a break water if expansion of the port area is needed. This concept includes the extension of the current south port break water. In contrast to SLPA concepts, the envisaged West Container Terminal I and West Container Terminal II should have a quay length of 1,400 m, in order to enable accommodation of 3 mega vessels simultaneously.
- North Port Large – The North Port Large option creates the necessary space through a design that is based on the original SLPA North Port concept. Besides meeting cargo capacity demand, the development option will offer sufficient space for logistics development near the quay side. As the western breakwater is not extended, the angle of the northern breakwater is adjusted to bring it in line with the western breakwater. An underwater guide pier should direct sedimentation from the river estuary further to the north.

The figures below visualise the two long term development layouts.

Figure 5-2 Colombo Long Term Design - South Port Max

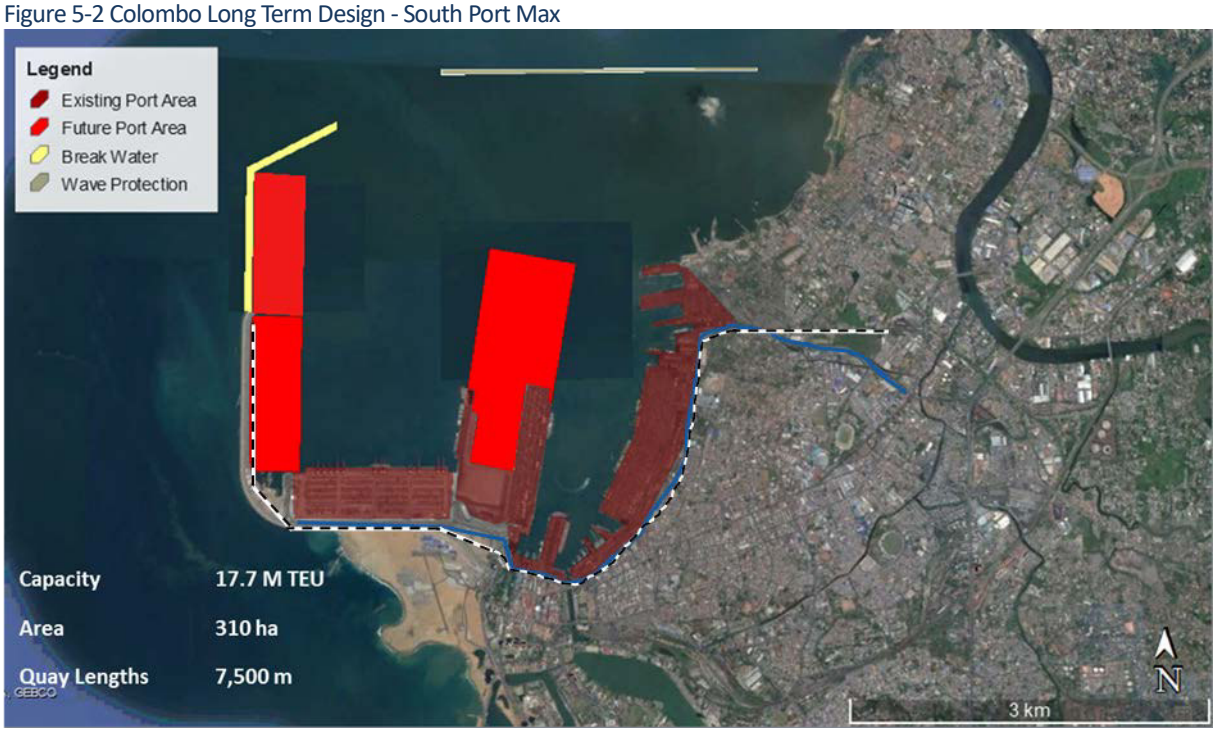
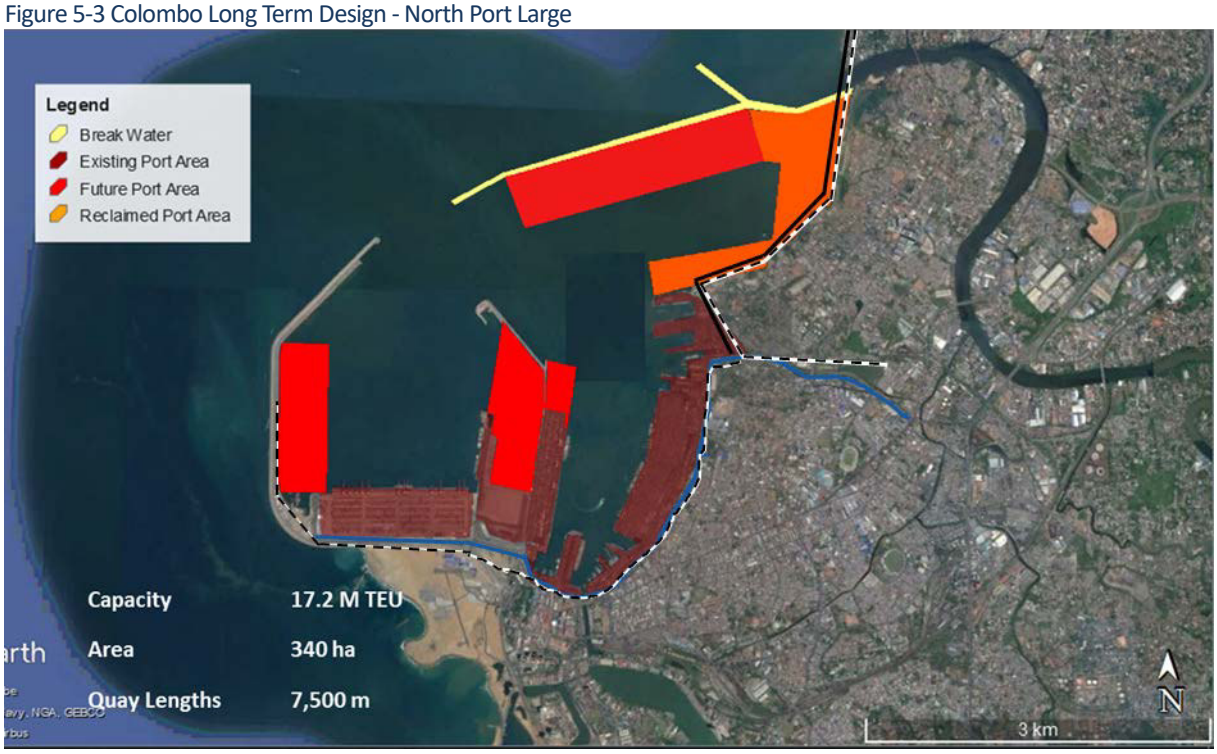


Figure 5-3 Colombo Long Term Design - North Port Large



In order to identify the preferred development option, a multi criteria analysis has been carried out. The table below summarizes the scores of the two development options; based on these scores, the South Port Max design is selected as the preferred long term development plan for Colombo Port.

Category	Score South Port Max	Score North Port Large
Capacity creation	**0.9**	0.6
Development flexibility	**2.2**	0.4
Terminal & port aspects	0.6	**1.4**
Manoeuvrability	**1.3**	0.7
Social & environmental impact	**1.4**	0.6
Final Score (weighted average)	**6.4**	**3.7**

In order to develop the port in line with increasing demand, a phased approach has been adopted towards the final 2050 South Port Max design. Specifically, additional layouts have been prepared for the short term (2025) and the medium term (2030). These two intermediate phases are visualised in the figure below.

Figure 5-4 Colombo South Port Max Phasing - 2025 (Left) and 2030

Potential of North Port development

South Port Max layout is based on the base case scenario in 2050 in the cargo forecast. North Port development is required only when unforeseen developments needs (or high case situation) emerge in the future. North Port development requires comprehensive technical and operational considerations, including vessel manoeuvring, water calmness in the basins, siltation, sand drift, flood- and river flows to determine its alignment (angle with the coast line) and layout. Some potential development options are preliminary assessed; these options are presented in the table below. Each option has its characteristics and of which pro and cons needs to be assessed during detailed studies.

Category	Assessment & Discussion Design		
	Energy Hub Concept	JICA Recommendation	SLPA Concept
			

Category	Assessment & Discussion Design		
Terminal & Ports Aspects	Aims at energy hub (liquid bulk) combined with containers, general cargo, RoRo and logistics	Aims at liquid bulk, containers, multi purpose and logistics through an island development	Aims at containers and liquid bulk with less space for logistics
Special feature	Energy hub can be developed as a standalone island in early phases. Bridge towards the North	Island with bridges towards North and South. Island can be developed with or without expanding south port	Bridge towards the North

5.3 Port of Trincomalee port directions

Trincomalee has development potential due to its key strength of a protected natural bay with deep waters. It is the place of choice for bulk goods servicing the energy and production sector with a focus on the Bay of Bengal.

Trincomalee is a natural deep water port in eastern part of Sri Lanka. It is therefore ultimately well positioned to handle dry bulk cargoes for the country. Especially in connection to the planned corridor development and rail connections the port can emerge as important dry bulk and general cargo port. The establishment of a refinery and power stations would create an additional node in Sri Lankan industrial development.

Several key developments impact the success of the port of Trincomalee, among the most import is the development of the Colombo – Trincomalee corridor to ensure hinterland access to the port. Linked to that is the railway connection to the hinterland to ensure access and distribution of bulk goods to country. For Trincomalee to attract industries of its own, substantial effort should be placed in targeting investors in specific markets.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Trincomalee followed by the main conclusions and recommendations leading to priority projects.

Figure 5-5: Trincomalee Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	-	112	-	
Transhipment	-	-	-	
Total	-	112	-	-
Dry Bulk ('000 Tons)				
Coal	103	120	0.5%	347
Wheat / Maize / Corn	867	1,709	2.0%	1,161
Cement / Clinker / Gypsum	1,712	3,113	1.8%	2,200

Fertiliser	-	1,536	-	-
Biomass	-	500	-	-
Ilmenite	-	700	-	-
Total	**2,682**	**7,678**	**3.1%**	**3,708**
Liquid Bulk ('000 Tons)				
Crude Oil	-	-	-	-
Refined Oil	238	1,358	5.3%	10,692
LNG	-	-	-	-
Total	**238**	**1,358**	**5.3%**	**10,692**
General Cargo				
Non-containerised General Cargo	-	832	-	-
RoRo ('000 Vehicles)				
RoRo	-	-	-	-
Cruise				
Vessels	No data	21	-	-

Containers

- Trincomalee will attract some container traffic for its captive hinterland.

Dry Bulk

- Substantial dry bulk handling capacity needs to be developed in Trincomalee, to accommodate the growing demand of existing and new dry bulk commodities.
- Trincomalee is the preferred location for a larger bulk facility with deep draft, due to the available space and natural deep waters assuming an efficient transport corridor to the western part of the country.
- In 2050, 75% of the wheat, maize, and corn volumes will be handled at Trincomalee; the remaining volumes will be handled in Colombo (15%) and Hambantota (10%). In order to accommodate the growing demand in grains, additional handling capacity will be required in Trincomalee.
- The Tokyo cement facility in Colombo is nearing maximum capacity, considering the 2016 throughput and the quay side estimated capacity.
- The TTA & Ashroff facility has a limited clinker handling capacity. Initially, new equipment is required to boost capacity; a further expansion of capacity can be achieved by expansion of the Ashroff jetty.
- Biomass is a new dry bulk commodity which may increase to 0.5 million tons per annum. The biomass pellets are stored in silos near the quay and transported through a belt system towards the quay.
- Ilmenite is a mineral of which 0.7 million ton will be exported as dry bulk; handling of this commodity will also require a belt system.
- The berths at the Ashroff quay should also accommodate the fertiliser trade once a fertiliser production facility is constructed.
- The above commodities will require that the Ashroff quay is expanded to facilitate the existing and new trades.

Liquid Bulk

- At the Lanka IOC facility, nearly three quarters of the storage tanks are unused; if these tanks are rehabilitated, total storage capacity can be boosted to approximately 10 million tons per annum. However, a new deep sea quay will be required to accommodate larger vessels.
- Trincomalee will have a larger share of refined oil imports in the future, due to the possible expansion of Lanka IOC facilities in the short term and the available space for long term expansion in Trincomalee.
- If Hambantota is not developed, Trincomalee would be a natural candidate for possible LNG power plants and the accompanying port infrastructure.

General Cargo, RoRo & Cruise

- Trincomalee is a prime destination for general cargo with its deep berth and future connectivity to the west.
- The Ashroff jetty needs to be expanded to accommodate projected growing volumes.
- No RoRo volumes are foreseen for the port of Trincomalee.
- Trincomalee does not have cruise facilities. Today, cruise vessels occasionally moor at the Ashroff quay. In the future, a cruise berth should be planned for, preferably near the city centre.

Other Port Functions

- Trincomalee does not have a marina yet. The location is expected to develop tourism and a marina should be planned for, preferably near the city centre.
- At Trincomalee a naval base exists. Improvements on the naval base are expected during the forecast period.

Observations Capacity & Efficiencies

The table below provides an overview of key issues and constraints that hamper capacity and efficient operations in the port of Trincomalee.

Table 5-3: Trincomalee - Port Issues

Category	Issue	Severity
Mud Cove		
Operations	Quay wall is in a deteriorated state	Low
Operations	Berthing space is constrained	Low
Operations	Slipway is not functional	Low
Operations	Mud cove is not conveniently situated for service jetties, as employees have to travel between Mud cove and Ashroff jetty.	Medium
Connectivity	Low quality access road	Medium
Operations	No Equipment	High
TTA & Ashroff		
Equipment	Belt systems required for new commodities such as Biomass and Ilmenite	High
Operations	There is a sunk barge in front of the TTA facility	Low
Connectivity	TTA quay wall is damaged / in a deteriorated state	Low
Connectivity	TTA quay wall has un-sufficient water depth for service crafts and tug boats	Low
Operations	Coal operations is cumbersome, from quay into container onto rail and truck	High

Category	Issue	Severity
Operations	Gypsum operations is dusty activity as hoppers are not designed for it.	
Operations	No equipment available (everything is with ship's gear) except for hoppers to handle the coal	High
Operations	Causeway to Ashroff Jetty results in inefficient operations	High
Connectivity	Low quality access road including road access to the Ashroff jetty	High
Operations	Ashroff jetty is not capable to receive mini-Capes or Capesize vessels due to length (250m) and depth constraints (-12.5m).	High
Operations	Gate configuration is poor	High
Operations	Limited flat land near the Ashroff jetty for operations and storage	High
Tokyo Cement		
Capacity	Production capacity from 1.8 M tons today to 2.8 M tons.	Low
Operations	The facility is only capable to receive small Handysize cement bulk carriers due to limited water depth but dredging works are underway to increase depths.	Low
Prima Flour		
Operations	The Flour mill is a modern complex with state of the art discharge facilities.	Low
Operations	To widen the access to the flour mill for trucks, land excavation works are under progress	Low
Lanka IOC		
Operations	Deep-water oil jetty necessary to handle increasing demand	High
General		
IT	No computer system for port operations management, ship cargo management and invoicing are manual processes	High
IT	Manual pro-forma invoices are generated, communication mainly by fax.	High
IT	Purchasing & Expense vouchering is manually based	High
IT	Many items are still cash based such as port permits, vehicle permits, handling fees	
IT	Paper Dependent Transaction Recording System (Documents are filled by hand, hard copy based, and require signatures) leading to mistakes, slow decision channels and missing documents.	High
IT	There is no planning system and /or MIS system which tracks; (berth) availability, reservations, space, scheduling of pilots, tugs and to publish information on productivity & performance.	High
Zoning	Encroachment of SLPA Lands	High
Connectivity	Port connection roads are partially unpaved and have limited capacity	High
Connectivity	No rail connection to SLPA facilities yet	High
Zoning	There is no overarching land use plan for the SLPA lands in Trincomalee	High
Navigation	Night time operations are not possible due to missing navigational aids	High

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Trincomalee:

SP1. **Ashroff Jetty Upgrade Phase 1 -** A belt system is needed to reduce inefficiencies of trucking to the Ashroff Jetty and to accommodate future cargoes. Land reclamation, the extension of the quay, new road development, new equipment amongst other should be included in the plans.

SP2. **Navigation Aids** - For night time navigation the ports needs lights, buoys and lighthouses to ensure safety. Maintenance can be outsourced to private parties. SLPA will be remunerated for these costs by increased traffic to the port for which it will receive port dues.

SP3. **Port Access Road Development** - A road connection starting from A15 near Lanka IOC heading North West will make it possible for port traffic to bypass the city traffic to A6.

SP4. **Rehabilitation and Extension of the Rail Connection** to the Ashroff Jetty

SP5. Make **promotional plan** on land and connectivity for newly assigned industrial and logistics.

SP6. **SLPA Land Use Plan** - The Trincomalee Port Zoning Report is a step in identifying the ports future needs to continue to think about which lands are lands need to be uninhabited for port development. A displacement plan, set-up years in advance will ensure a smooth process.

Trincomalee development plan

In this document the information that follows is an abstract from the Trincomalee Port Development, which can be assessed for more detailed information.

5.3.1 Ashroff Jetty

SLPA land plot FVP 17 which currently includes the TTA warehouses is ideally located near the Ashroff Jetty, making it suitable for storage and terminal area. The railway expansion from China Bay station is a necessity in order accommodate dry bulk transport to the Sri Lankan hinterland.

The proposed expansion of the Ashroff Jetty follows twee phases, adding two berths. The proposed shape is different from the SLPA development plans as it follows the natural depth of the water on the eastern side and tries to limit quay construction in shallow waters on the western side.

The following activities can take place at the Ashroff Jetty:

- Coal storage (import);
- Clinker (imports and ship-to-ship transfer);
- Ilmenite & Biomass export processing.

The prime purpose of the Ashroff Jetty should be coal, initially coal destined to the power plant in Puttalam and possibly elsewhere in the country in case of new coal fired power plants. A conveyor belt system to the stock pile is needed, after which coal is loaded on train wagons.

The current hilly road is being replaced by SLPA. Some land reclamation will increase the area available for cargo activities. The current TTA facility is in bad shape and should be replaced. Any office should preferably be centralised in a high rise building to maximise land use as it is prime port development area.

Figure 5-6: Expansion Ashroff, Railway and TTA

A	Phase 1 Ashroff Jetty expansion	F	Possible location coal stock pile
B	Phase 2 Ashroff Jetty expansion	G	SLPA land plot FVP 17
C	100m service jetty for tug boats	H	Rail expansion from China Bay station to Ashroff
D	Land reclamation	I	New road development
E	Service pier (-3m CD)		

5.3.2 Deep-water Oil Jetty

Lanka IOC operates 16 fuel storage tanks for Gasoil, Diesel, IFO and water. It handles the imports and exports through one jetty and is facing marine loading/discharging constraints with high berth occupancy rates.

The company currently sees a steep increase in demand for bunkering fuels for vessels on the east-west trade. Additionally, the refined oils demand which include fuels are set to increase in Sri Lanka with the tank farm in Trincomalee being a prime distribution location. The government designated 10 extra tanks to Lanka IOC, and 10 to a JV set to develop in the future. These tanks are assigned from the 99 storage tanks available. Reportedly, the majority of the storage tanks are in reasonable condition. The current bottlenecks are in the pipelines to connect them.

Due to the water depth constraint at Trincomalee jetty 3 (CD -11.5 m) the facility can handle small tankers up to 45,000 DWT. Larger vessels are currently sailing to Colombo and Trincomalee is then opted as secondary discharge port. A new deep-water jetty could accommodate large mainline vessels of 50,000 to 80,000 DWT. This would enhance the economies of scale and have a positive effect on the purchase price of fuels in the nation.

The Jetty

Characteristics of the new jetty:

- Deep-water jetty of CD -18 m[12];
- Able to handle 80,000 DWT mainline vessels;
- Open jetty construction with service people walking about the jetty;
- Location at the end of prima flour;
- Maybe emergency response vehicles should be able to cross the jetty; then a regular steel construction is not sufficient;
- Pipelines exposed above ground to enable regular environmental checks and maintenance.

Figure 5-7: Deep-water Oil Jetty

5.3.3 Ship Lay-up

The deep-water Trincomalee bay offers enough area for ship lay-up if SLPA deems the business case positive.

The term 'ships laid-up' means ships which are temporarily idle due to lack of cargo or which are temporarily phased out of commercial operations. Ships are laid-up when freight rates are not sufficient to cover the running costs. During times of economic crisis, laying-up is often preferred to the sale of the ship.

Within the vessel operating market, we can distinguish two types of lay-up:

- Hot laying up
- Cold laying up

[12] It should be noted that in the proposed location about CD -18m water depth is available. The waterdepth required for a 80,000 DWT vessels would be around 15m.

During 'hot laying-up' a ship is idle but can be brought back into service at short notice. 'Cold laying-up' means that the ship is taken out of service due to lack of business and is moored or anchored at a safe place waiting for new business.

In lay-up the shipowner removes the normal crew and the ship is only manned by safety guards. In this way, the shipowner is able to reduce its cost and waits till market demand picks up again.

The above description indicates that the lay-up business is cyclical and also marginal in terms for what a port authority can ask for sheltering the ship at its anchor grounds.

There are also other lay-up reasons, different than low freight rates. Ships can be put into laid-up in case major repairs have to be carried out or that the ship is "arrested by law" or is under sale or waited to be scrapped. The following locations are identified where ships may be laid-up.

Figure 5-8: Locations for Ship Lay-up

Indicative areas in the picture from left to right-above:

Area 1: Near Clappenburg, large 13 ha[13].
Area 2: Between Clappenburg bay and Sobar island, large 10.4 ha.
Area 3: Opposite Clappenburg bay, large 10.5 ha.
Area 4: Town bay, large 31.3 ha.
Area 5: Powder bay, large 25.9ha.

5.3.4 Connectivity

The existing railway line currently reaches the private facilities of Prima Flour and Tokyo Cement heading west. The expansion of the railway to Ashroff Jetty is essential for smooth operations at the jetty. The shunting yard next to the port needs expansion space as well, if possible.

The port is connected by road to the east coast of Sri Lanka through the A15 and heart of the country in the direction of Colombo through the A6. Currently, the area west of the port lacks sufficient connection for it to be developed. A connection starting from A15 near Lanka IOC heading north west will make it possible for port traffic to bypass the city traffic to A6. The land between road and rail can be used for industrial development.

Figure 5-9: Connectivity Trincomalee Port

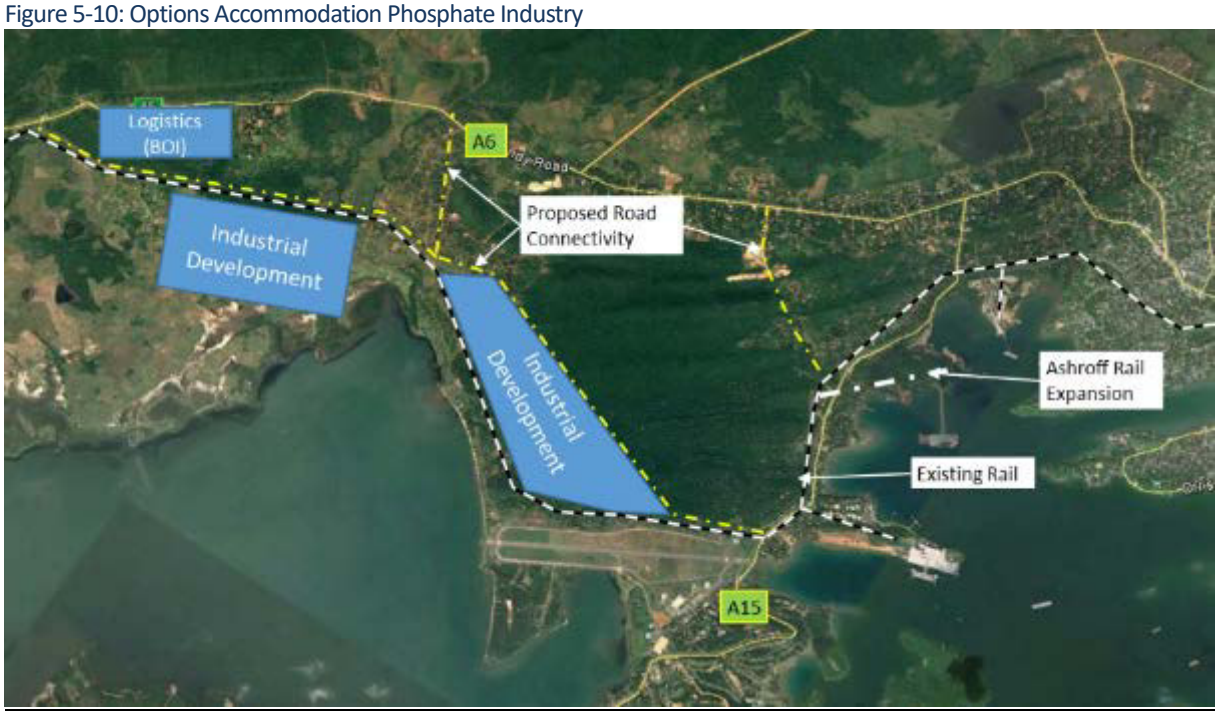
5.3.5 Industrial Development & Logistics

Currently, BOI has designated land for the development of logistics in Trincomalee. Some local companies have settled at this area. SLPA has two potential areas of both in this picture of 160 ha to be designated to either logistics and more probably large-scale industries. The road connectivity will ensure good access to the areas.

A prime user might be the fertiliser industry. The fertiliser manufacturer needs the port in its proximity to minimise transportation costs to produce the 1.8 M tons of fertiliser when fully operational. The facility is expected to import phosphate and sulphur.

[13] In case a LNG terminal is constructed this site will no longer be suited for anchorage

Figure 5-10: Options Accommodation Phosphate Industry



5.3.6 Other Long Term projects

Several projects have been identified for the long term, as sufficient demand arise for the project materialize. As such reservations have been made for the following developments.

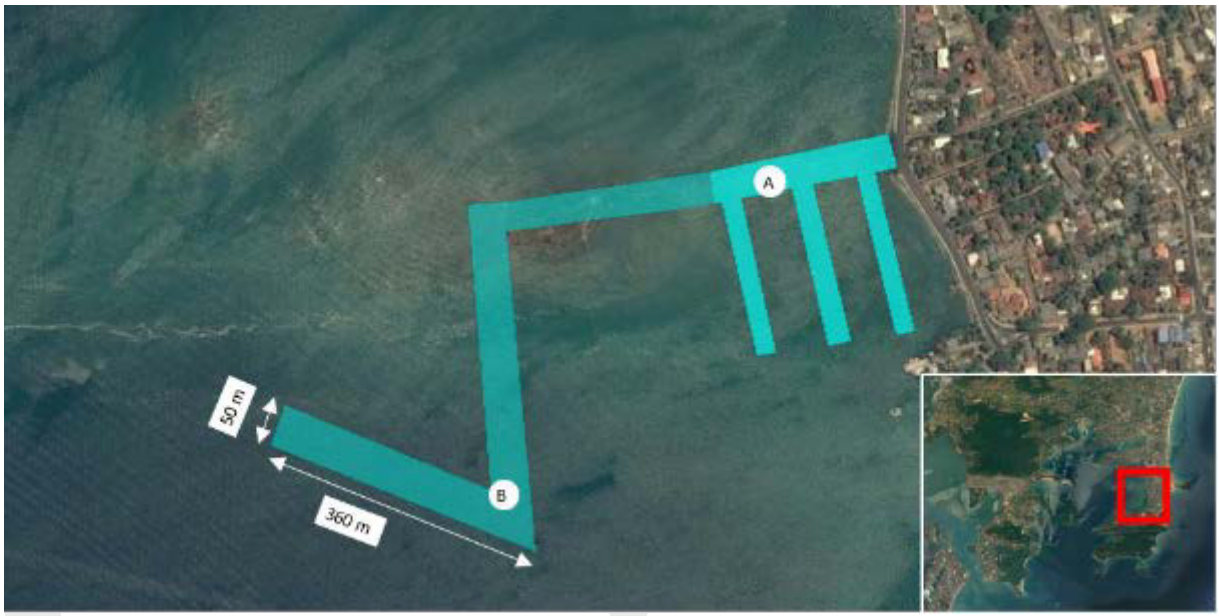
- Development of Cruise facilities and Marina in front of Trincomalee City
- LNG Floating terminal location
- Sampur area development for energy supply and marine requirements
- Dockyards, shipmaintenance and repair
- Container terminal developments

Cruise Berth & Marina

The image below provides a possible design for a marina and cruise berth at the city of Trincomalee. The marina would be developed as phase 1 of the design. If enough demand arises based on market interest, the cruise berth could follow.

The berth provides just enough space for busses to pass and to turn. The shape is designed to locate the 360-m south berth along a stretch of a natural 10 m deep water spot. Dredging it to 11 metres would allow the accommodation of the largest cruise ships currently in operation. Smaller vessels can be accommodated on the East side. The area northeast along the connectivity pier would be suitable for a marina to concentrate touristic development.

Figure 5-11: Cruise Berth & Marina Concept



A	Phase 1 Marina	B	Phase 2 Cruise Berth

LNG Hub Terminal Floating Storage

Floating storage and regassification of LNG can be realised on a jetty near Clappenburg Island. This design minimises the cost, as no land development for tanks are needed. The facility can supply a power station and industry by gas pipelines. Ships of LOA up to 350 m with draught of 12 m need to discharge and load at the hub terminal. This often reaches depths up to 16 metres. The floating storage can be specifically used for the gas supply to a power station and for bunkering services to vessels and or for supplying industries with energy through gas. LNG has an important safety aspect and hence the region should stay clear of housing and other human activities.

The LNG terminal could also have a land-based storage area for gas tanks to match the storage supply with the power station demands in case this is beyond the vessel capacity. A common LNG land-based terminal which has for example three tanks (full containment tanks) with a net useable capacity of 180,000m³ each would require a terrain of approximately 42 hectares[14]. This is based on the LNG Gate terminal in the Port of Rotterdam which acts as supplier for the local gas networks, the LNG supply from/to seagoing ships, the LNG supply to inland vessels and bunkering, and the supply of LNG to road trucks.

[14] Based on the example of Rotterdam LNG Gate terminal of which specifications are provided in the annex

Figure 5-12: Options Accommodation LNG Hub Terminal

Sampur Area Energy Development

Several plans for development of energy plants for the Sampur area have been considered by the government. The two proposed coal plants have been cancelled by the government. No definitive decision has been taken yet as the energy development at Sampur. The possibilities include but are not limited to:

- An LPG fired power plant;
- A coal fired power plant;
- Solar panels.

Obviously, in case of a solar farm no marine side facilities are required, but in the former two cases, SLPA can provide facilities.

LPG (Option A)

To supply LPG the gas powered station an LNG jetty is projected in the bay close to the power plant. The jetty should have a length of 280 m and a depth of CD -14 m. This is sufficient to handle 80,000 cbm design vessels. The connection to the power plants would be through pipelines. A jetty in Sampur area will however be prone to possible high swells during the north easterly monsoon. Alternatively, a jetty can be constructed in the port of Trincomalee and then connected by pipeline. This would provide sheltered mooring. It can also be supplied by a FPSO, a floating storage unit for LNG with a re-gasification unit onboard. The later is described under a separate paragraph. The location and type of the jetty (Gas or LNG) and the pipeline connection paths are fundamental issues which shall be assessed when the location of the gas power station has been appointed.

Coal (Option B)

Figure 5-13 depicts possible locations of the plant and the jetty necessary to accommodate the dry bulk vessels. The jetty has a length of 400 m with a depth of CD -20m. It is to be noted that for 4 to 5 months a year the jetty cannot be used due to the Monsoon. Sampur cannot function as a coal hub for the entire country because there are no rail lines connecting it to the hinterland and the high cost component to construct one. The most efficient option would be to ship the approximate 2 M tons of coal annually needed for a 1000 MW

energy plant directly to Sampur. The rest of the coal would flow through the Ashroff Jetty by rail further inland to cement factories.

Figure 5-13: Sampur Coal Plant & Jetty

Dock Yard facilities development

The dock yard in Mud Cove can be expanded as presented in Figure 5-14. These options can only be developed if private initiatives see market potential. SLPA would then be responsible for the road connection to the facility. SLPA service vessels are to remain at the Ashroff jetty due to the distance between these facilities.

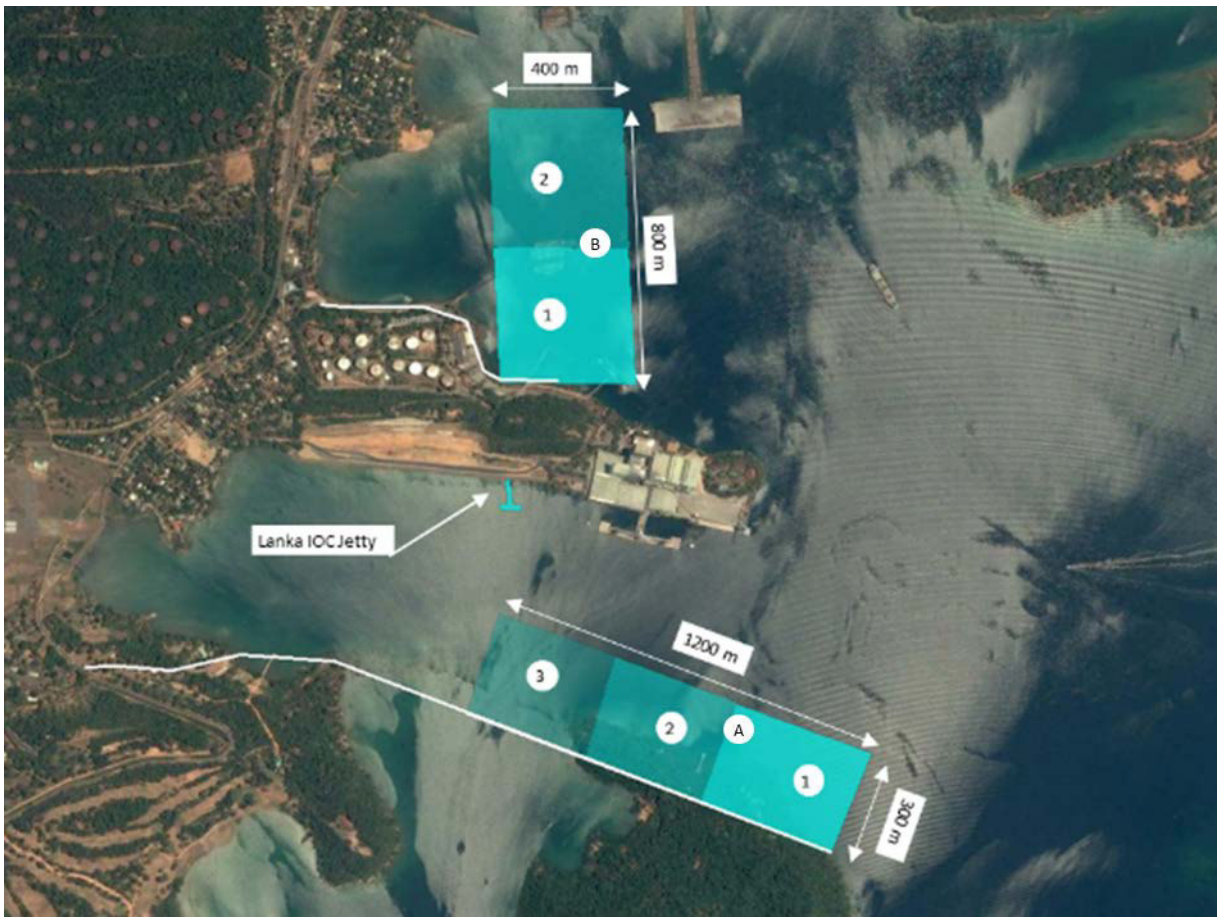
Figure 5-14: Options Accommodation Dock Yard

Container Terminal

The demand for containers in Trincomalee is still highly uncertain; the initial demand can be handled at Ashroff Jetty. In case a dedicated terminal is needed, the first option (A) would be to construct it in three phases on Sobar Island. This design will need a bridge to cross to the island for connectivity.

The second option (B) would be to construct a terminal in two phases between Lanka IOC and the Ashroff Jetty. The Lanka IOC jetty should then be replaced.

Figure 5-15: Two Options Accommodation Container Terminal



5.4 Port of Hambantota port directions

> Hambantota has ample industrial areas and combined with deep-water, the port is ideally suited for large voluminous products such as liquid bulk, cars, project cargoes and containers. It will act as anchor project for heavy and medium manufacturing industries port bounded industries which are not suitable for the heavy urbanised areas like the Western Province.

It is expected that Hambantota will encompass a bunker hub for vessels and emerge as an industrial port for Sri Lanka. The industrial value added activities can lead to economic gains to the region, and Sri Lanka as a whole, if Sri Lankan labour will be trained and employed in the facilities.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Hambantota followed by the main conclusions in part B.

Table 5-4 Hambantota Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	-	336	-	-
Transhipment	-	-	-	-
Total	**-**	**336**	**-**	**3,116**
Dry Bulk ('000 Tons)				
Coal	-	-	-	-
Wheat / Maize / Corn	-	228	-	-
Cement / Clinker / Gypsum	-	1,556	-	-
Fertiliser	-	-	-	-
Biomass	-	-	-	-
Ilmenite	-	-	-	-
Total	**-**	**1,784**	**-**	**-**
Liquid Bulk ('000 Tons)				
Crude Oil	-	5,007		-
Refined Oil	21	905	11.7%	-
LNG	-	1,994	-	-
Total	**21**	**7,906**	**19.1%**	**-**
General Cargo				
Non-containerised General Cargo	399	1,054	2.9%	750
RoRo ('000 Vehicles)				
RoRo	182	434	2.6%	515
Cruise				
Vessels	No data	10	-	-

Containers

- 9% of gateway containers in 2050 are assumed to be handled at Hambantota, due to the port's envisioned large-scale industrial and logistics zones and its proximity to main trade routes.
- The Hambantota expansion plans are not considered extensively due to the uncertainty of development and the fact that it is not under SLPA control.
- The current Phase II container terminal is sufficient to handle projected demand.

Dry Bulk

- Some cement volumes are foreseen for the port of Hambantota, in order to facilitate the region's envisioned future development.
- Hambantota may develop as agribulk distribution centre for South East Asia requiring berthing for large dry bulk vessels and silo's or dome-warehouses.

Liquid Bulk

- In the Base Case, industrial development in Hambantota will attract 20% of refined oil imports for further processing.
- It is assumed that 50% of LNG volumes will be handled at Hambantota port, and that the remaining 50% will be handled at Colombo.
- It is envisaged that a new refinery will be developed in Hambantota by 2025. In order to supply the refinery with crude oil inputs, substantial crude oil imports are expected in Hambantota in the medium to long term.

General Cargo, RoRo & Cruise

- By 2050, it is expected that Hambantota will handle 38% of non-containerised general cargo.
- 90% of gateway vehicles and 100% of transhipment vehicles are expected to be handled in Hambantota in the future, due to the ample available space and the highway connection to Colombo. Current handling capacity in the port is sufficient to accommodate the estimated growing demand over the forecasting period. However, it is noted that some of the space that is currently used towards vehicle storage may be used for other purposes in the future.
- Hambantota serves as a way port for Colombo for cruise vessels. No dedicated facilities are needed.

Other Port Functions

- At Hambantota, a marina is expected to be developed.
- A new naval base could be established in the port.
- A new sugar plant is projected
- A grain terminal is projected

Observations Capacity & Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Hambantota.

Table 5-5: Hambantota - Port Issues

Category	Issue	Severity
Institutional Setting		
Structuring	There is no clear institutional structuring, hampering a swift start of operations of the container terminal	High

Category	Issue	Severity
Infrastructure	Container yards and feeder yards are not at same ground level, increasing operational constraints	Medium
Equipment	For the container terminal panamax cranes have been ordered, used for feeder business	High
Equipment	For break bulk or bulk handling, mobile cranes are lacking	High

The table below provides an overview of short-term priority projects that have been identified to mitigate the most severe issues. From this priority project list, only projects that fall under the responsibility of the SLPA will be considered for further analyses.

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Hambantota:

SP1. **Container Terminal Concession -** A clear concession contract should be swiftly developed, after which operations should be handed over to the terminal operator.

SP2. **Break Bulk Terminal Concession -** A clear concession contract should be swiftly developed, after which operations should be handed over to the terminal operator.

SP3. **Industrial zone development plan -** A clear development plan sould be made to attract new businesses

SP4. **A dockyard development plan -** A feasibility plan for the development of a dock yard for large commerical vessels should be made.

SP5. **The refinery development plan** should be prepared - A feasibility plan for the development of a refinery should be made.

SP6. **SLPA Role** - The role of the SLPA/Customs/Navy in Hambantota port has been clarified and institutionalized under the concession contract and have to be implemented. These roles are important and comprise (i) the harbour master function; (ii) port safety and security; (iii) tugging and pilotage; and (iv) customs activities by Customs and (v) Navy should have a permanent base with mooring facilities for their largest ships.

Hambantota development plan

Short term development plan

The short term development focusses on:

- RoRo;
- Bunkering and LNG;
- Establishment of Dockyard and repair of large commercial ships;
- Development of Industrial zone;
- Concession of the conventional break bulk quays;
- Concession of the container terminal (phase I);
- Prepare for cement factories;
- Prepare for a refinery development;
- Prepare for a sugar plant;
- Prepare for a grain terminal.

RoRo operations

Sind 2012 when the RoRo was diverted from the Port of Colombo to the Port of Hambantota, the transhipment and local RO-RO operations have grown fast by utilizing its inherent features of land availability and well developed road network. In the short term development plan, priority has been given for this

business by allocating wide yard space of 25 ha for RO-RO operation. Further measures have been identified to improve the quality, safety, security and efficiency of operation.

Bunkering/LPG/LNG and oil storage

Bunkering facility and tank farm in Hambantota will increase business after low utilisation during start-up periods. The private party offers bunker services, LNG and LPG. Further oil storage facilities (on total of 61 ha) has been established at some distance from the berths.

Dockyard for commercial ships

Establishment of a dockyard on 85ha of land for repair and building of ships has been considered in the short term business plan as a private investment project. It is envisaged to generate considerable employment opportunities in addition to the port income out of the project.

Industrial zone development

Utilizing the extensive land area available and the dedicated and integrated infrastructure, setting up of a planned industrial zone has been identified as a major development proposal in short term business plan. Successful bidders under RFPs will be given lands to establish their businesses and fresh RFPs will be invited for more investors to establish industries. Cement manufactures will be one of the first tenants for the zone.

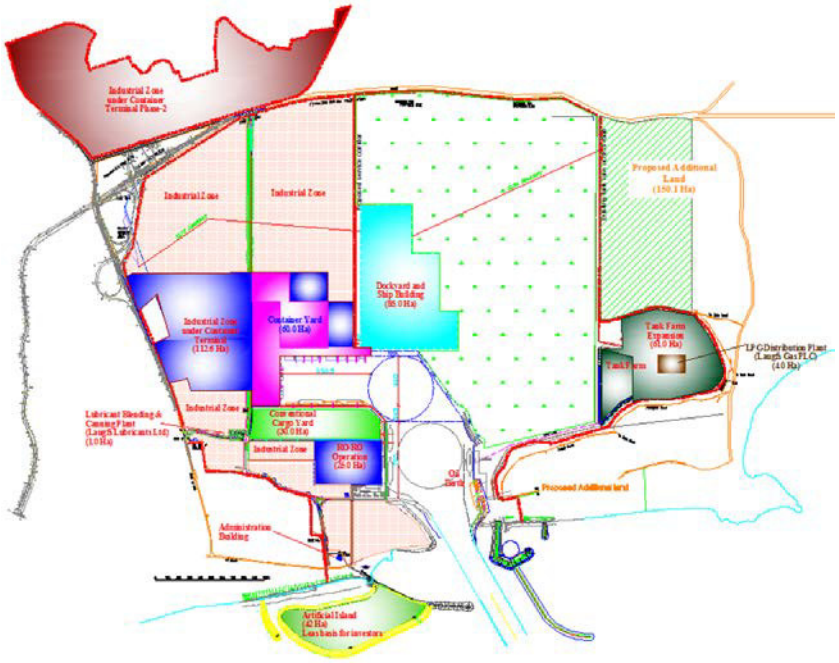
Conventional cargo

Conventional cargo or break bulk can be handled at the new facility. The total area is 30ha and has a berth length of 835m. A private operator shall be attracted to operate on this new facility. Cement and steel products are expected one of the first commodities.

Container terminal

The container terminal Phase I developed under Phase-II of the Port Development Project has been identified to develop and operate as a public-private partnership business. The new container terminal is planned to comprise 60ha. Currently only the feeder yard has been developed, the container yard at the back of the container apron has not yet been developed. The private investor will be offered land to establish industries and an area large 112.6 ha on the opposite site of the port road. This container terminal will facilitate importing raw materials and exporting finished products generated in the industrial zone.

Figure 5-16: Hambantota Short Term development



Long term development

Under the long term development, the following additional elements are envisaged:

LP7. Develop a refinery in the industrial area near the port;

LP8. Should demand exists a Container terminal development (phase II) of additional 3960m quays;

LP9. An artificial island of 42ha for real estate commercial project development;

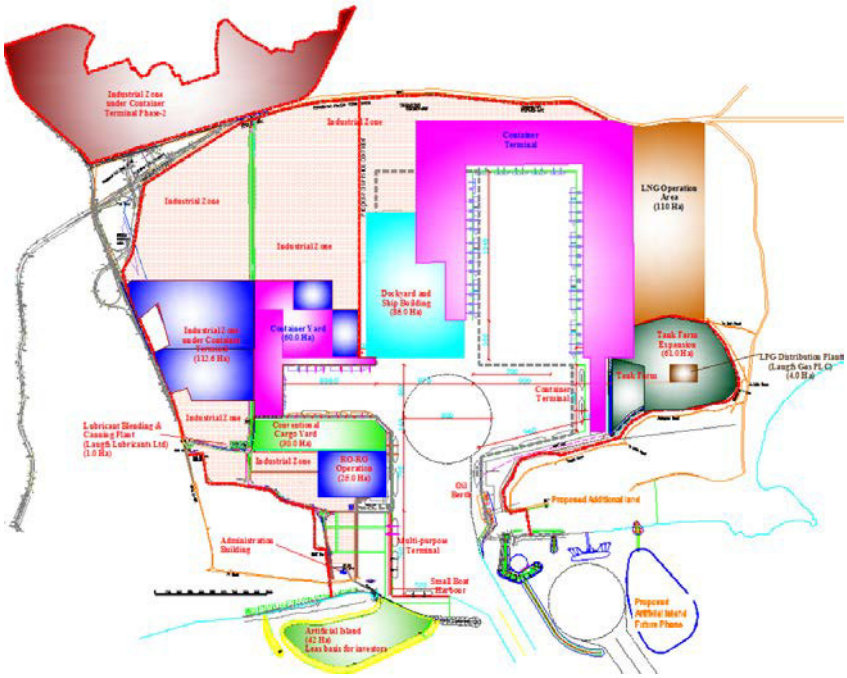
LP10. LNG operations and development on 110ha of land;

LP11. Small boat harbour (marina);

LP12. Additional industrial zones for the port.

This is illustrated in the picture below.

Figure 5-17: Hambantota Long Term development



5.5 Galle Port Directions

Galle port future is drafted around the touristic attraction of the heritage of the port. It is well suited for a cruise berth and additional touristic attraction including hotels. Galle's beaches; cultural heritage and future resorts can be a prime location for cruise and yacht vessels. The cement operations in Galle does not nicely combine with the tourism function. However, under strict conditions the facility may actually be able to upgrade and expand.[15] The ports Out Port Limit Services (OPL) consisting of crew changes services, supplying goods and spare parts shall remain acting in competition to possible new services from Hambantota. The marina for yachts is nicely combined with the tourisms attraction of the city and is rightly positioned.

Currently there are out of port limit services being performed at Galle which requires customs and immigration presence at the port. These businesses should be sustained as long there is a sustainable and profitable business model to the port. The passenger vessels or cruise vessels is a growing market for Galle port. Galle has a number of attractions including, the old fort and city heritage, world heritage rain forests Singharaja and Kanneliya, natural beaches (Unawatuna, Rumassala, corals and underwater attractions for divers. Galle is well connected to the national highway and daytrips are be planned frequently.

Combining the touristic values of Galle (Boating industry and cruise) with the existing cement manufacturing is not an ideal combination. However, modernisation of the cement plant with proper dust prevention through belt systems and green segregation between the facility and the port under a new concession with clear environmental criteria could make the facility sustainable. It remains however advisable to discuss alternatives for settlements before approval is given on the modernisation plans.

Summary Conclusions

The table below provides an overview of the cargo flowing to Galle followed by a summary of conclusions.

Table 5-6 Galle Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Galle		
Cement / Clinker / Gypsum	771	778
Non-containerised General Cargo	36	28
Cruise Vessels	no data	29 vessels

- It is expected that the cement facility in Galle will remain after major rehabilitation, resulting in ongoing cement handling operations in the port. It remains however advisable to discuss alternatives for settlements before approval is given on the modernisation plans.
- Galle is expected to have some local general cargo throughput.
- Galle is an attractive location for cruise passengers. A dedicated cruise berth can service demand; it is not foreseen that a dedicated passenger terminal is required.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Galle.

[15] The cement expansion plans came in after the submission of the first draft and hence not yet incorporated into the forecast.

Category	Issue	Severity
Galle		
Infrastructure	Apron of Closenberg berth, yard and warehouse are in poor status and needs rehabilitation as it is the only wharf and warehouse available in the port.	High
Infrastructure	Breakwater is at dilapidated stage as new outer breakwater project was not commencing	High
Marina	The existing yard marina is relatively small and lacks facilities for boating maintenance and repair.	Medium
PPP	Crew service to Liners vessels or out port limit services (OPL) require additional mooring facilities when expanded	Medium
PPP	Boat building and repair facility is not available	Medium
Superstructure	Customs and Immigration are not located in one building	Low
Infra and super structure	The upgrading of the marina including expansion is envisioned	Medium
Infrastructure	There is no adequate dedicated passenger terminal to accommodate cruise vessels	Medium
IT	No adequate Vessel Monitoring System and communication system are available to the harbour master	High
Infrastructure	Deputy harbour master and regional manager lack proper offices	High
Operations	There are plans to place a power generation barge in Galle	High

Priority Projects

The table below details priority projects for the port of Galle.

Table 5-7 Port of Galle Priority projects

Category	Priority Project	SLPA Responsibility
Galle		
Infrastructure	Rehabilitation of Closenberg berth, yard and warehouse. Est. cost 70 million SLR	Yes, Short term
PPP	The upgrading of the marina including expansion from 22 berths (15m at 3m draft) to 100 berths is envisioned, including promoting the industries related to tourism and ship repair.	Yes, Short term
Infrastructure	Land developed of two land plots (0.25 ha) and (0.35 ha) for marine and port related activities. Optional PPP project	Yes, Short term
Land lease	Sri Lanka Telecom requires warehouse facility (2100m2) at port of Galle for storage of submarine cables. This can be accommodated by leasing out warehouse space.	Yes, Short term
Operations	Cement manufacturer in Port of Galle plans rehabilitation and modernisation of its factory. Quay access will be through modern (dust free) belt systems. SLPA is to decide on a new (green) concession for the modernised facility.	Yes, Short term
PPP	Crew service to Liners vessels or out port limit services (OPL) require additional mooring facilities when expanded	PPP, Medium term
PPP	Boat building and repair facility to be accommodated in the port. The project would focus on economic development of the sector by promoting industries for boat building and repair	PPP, Short term

Category	Priority Project	SLPA Responsibility
PPP	Marina extension (phase II), close to Galle ancient city, berthing for 100 yachts of 15m at 3m draft. Land area approx. 2 ha and water area 5ha. The project would be under BOT terms.	PPP, Long term
IT	An improved Vessel Monitoring System and communication system should be provided	Yes
Operations	Plans for a potential power barge are to be further discussed and developed in cooperation with the Ceylon Electricity Board (CEB)	Yes, in cooperation with CEB
Infrastructure	The breakwater needs re-enforcements as a new outer breakwater was planned but not started yet. Est 3850 million SRL or USD 25 million	Yes, Short term
Superstructure	Customs and immigration can be located at one station, when land is leased Customs can build own office	Customs, Medium
Superstructure	Separate offices for deputy harbourmaster and regional manager. Est. 40 million SRL	Yes, short term
Infrastructure	Land of SLPA outside the port is to be assessed on future developments options. Est. 10 million SRL	Yes, short term
Infrastructure	The development of the cruise berth	Yes, Long term
PPP	Marina (phase III) development as demand arises	Yes, Long term

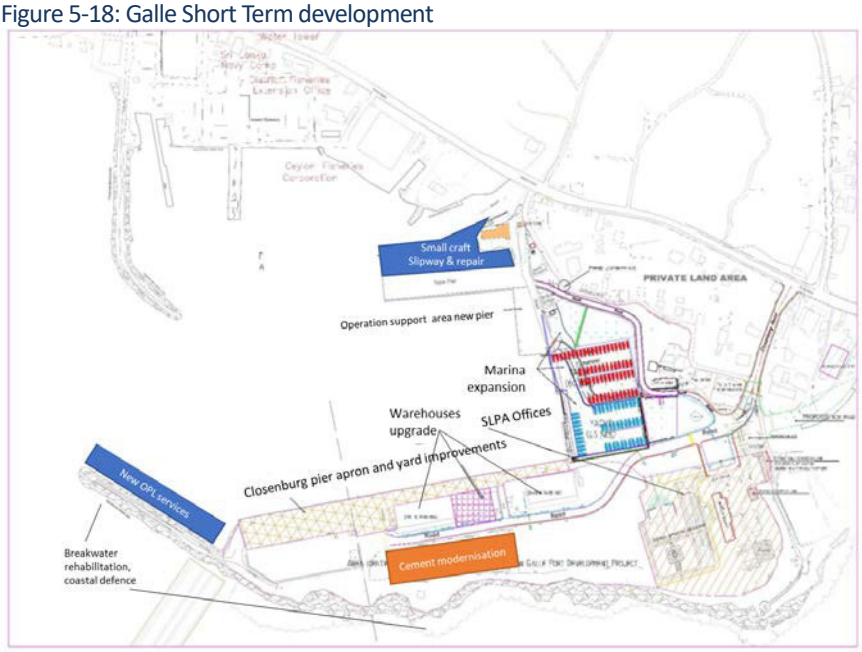
In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Galle:

SP1. An improved **Vessel Monitoring System (VMS)** and communication system should be implemented.
SP2. **Power Barge** – The plans for a power barge should be further discussed and developed in cooperation with the Ceylon Electricity Board (CEB).
SP3. **Existing Marina extension under PPP** to about 100 berths (15m at 3m draft).
SP4. **Boat building and repair PPP facility** to be accommodated in the port.
SP5. **Decision by SLPA on modernisation of cement manufacturer at the port.**
SP6. **OPL additional mooring facilities** at breakwater under PPP.
SP7. **Breakwater works,** rehabilitation existing and creating a new outer breakwater.
SP8. **Customs and Immigration to be located at one building.**
SP9. **New offices** for deputy harbour master and regional manager.
SP10. **SLPA Land ownership** outside the port needs to be mapped and development options identified.

Galle development plan

Galle development plan is illustrated in the picture below.

Figure 5-18: Galle Short Term development



Following long term developments has been identified:

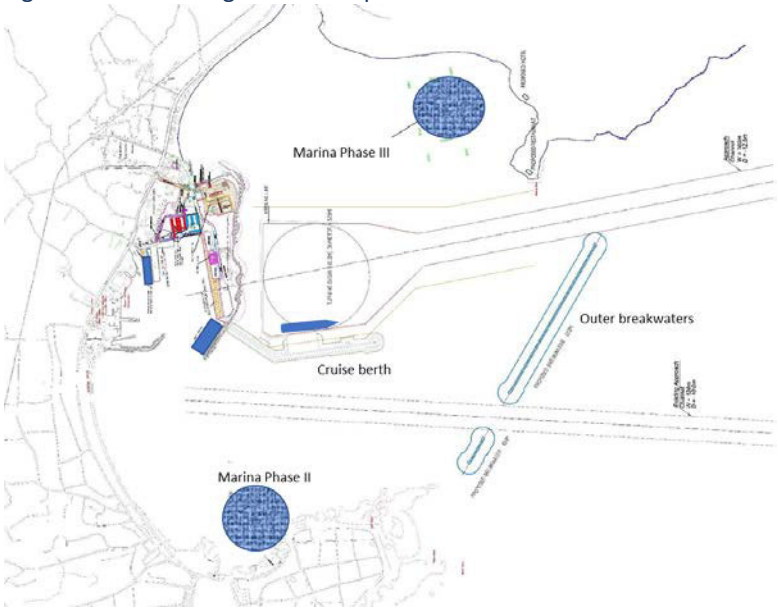
LP1. **Marina (phase II)** – Marina extension (phase II), close to Galle Ancient city, berthing for 100 yachts of 15m at 3m draft. The project would be under BOT terms.

LP2. **Marina (phase III)** – Marina extension (phase III) closer to Rumassala Hill as demand rises, berthing for approx. 100 yachts of 15m at 3m draft. The project would be under BOT terms.

LP3. **Cruise Berth** – A cruise berth should be developed in the long term to cater to the growing number of cruise vessel arrivals.

Long term developments are displayed in the next picture, including the short term outer breakwater.

Figure 5-19: Galle Long Term development



5.6 Kankesanthurai Port Directions

Kankesanthurai (KKS) Port Directions

Kankesanthurai has a high development potential due to its proximity to a densely populated area and its (cultural) connection to India. The SLPA has several development options regarding the enabling of passenger transport and of the food and agriculture sector. Regarding port development, a need for a multi-purpose is apparent to service the region, but further studies should go into detail about the need for the railway line for cargo transport and passenger transport. The estimation in the SLPA master plan assumes 500 passengers per day in both ways which is an estimation of before 1984. The passenger estimation thus needs an update.

KKS can retain its navy presence for security and other auxiliary functions should be developed per demand.

Summary Conclusions

The table below provides an overview of the cargo flowing to KKS followed by a summary of conclusions.

Table 5-8 Kankesanthurai Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
KKS		
Non-containerised General Cargo	31	277

KKS is envisioned to fulfil a major role in Sri Lanka's northern regions' throughput of general cargo to and from India.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of KKS.

Table 5-9 Kankesanthurai - Port Issues

Category	Issue	Severity
Kankesanthurai		
Connectivity	There is no rail connection to the port	Low
Infrastructure	Water depth is restricted in the port	Medium
Warehouses	The port lack proper warehouses	Medium
Gate	A proper gate is lacking	High
Infrastructure	The port lack zoning for logistics and industrial activities	High
Infrastructure	Some sections of the breakwater have been damaged during storms and need to be rehabilitated	Medium
Infrastructure	Pier 1 is in a partially deteriorated state and has tilted slightly due to missing support of the top concrete slab	Medium

Priority Projects

The following priority projects have been defined for the port of Kankesanthurai:

Table 5-10 Kankesanthurai Priority projects

Category	Priority Project	SLPA Responsibility
Kankesanthurai		
Warehouses	Two small warehouses (22m*27m) will be created using dismantled materials from port of Trincomalee for multi-purpose usage (for example cement in bags and fertilisers). Est. 15 million SRL.	Yes, short term
Gate and gatehouse	Gate, and gatehouse buildings are required to accommodate staff of SLPA, Customs and Navy. Dimensions of the gate will be 4 lanes with truck queuing for 16 trucks. Est. 40 million SRL.	Yes, short term
Breakwater and new multi-purpose berth	The breakwater needs rehabilitation and a plan exists to construct a new main pier to create Port of KKS as feeder port and facilitating trade with India. Project depends on Indian credit line. Est. 7,200 million SLR.	Yes, Possibly Short term
Pier I extension	Pier I can only handle vessels up to 4m draft. The pier extension is planned to make a berth of 120m at 6m water depth. Est. 400 million.	Yes, Short term
Infrastructure	Develop an economic zone for the port.	Yes, Short term
Access road	A new port road is required from the breakwater to the main road. Est. 50 million SRL	Yes, Short term
Rail connection	The rail could be extended by 1.5km connecting the port with the national railways. Est. 165 million SRL	S.Railways, Long term

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Kankesanthurai:

SP1. **VMS –** An improved Vessel Monitoring System and communication system should be implemented.

SP2. **Port Planning** – A comprehensive port development plan should be prepared, including a demand study for passengers and cargo activities. Three piers will be developed, one dedicated for the navy.

SP3. **Development of two small multi purpose warehouses**.

SP4. **Gate and gatehouse development**.

SP5. **Breakwater rehabilitation.**

SP6. **Pier I extension** to 120m at 6m waterdepth.

SP7. **Port road** connecting facilities at the breakwater to the main road outside the port.

SP8. **Develop economic zone near the port.**

SP9. **New Multi-Purpose feeder berth** – A multi-purpose berth should be developed under an to be granted Indian credit line.

KKS development plan

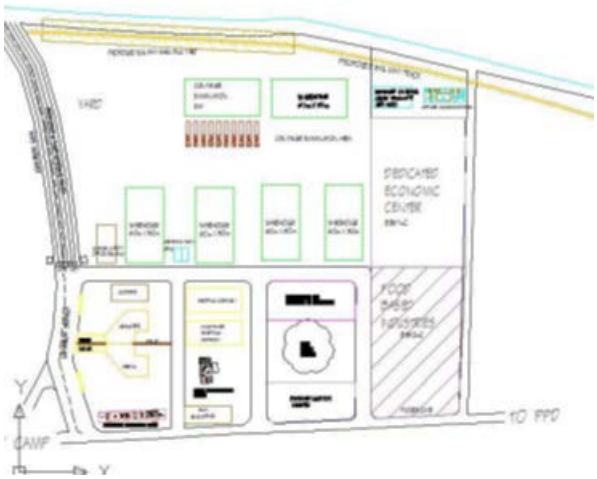
Kankesanthurai developments are illustrated in next pictures.

Figure 5-20: Kankesanthurai port developments

In the short term, an Economic zone development of about 9ha in planned for:

- Warehousing
- Container depot
- Mineral depot
- Rail shunting yard
- Dedicated economic centre
- Food based industries
- Customs inspections
- Offices

Figure 5-21: Kankesanthurai Economic Zone and Railway connection



The long term plans are:

LP2. Rail connectivity at the port through rail extension of 1.2km.

5.7 Oluvil Port Directions

Oluvil Port Directions

Oluvil will be a small port serving local, mainly fishery, needs. The port is not near an Expressway or any planned Expressway and therefor remains a small regional focussed port. SLPA plans to expand commercial operations for the food processing industry at Oluvil alongside the development of the fishery sector to allow for a mechanised fishing fleet and increased fish processing. The agricultural hinterland of Oluvil is expected to generate 25% of the nation's maize production and paddy production which is mainly processed locally and transported by truck. The agriculture sector generates also some fertilisers and storage facilities and packing facilities can be a target area. Also, the livestock sector is a possible market sector in which this port may become active. The eastern region contributes to 17% of the national milk production and possess 14% of the cattle population and 11.7% of the goat/sheep population and 11% of the buffalo population of the country. Hence it is viable to develop livestock related industries in the region such as meat processing and production of dairy products like Milk/Yogurt/Curd. These would require additional cold storage facilities.

Hence, in the proximity of the port a FTZ/ EPZ zone should be created with the focus to accommodate the industrial value added activities, processing and warehouse services for the following sectors:

- Fish industry (fish processing and canning)
- Agri sector (maize, paddy)
- Livestock sector (meat and dairy products)
- Agro chemical sector (warehousing and packaging of fertilisers).

The majority of the output of the region is for national consumption but export oriented processing can be developed through sea transportation. Also, some domestic feeder vessel can be expected in the future connecting to main ports of Colombo, Trincomalee and Hambantota.

Summary Conclusions

The table below provides an overview of the cargo flowing to Oluvil, followed by a summary of conclusions.

Table 5-11 Oluvil Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Non-containerised General Cargo	no data	28

Oluvil is expected to have some local general cargo throughput.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Oluvil.

Table 5-12 Oluvil - Port Issues

Category	Issue	Severity
Oluvil		
Dredging	There are major siltation issues, resulting in recurring dredging requirements	High

Category	Issue	Severity
Coastal protection	The lay-out of the breakwater causes heavy coastal erosion	High
Fishery sector	The port is very occupied by the fishery sector and they like to increase vessel sizes but the siltation issue is hampering this trend	High
Equipment	Port has no mobile harbour cranes	High
Institutional	An institutional framework for Port zoning and settlement of industrial activities is to be implemented	High
Ship repair	There is no ship repair / maintenance facility for fishery vessels and small boats	Medium
Zoning	FTZ and EPZ zones to be developed to attract industries	High

Oluvil is about 56km away from the nearest railhead in Batticaloa. There is no commodity-volume in Oluvil which would justify a rail development.

Priority Projects

In order to remedy the most severe issues identified, the following short-term priority projects have been identified for the port of Oluvil:

Table 5-13 Port of Oluvil Priority projects

Category	Priority Project	SLPA Responsibility
Oluvil		
Dredging	Solve siltation issues in the port, protect coast from erosion	Yes, Short term
Land lease	Attract Fishing processing/canning industry through EIO for private development on 2 acres of land near port. Project value 150 million SRL. Note the project can be implemented without addressing the port siltation issue. An ice plant and cold store is ready available. Expected employment 100 – 200.	Yes, Short term
Land lease	Attract private fish net manufacturing industry on 2 acres near the port. Est. project value 150 million SRL. Expected employment 100 – 200.	Yes, Short term
Land lease	Attract private fertiliser storage and packing industry at 3 acres of land. Est. project value TBD. Expected employment 100 – 200.	Yes, Short term
Land lease	Attract private organic waste producer which use the waste from fish manufacturing for fertiliser production. At about 4 acres of land.	Yes, Short term
Land lease	Development of private Agri cluster for processing and storage of maize and paddy production and distribution. At about 2 acres.	Yes, Short term
Land lease	Development of private Livestock cluster for dairy products and meat processing. Est. project value 20 million SRL.	Yes, Short term
Ship repair	Call for EIO for development of ship repair as private facility. Est. About 3 acres of water and 5 acres of land in the port. project value 300 million SRL. Expected employment 100 – 200.	Yes, Short term
		Yes, Short term

The following short term priority projects have been identified:

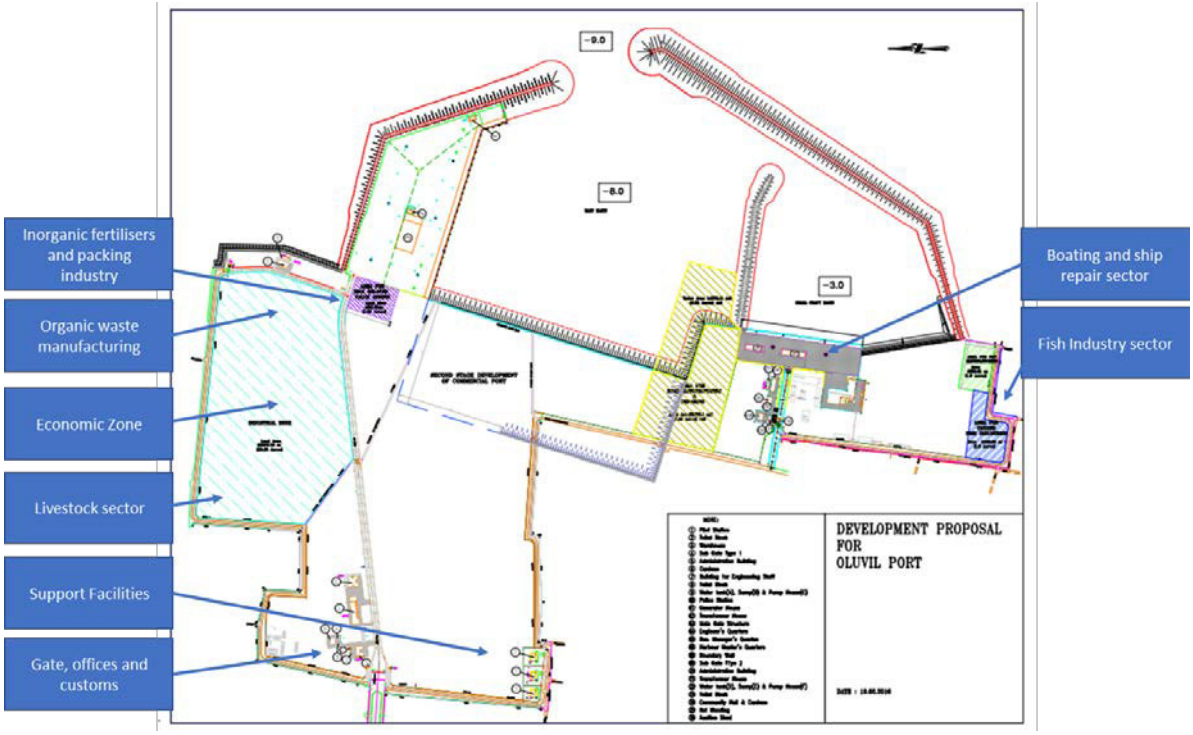
SP1. **VMS –** An improved Vessel Monitoring System and communication system should be implemented.

SP2. **Solve Siltation and Erosion** - Solve siltation issues in the port, protect coast from erosion
SP3. **Develop the fishery sector** – Attract fish processing and net manufacturing.
SP4. **Develop the agri sector** – Attract processing and warehousing for maize and paddy.
SP5. **Develop the organic waste –** Attract organic waste producer which utilise waste from fish manufacturing.
SP6. **Develop the inorganic fertiliser packing industry –** Attract packing and fertiliser processing industry.
SP7. **Develop livestock sector** – Attract cluster for dairy and meat processing.
SP8. **Develop the shiprepair industry for small boats and fishery vessels –** Attract shiprepair industry

Oluvil development plan

The following picture shows the proposed developments near the port.

Figure 5-22: Oluvil port development



5.8 Puttalam

Puttalam Directions

They jetty in Puttalam is used to barge coal to the stockpile next to the Norochcholai power plant. The jetty cannot be operated during Monsoon season leading to high stockpiles of coal, which add to storage and purchasing costs of coal.

The solution is found in rail transport of coal through Trincomalee. The latter already takes place but a rail connection to the power station is lacking. Currently, an operational rail line runs from Maho Junction in Cenral Sri Lanka to the China Bay station near the Port of Trincomalee. However, no rail exists between Maho Junction and Puttalam; a pre-feasibility study has been conducted for development of this rail line, but no detailed plans and development timeline have been established. Currently, efforts are ongoing to attract funding from private parties that could benefit from a rail line to Puttalam.

Summary Conclusions

The table below provides an overview of the cargo flowing to Puttalam followed by a summary of conclusions.

Table 5-14 Puttalam Summary Table

Port / Commodity	Demand 2016 ('000 Tons)	Demand 2050 ('000 Tons)
Coal	1,836	2,280

Puttalam is to retain its function as coal import facility for the power plant.

Observations Capacity and Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations at Puttalam.

Table 5-15 Puttalam - Port Issues

Category	Issue	Severity
Puttalam		
Connectivity	There is no rail connection from Trincomalee to the power plant	Medium
Operations	Midstream operations are carried out in an unprotected area and are not possible during the monsoon season.	High

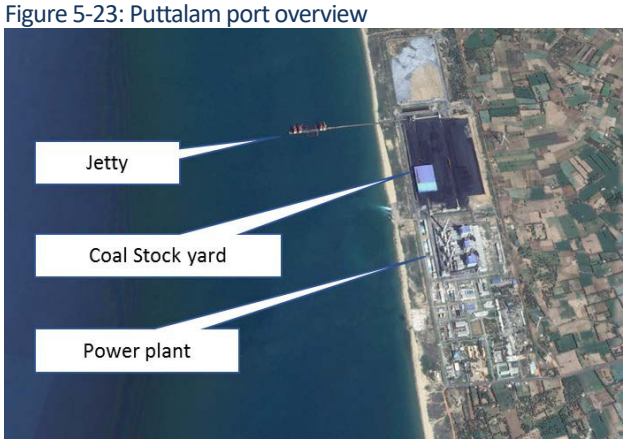
Priority Projects

No priority projects have been identified for Puttalam.

Puttalam development plan

The Puttalam coal fired power station remains an important contributor to the energy sector.
Developments on the jetty are focussed around maintenance. No major changes are expected except for the option that local cement manufacturers should explore the possibility to co-use the coal facility for their supply.

Figure 5-23: Puttalam port overview



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PART C: Port Connectivity & Logistics Hubs

6 National Port Connectivity

6.1 Introduction

This chapter describes the National roads and the connectivity to ports.

The following approach has been used for this chapter:

- Paragraph 6.2 describes existing national roads in Sri Lanka including a section on the Port Elevated Highway and recommendations of development;
- Paragraph 6.3 shows the important port connectivity projects.
- Paragraph 6.4 describes existing rail in Sri Lanka and recommendations for development;
- Paragraph 6.5 describes opportunities for coastal shipping in Sri Lanka; and
- Paragraph 6.6 describes opportunities for inland waterways in Sri Lanka.

6.2 Port Connectivity Projects

Substantial works are underway concerning the improvement of ports to the national highways and rail networks. This is an essential step in creating efficient ports and supporting the nations export ambitions through connecting Logistics Hubs with ports. The table below summarizes key connectivity projects for each of Sri Lanka's main ports.

Table 6-1 Key Connectivity Development Projects

Port	Modality	Project	Need
Colombo	Road	Widening of port access road to 6 lanes	High
	Road	Development of PAEH and fort-end ramps	High
	Road	Optimization of the gate process (main gate and PAEH gates)	High
	Road	New Kelani bridge for highway connecting E03, E02 and the PAEH	High
	Road	Connecting North Port development with the E03 passing along the coast	Planned
	Rail	Development of a rail connection to South Harbour (potential)	Medium
Trincomalee	Rail	Development of a rail connection to Ashroff jetty	High
	Road	Connecting port with port road to A6 and planned highway	High
Hambantota	Road	Extension of the E01 Expressway from Matara to Hambantota	High
	Rail	Extension of the railway network from Matara to Hambantota port	High

Main conclusions of analysis:

- Port connectivity by highways is required for all major port: Colombo, Hambantota and Trincomalee
- Port connectivity by railways is required for cargo commodities connecting:
  - Colombo port with inland dry ports (dedicated cargo rail)
  - Hambantota with western region (cargo & passengers)
  - Colombo and Trincomalee connection by railway (cargo & passengers), also connecting main inland dry ports in western region and connecting to Puttalam
  - Rail to smaller ports such as KKS, Oluvil and Galle.

6.3 National Roads

Ports cannot function without proper connections to the hinterland where goods have to be transported to and from. Connections can consist of road, rail or waterways. For some industries pipeline connections are important as well but this chapter will focus on the first three. It assesses, from a national perspective, the existing connectivity of roads, rail and coastal shipping followed by the needs for future development related to port connectivity. The detailed description of each port and its connectivity is described into more detail in each port development as part of the port specific masterplans.

6.3.1 Current situation

Sri Lanka has a relatively developed road network, with a distinction being made between four categories of roads:

- Class E Roads – High speed, high capacity corridors, aimed at relieving congestion along key corridors.
- Class A Roads – Sri Lanka's primary highway network (separate lanes).
- Class B Roads – Major provincial roads that mainly act as branch roads from the primary highways.
- Class C Roads – Local roads.

The table below provides an overview of the classes of roads within the country. Subsequently, Table 10-1 shows the country's road network.

Table 6-2 Overview of Sri Lanka Road Network

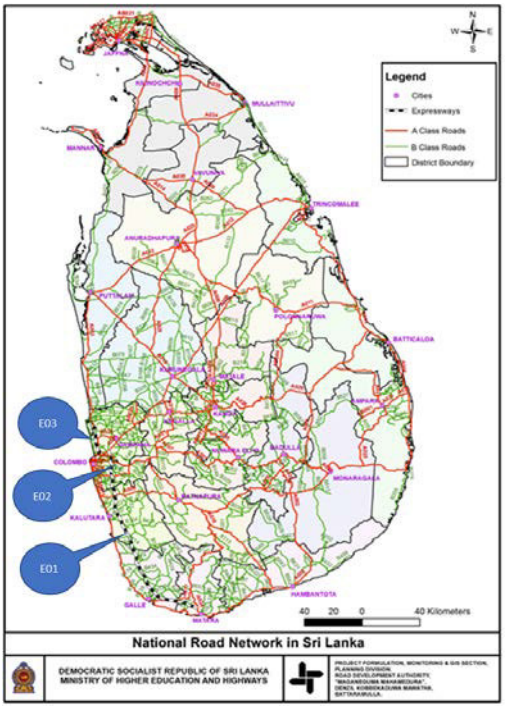
Road Category	Total Length (Km)	Speed Limit (Km / H)
Class E	169.13	100
Class A	4,217.42	70
Class B	7,992.94	60
Class C	N/A*	50

*No statistics were available for class C Roads
Source: RDA

Overview of Expressways:
The country's first expressway, the E01 (also referred to as 'the Southern Expressway'), was first opened in 2011, connecting Colombo to Galle. Subsequently, a section from Galle to Matara was opened in 2014, resulting in a total Expressway length of approximately 126 km.

Table 6-3 Expressway overview

Interchange	Airport Expressway E03	Distance between interchange in km
1	New Kelani Bridge - Peliyagoda	1.82
2	Peliyagoda – Ja Ela	14.58
3	Ja Ela - Katunayake	9.4
Total distance	New Kelani Bridge – Katunayake (BIA)	25.85



Interchange	Outer Colombo Expressway E02	Distance between interchange in km
1	Kaduwela - Aturugiriya	6
2	Aturugiriya- Kottawa	5
Total distance	Kaduwela- Kottawa	11.0

Interchange	Southern Expressway E01	Distance between interchange in km
1	Kottawa-Kahathuduwa	6
2	Kahathuduwa-Gelanigama	8
3	Gelanigama-Dodangoda	21
4	Dodangoda-Welipenna	11
5	Welipenna-Kurundugahahatakma	22
6	Kurundugahahatakma-Baddegama	12
7	Baddegama-Pinnaduwa	16
8	Pinnaduwa-Imaduwa	12.4
9	Imaduwa-Kokmaduwa	7.9
10	Kokmaduwa-Godagama (Matara)	9.9
Total distance	Kottawa- Godagama (Matara)	126.2

Observations & bottlenecks

Currently, Sri Lanka's road network faces several issues. The following key issues have been identified:

- Generally, there is severe congestion in Colombo city roads, especially during peak hours. This congestion hampers efficient cargo movement from the port to the cargo owners. The congestion caused by a mix of urban and cargo traffic combined with congested routings towards customs inspection areas.
- Port access road Colombo – the port access road suffers from severe peak congestion, due to an inadequate number of lanes and inefficient gate operations.
- The majority of gateway cargo is destined for a 50 km zone from
- Major truck road stretches of A01 and A02 near Colombo are heavily congested with mix of urban, suburban and regional traffic.
- A01 Colombo to Ambepussa stretch faces congestion and capacity issues as primary access route for local industrial areas.
- A06 Highway to Dambulla passes through urban settlements and experiences congestion due to mixing local short distance traffic with long distance traffic.
- A06 stretch between Dambula and Trincomalee is not very congested and further land area is available for expansion in the future to a full expressway.
- E01 Expressway – A highway connection from Matara to Hambantota is lacking.

Recent Developments

The road authority RDA is developing a national road masterplan.

The following key developments on Express roads are being implemented as part of the masterplan:

- Development of the Port Access Elevated Highway, 5.27km (Fort to 2nd New Bridge Project).
- Development of improving Colombo port roads and connectivity to PAEH.
- Development of 2nd New Kelani Bridge project with connection to PAEH and E03
- Development connection 2nd New Kelani Bridge to E02.
- Development of the E04 Expressway, which connects Colombo to Kandy.
- Development of E01 Expressway extension from Matara to Hambantota.

The PAEH from the Ingurukade Junction to Gate No 06 the ground clearance is 5.2m and from there onwards only inside the port the ground clearance is 10m. The total length is 5.27km.

The following Express roads are proposed:

- Central Expressway Colombo to Trincomalee (partly using E04)

6.3.2 Recommendations and development plans

The national highway structures should provide connectivity to all major ports and connect between them through nodal points near the Western region.

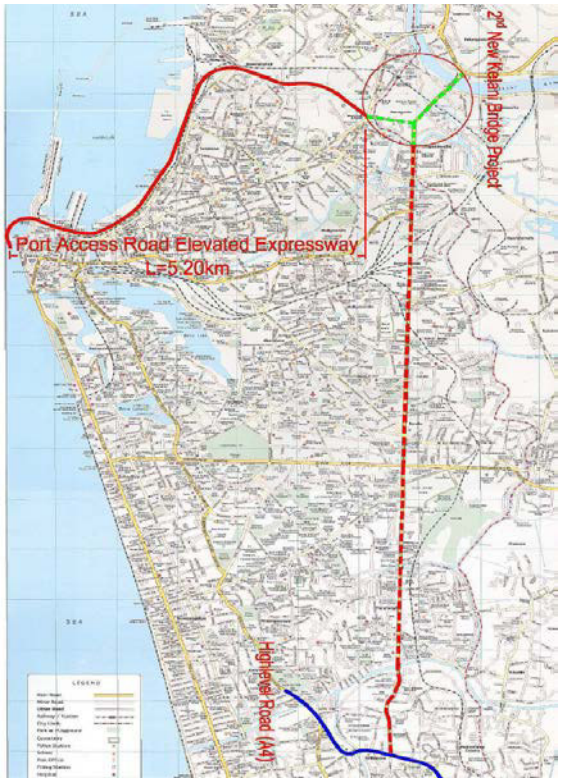
Regarding road connectivity, the following key developments for ports have been identified:

R1. Development of the Port Access Elevated Highway, 5.2km (Fort to 2nd New Bridge Project).
R2. Development of improving Colombo port roads and connectivity to PAEH.
R3. Development of 2nd New Kelani Bridge project with connection to PAEH and E03
R4. Development connection 2nd New Kelani Bridge to E02.
R5. Development of the E04 Expressway, which connects Colombo to Kandy.
R6. Development of E01 Expressway extension from Matara to Hambantota.
R7. Proposed Central Expressway from Colombo to Trincomalee (partly using E04).

Port Access Elevated Highway

The Port Access Elevated Highway (PAEH) is a project launched by the RDA to reduce traffic congestion to and from the city. The figure on the right shows the envisioned route of the PAEH.

Figure 6-1 Port Access Elevated Highway



The port access elevated highway runs from the New Kelani Bridge Project (NWB) (northern part) to the Fort at the southern part of the port. The path of the PAEH slightly deviates from the existing internal port road. The ground clearance from the Ingurukade Junction to Gate No 06 is 5.2m and from there onwards only inside the port the ground clearance is 10m. The total length is 5.27 km.

The PAEH project is currently in the detailed design phase, and comprises the following key features:

- Total length of 5.27 km.
- 2 city ramps and 1 port ramp at Fort end.
- Duel lane in both directions.
- 80 km per hour speed limit.

Port Sector Impact

- The PAEH may substantially reduce congestion in Colombo, thus enabling more efficient truck transport between the port and the cargo destinations/origins.
- As the PAEH will run at several places directly above[16] the port access road, the development may impede subsequent development of the port access road and hamper port traffic during construction. This in studied under the detailed design of the PAEH.
- The construction of the PAEH impacts temporarily the availability of the port rail track. This is studied under the detailed design of the PAEH. The rail track is requested to be available again in advance of arrivals of newly purchased rail wagons and locomotives.
- The rail track reservation towards south port is included in the detailed design study.
- The PAEH port ramp at Fort is studied by SLPA and addressed in the Masterplan of Port of Colombo.

Extension of E01 Expressway

The E01 Expressway currently provides a high-speed connection between the Colombo area and Matara. Currently, design and construction works are underway to extend the E01 towards Hambantota. For this 96-km development, four sections have been identified; these sections, and their characteristics and current progress are presented in the table below.

Table 6-4 E01 Expressway Extension Project

Road Section	Section Length (km)	Current Phase	Target Completion Date
Matara to Beliatta	30	Construction in progress	H2 2019
Beliatta to Wetiya	26	Surveys in progress	N/A

[16] The centre line does also deviates at several locations from the ground Port Access road.

Road Section	Section Length (km)	Current Phase	Target Completion Date
Wetiya to Andarawewa	15	Designs in progress	H1 2018
Hambantota to Mattala (via Andarawewa)	25	Construction in progress	H1 2019

Port Sector Impact

The envisioned high speed and high capacity connection between Colombo and Hambantota may have a substantial impact on the port sector, as it drastically improves the hinterland connections from the Hambantota port. As such, it may boost the development of the Hambantota port.

Development of E04 Expressway

The envisioned E04 Expressway, also known as the "Central Expressway", will connect Colombo (Kadawatha) to Kandy. In later phases of the development, the Expressway is envisioned to further connect Eastern and Northern regions of the country.

The project is aimed at improving inter-regional connectivity; thereto, the expressway will directly connect to the Colombo Outer Circular Highway (E002), Colombo – Katunayaka Expressway (E003), Colombo – Puttalam Road (A003), Colombo – Kandy Road (A001 Road), Kandy Jaffna Road (A009 Road), Ambepussa – Kurunagala – Trincomalee Road (A006 Road), Katugastota – Kurunagala – Puttalam Road (A010) and many other highways.

The first phase of the road development has been divided in four stages, which are presented in the table below. Additionally, Figure 6-2 shows the sections of the phase 1 development.

Figure 6-2 Central Expressway Project Phase 1

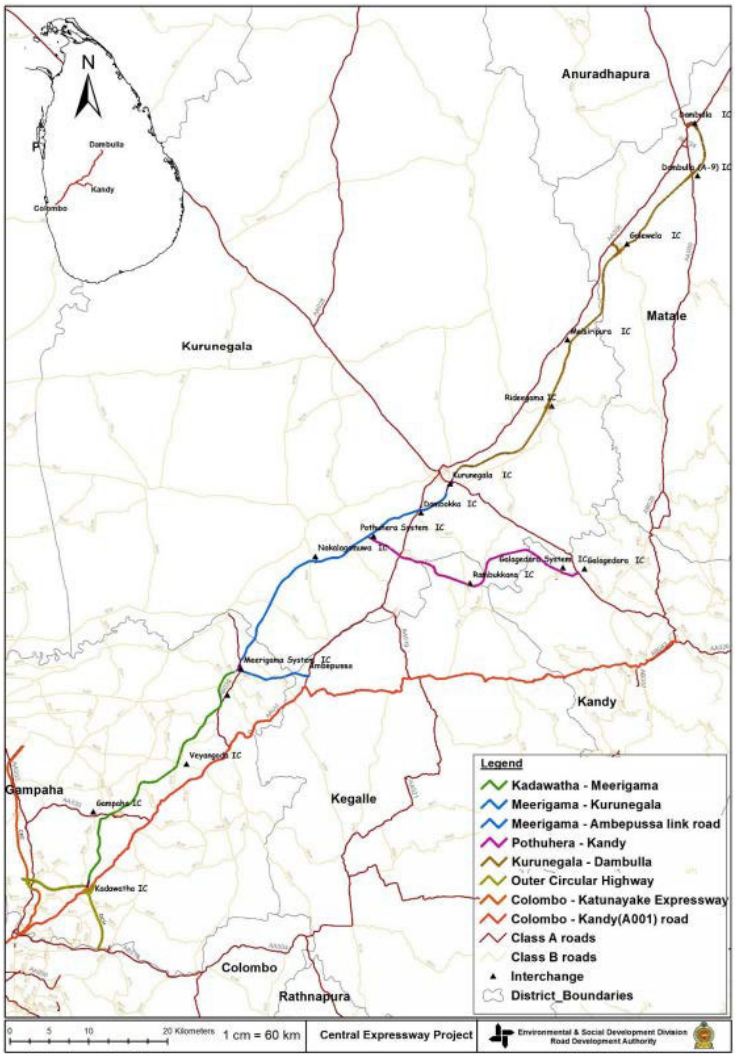


Table 6-5 Central Expressway Project Phase 1

Road Section	Section Length (km)	Current Phase	Target Completion Date
Kadawatha to Meerigama	37.1	Land acquisition ongoing Studies and designs ongoing	2020

Meerigama to Kurunegala and Ambepussa link road	49.0	Studies and designs: complete Procurement of construction supervisors: complete Procurement of contractors: complete Land acquisition: 70% Construction: commenced	2019
Pothuhera to Galagedara (Kandy)	32.5	N/A	N/A
Kurunegala to Dambulla	60.3	Land acquisition ongoing Studies and designs ongoing	2020

Port Sector Impact

The project will add substantial high speed traffic capacity between Colombo port and central hinterland regions, thus reducing hinterland transport costs and cargo lead times.
The project may relieve congestion on the roads between Colombo and Trincomalee, making land transport of cargo volumes from Trincomalee port to the Colombo area and vice versa more cost-efficient.

Improvement of Colombo Port Connectivity

Despite the considerable amount of road projects that are underway regarding the improvement of Sri Lanka's key transport corridors, projects that adequately address the direct connectivity of the port of Colombo except of the PAEH are lacking. To relieve the current port road congestion, the following two development projects have been identified:

- Optimization of the gate process – automation of the gate process could substantially reduce the truck waiting times. Additionally, a flexible gate system, which enables most gates to function as entry (exit) gates when substantial truck inflows (outflows) occur, could further decrease truck waiting times.
- Widening of the port access road – irrespective of the PAEH development, the port access road should be widened from 4 to 6 lanes, in order to increase the capacity. The section underneath the Aluthmawatha road cross-over, shown in the figure below, should also be widened to a 6-lane road.
- Signalling should improve the use of the six lanes, for example two lanes for the gates and one lane for interterminal traffic.

Figure 6-3 Aluthmawatha Road Cross-Over

6.4 National Railways

This section describes the rail cargo transportation from a national perspective. The current role of the national railways for cargo is extremely limited. It focuses on the transportation of liquid bulk from the refinery to the Airport and from Colombo and Trincomalee to distribution points. Other rail cargo activities are the transportation of wheat and coal. The modal split on rail cargo transportation is 1%, the remaining 99% is carried by truck. The reader should note that rail passenger transportation is a more dominant sector for the National railways. Considerable plans have been formulated on passenger transportation both by Ministry Megapolis and Western Development (including light rail transit solutions (RTS)) as well as by the Sri Lankan Rail Authority. Passenger transportation is however not addressed in this document.

6.4.1 Current situation

Initially established by the British in 1864 as Ceylon Government Railways, the Department of Sri Lanka Railways (SLR) operates the country's rail network. The country's rail network consists of 1,449 km of tracks; most the track comprises broad gauge (1,676 mm), the remainder comprises narrow gauge.

In the first half of the 20th century, more than half of Sri Lanka's freight transport and more than a third of passenger transport was done by rail; currently, only 1% of freight and 5% of passengers are transported by rail. This substantial decline in the modality's share is mainly the result of deteriorating rail infrastructure (tracks and bridges) and rolling stock, and the concomitant development of the roads and trucking sector.

Most current rail transport activities concern commuter transport in and around Colombo, which is subsidized by GoSL. There are approximately 330 commuter trains; approximately 250 of these trains operate in the Southern provinces; the remainder of the trains are used for long distance routes.

Observations & bottlenecks

The following key observations have been made:

- The country's main ports (Colombo, Trincomalee, and Hambantota) are not adequately connected to the railway network.
- Railways work with old rolling equipment. 65% of the rolling stock is 30-35years old and has high maintenance costs. Track upgradation is required before rolling stock is upgraded.
- The Port of Colombo is the only port where railwagons and locomotive can be loaded onto the track.
- More than 40% of trains face more than 30 min delay. Only half the local trains run on time.
- More than 60% delays are caused by infrastructural issues on rails and sleepers.
- Approximately 30% of the rail network has severe speed restrictions (down to 30 km per hour) due to safety issues. Only 22% of the network accommodates speeds of 100 km per hour or more.
- Existing rail mode on freight (1%) is low due to network inefficiency and delays.
- Rail is barely used for freight transport; only some volumes of oil (mainly to the airport), coal, and wheat flour are being transported by rail from Trincomalee to the Colombo area and coal to Puttalam.
- Urgent need for track improvements to enhance track speed from 30 km/h to 100 km/h.
- Most of the rail network is single track.
- A share of the rail network is low-capacity narrow gauge track.
- Infrastructure is deteriorated and should be rehabilitated; especially rail bridges should be restored for safety.
- Signalling and communications systems are outdated.
- The track is used as a walkway when there is no train.
- The rail network is restricted; as such, large parts of the country are not (efficiently) accessible by rail.
- Train load restrictions result in inefficient operations. On the China Bay – Maho Juntion line, trains are operated with 12 wagons that carry 2 20' containers each. Containers are loaded with approximately 25 tons each, in order to restrict axle load to 15.5 tons.
- The number of trains per day are limited on many sections of the rail network, especially for freight transport. On the China Bay – Maho Junction line, 1 daily freight rail service is operated.

Figure 6-4 Sri Lanka Rail Network Map

Recent Developments

Containerized coal transport by rail from Trincomalee to Maho junction has been introduced, in an effort to increase the cost-efficiency of rail transport. Currently, 1 cargo train runs each day, carrying 24 TEU with a total volume of 600 tons of coal.

6.4.2 Recommendations and development plans

Rail cargo should be further developed, especially for the bulk cargoes transported through the axis Trincomalee and Western Region and dedicated rail for containers to connect Port of Colombo with inland dry ports. The rail track to KKS holds promises for the transportation of bulk cargoes as well.
Once industries and or logistics are developed near Hambantota, a rail connection from this port to the Western region will also be required.

Rail cargo in a small country like Sri Lanka may not be very cost efficient as major rail infrastructural works are required to create the rail networks and limited tracks at are available.

Rail cargo would aim on the bulk transportation between Trincomalee and Western region and, depending on industrial development near Hambantota, on the Hambantota to western region (containers and bulk) and Colombo to dedicated inland dry ports (containers).

For the improvement of cargo rail transport, the following development projects recommendations have been identified:

R8. A rail track reservation in the Port of Colombo with extension to south port will enable direct rail handling near the terminals. The future rail cargo transportation according to the national rail masterplan towards newly developed inland dry ports can then be accommodated.

R9. Extension of network from China Bay station to Ashroff jetty – like the development of a rail connection between Maho junction and Puttalam, an extension of the rail network to the Ashroff jetty would reduce transhipment costs from truck to rail (at China Bay station), making rail transport from the port of Trincomalee more competitive.

R10. Extension of network from Maho junction to Puttalam – currently, coal for the Puttalam cement factory is shipped to Trincomalee, trucked to China Bay station, transported by rail from China Bay to Maho Junction, and then trucked to Puttalam cement factories. A direct rail connection to the Puttalam facility would substantially improve the cost-efficiency of coal transport to the cement plants, as it removes the need for the last transhipment from rail to truck. A more cost-efficient connection between Trincomalee and Puttalam could also make coal transport to the Puttalam power plant more attractive.

R11. Extension of network from Matara to Hambantota – it is envisioned that Hambantota port will handle several types of gateway cargo for Sri Lanka; currently, the port already handles vehicle imports, which are mainly destined for the Colombo area. A rail connection between Hambantota port and Colombo could substantially reduce land transport costs.

R12. Extension of network from Kankesanthurai to Kankesanthurai port – the city of Kankesanthurai is already connected to the national rail network; through a short extension of the existing network, the port of Kankesanthurai can be included in the network.

The main characteristics of these projects have been summarized in the table below.

Table 6-6 Sri Lanka Rail Development Projects

Project	Track Length	Current Stage
Maho Junction – Puttalam	75 km*	Pre-feasibility completed
China Bay - Ashroff jetty	1 km	Detailed surveys completed Funding arrangement ongoing
Matara – Hambantota	130 km	Matara – Beliatta section: construction 80% complete Beliatta – Hambantota: funding has been requested
Port of Colombo	2 km	Rail track reservation to reach South port
Kankesanthurai - Kankesanthurai port	1.2 km	Under discussion

*estimated

The rail track reservation at the port of Colombo should be made in advance of the PAEH development to ensure future possible connection to Colombo south harbour connecting to inland dry ports under the multimodal connectivity concept. In the case of Sri Lanka, such a rail development may not be competitive vis-à-vis trucks, as rail transport typically becomes competitive at long distances. Distances in Sri Lanka are relatively small, especially considering that the majority of cargo demand is concentrated within a radius of 50 km from Colombo. However, the rail connection may be used to relieve congestion on the port access road and city roads, at times when the road network cannot cope with truck traffic. If a Colombo South Harbour rail connection is to be established, it is crucial that such a development is taken into account in the PAEH development plans. In that case, container terminals should be connected with a railhead and a rail shunting yard is required. So far, the South Harbour was not designed to include rail connectivity. Alternatively, one railhead can be developed for the port near the Bloemandhal Area but this has major cost implications as containers will face double handling.

Rail Cargo Ambition and modal split

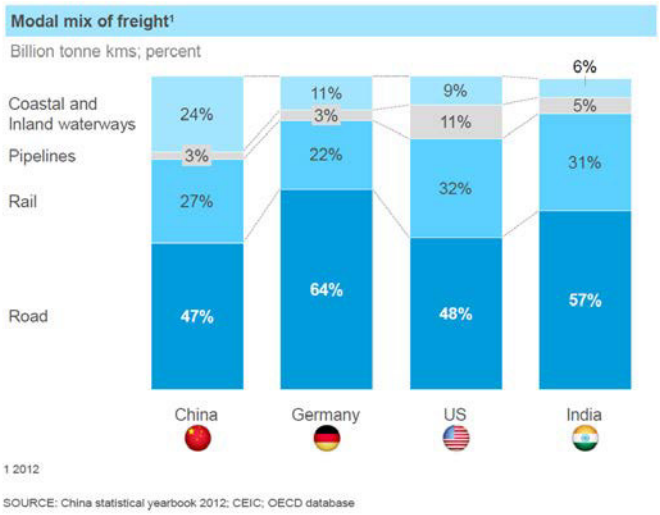
As can be observed from Figure 6-5, the share of cargo transported by rail can increase to 20% - 30%. However, as stated, the distances between Sri Lanka's main economic centres are relatively small, making rail transport less attractive. As such, it is expected that the modal split is only 2% - 3% of cargo transported by rail in the future with increased volumes through the unlocking of Hambantota over time. This requires considerable upgrade of the national rail tracks. A new national rail plan is under construction to formulate this in detail. The expected volumes also very much depend whether Hambantota is connected through a pipeline or not. If not, liquid volumes maybe handled by rail, boosting the modal split. The future mode of rail connections should focus on the cross-country bulk trade from/to Trincomalee; additionally, connections may be offered to the smaller ports (KKS) in the north. The connections to Colombo and Galle require upgrades to create new efficiencies while retaining a healthy port-city interface. A new railhead near Bloemandhal Area is planned to link the logistics facilities to the railnetwork in the future. A new rail connection to Hambantota is under review and shall add to the longer rail haulage possibilities for bulk cargoes, RoRo, liquid bulk and containers. In principal, the national rail masterplan would determine the rail cargo possibilities, the ports shall be timely equipped with railheads (with excepton of Oluvil).

6.5 Coastal shipping

The role of coastal shipping in Sri Lanka is very limited but holds promise when it is further developed. The following picture shows the role of coastal and inland waterways for a number of nations. Sri Lanka is an island with very limited navigational rivers so the future should be sought in coastal shipping, especially in the sectors of bulk transportation and container transportation.

It is noteworthy that India depends for 90% on land transportation, not utilising their coast line of 7,500km and navigational rivers of about 14,500km. This issue has been addressed in masterplans in India with the focus to increase coastal shipping.

Figure 6-5: Modal split examples of countries



6.5.1 Current situation

Currently, there are no developed coastal shipping services in Sri Lanka, except for Siam Cement's small-scale coal & clinker shipping activities between Trincomalee and Galle, liquid bulk between Colombo to Trincomalee and some Cruise lines which call at multiple ports. Coastal shipping is expected to increase in the future due to the development of the nation and related port infrastructure. Further, the possibility of a formal RoRo connection with India may (re-)emerge. Finally, when Hambantota becomes a major player as industrial port, short sea shipping activities can be expected between that port and the ports of Colombo and/or Trincomalee.

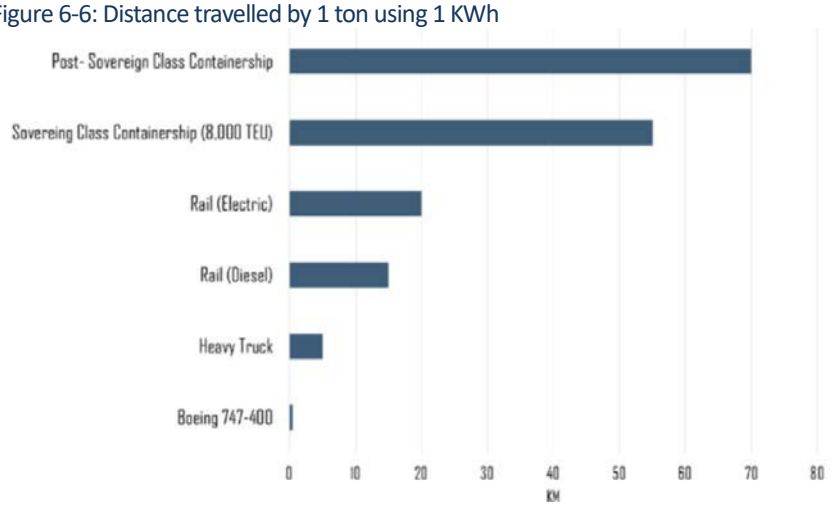
6.5.2 Recommendations and development plans

Coastal shipping is expected to increase due to the development of the nation and related port infrastructure. The logic lies in gains of economies of scale as small coastal ships can carry many truck loads at once. This would reduce the number of trucks on the road. This is of interest from a logistical point of view and a cost perspective but also from an emission point of view once "green ships"[17] are used.

The figure below shows the efficiency of various modes of transport measured in kWh. It is clear that ships have the lowest ratio's and are about 18 times more effective than trucks due to the economies of scale. But is noteworthy that Rail is also 5 times more efficient than trucks.

[17] Green ships are ships with the latest engine technologies for emission reductions able to sail in ECA zones and tier II or Tier III engines for NOx. Often an ESI index of 50 and higher is required for rebates on the port tariffs.

Figure 6-6: Distance travelled by 1 ton using 1 KWh



Source: Energyskeptic using US data

Unlike India, Sri Lanka has no cabotage law[18] that requires shipping lines to sail under the national flag. Once demand improves, national and international shipping companies can offer coastal shipping.

There are five types of coastal shipping opportunities which are recommended to be developed:

R1. Development of coastal Container feeder transportation development
R2. Development of coastal Bulk transportation
R3. Development of coastal Liquid bulk transportation
R4. Development of Passenger transportation
R5. Development of Cruises for Multiple ports in Sri Lanka

Development of coastal Container feeder transportation development

Container transportation along the coast of Sri Lanka can be developed when it proves to be more cost effective than trucking the goods through the nation. Most of the time the development of such services depends on the size of the allotment and the frequency of this demand. Some regional demand at or near small ports may drive the flow of containerised traffic in small feeder vessels but this may remain rather small due to expansion of the road highway networks. Once, Hambantota performs transhipment volumes additional feeder traffic between Colombo and Hambantota may emerge to make the connection to other feeder networks and to distribute containers from Hambantota to destination in Colombo district. It is likely that feeders towards East Coast of India will in future also call at Hambantota once transhipment is offered in this port.

Development of coastal Bulk transportation

Bulk transportation is already performed on occasion. For example, coal and clinker transportation from Trincomalee to Galle. Construction materials (stones, rocks), sand) are also transported along the coast but

[18] India is in the process to deregulate the cabotage rules to allow international lines to operate on coastal trades

this is mostly pure building projects related. Other bulk commodities may be transhipped along the coast such as grains and fertilisers. This is not expected to become a large trade but merely regional distribution.

Development of coastal Liquid bulk transportation

Liquid bulk transportation in coastal vessels is usually done because of the fuel demand at local ports, airports and regional hinterlands. Next to refined fuels (diesel, gasoil, kerosene) also vegetable oil such as palm oil and light chemicals can be moved via coastal transportation depending on the type of industries developed along the coast. Due to the sheer size of tankers (1,000t to 3,000t) compared to truck loads (40t) it is often of interest to use small tankers to achieve economies of scale. Also, the supply of fuel to the navy basis and fish ports around the nation are of interest to be carried by small tankers. A 1,000 DWT to 3,000 DWT bunker tanker are often used in this trade. A prerequisite for this trade is the development of local fuel storage facilities in the ports. Several ports already have such facilities such as Colombo, Hambantota and Trincomalee. However, it is expected that also liquid bulk storage is further developed at port of Galle, Oluvil and KKS.

Examples:

- At the port of Galle for example an oil power barge will be located to boots electricity supply in the region. This barge should be supplied through coastal transportation.
- The navy uses gasoil, diesel and kerosene and is located at several ports. The supply to strategically located tanks near ports should be supplied preferably through maritime transportation.

Development of Passenger transportation

Sri Lanka has limited ferries between India and Sri Lanka. With the development of the southern part of India passenger transportation is likely to be developed. This would require a RoRo berth / ferry berth for passenger traffic. Optional development areas are:

- Rameswaram (India) – Mannar (shallow water RoRo)
- Thoothukudi (Tuticorin) (India) – Puttalam / Colombo area (deep-sea RoRo)
- Kanyakumari (India) – Colombo area (deep-sea RoRo)
- Rameswaram (India) – Jaffna (shallow water RoRo)

Development of Cruises for Multiple ports in Sri Lanka

Today already some cruise vessels make multiple call at Sri Lankan ports. The most common combination is Colombo and Galle. Some Cruises also make the combination Colombo – Trincomalee or Colombo combined with Hambantota. It is expected that this trend will strengthen in future with increased cruise calls to Colombo and a spin off to combinations with other Sri Lankan ports. Cruise berth developments in Trincomalee and Galle shall support this trend.

6.6 Inland waterways

Sri Lanka has several inland rivers some of them can be used as navigational rivers especially in the estuary section of the river. These sections can then be regarded as inland waterways. Most of the rivers have low bridges near the sea and as such make them not suited for cargo transportation. Whilst several river estuaries are already used for fishery vessels, the rivers also hold promises for the development of the boating sector and river cruises.

Figure 6-7: Inland Waterways Colombo Area

6.6.1 Current situation

Fishery at river estuaries

The Fishery sector is using the shallow water estuaries of the rivers for example at Colombo, Negombo and Kochchikade. To accommodate fishery vessels a new Fishery port was developed north of Colombo Port which moved the majority of small vessels from the Dutch canal near Kelani Bridge. The fishery sector is domain of the Ministry of Fishery and hence not further discuss here.

Boating sector

The boating sector in Sri Lanka is still very underdeveloped at certain touristic places leisure boating is offered. This is often done from beaches and not supported by marina's.

River passenger transportation

The river transportation is not development in Sri Lanka. Locals are using small boats and offer some offer transportation across and over the rivers. Especially in dense urban area's there is a potential to offer high quality and frequent water transport services to offer an alternative to congested roads.

Leisure cruising

Leisure cruising is something which is not developed in Sri Lanka. Some rivers offer excellent scenic views from the waterside and in combination with touristic places this industry can be developed.

6.6.2 Recommendations and development plans

Colombo region

The inland waterways around Colombo are regarded of interests for the development of river passenger transportation, river cruising and leisure boating. Especially due to congested roads river transportation provides a new east-west connection which is otherwise only offered by specific busses. Connection points could be made at major junction crossings. By using the existing canal systems, strong east-west transport connectivity can be generated for the commuters' convenience. Comfortable air conditioned boats will ensure a smooth comfortable ride for passengers.

Ministry of Megapolis and Western Development has identified three inland waterways for investigation on the feasibility of such developments.
Following three inland water transport lines were identified as shown in the figure below:

- Wellawatta – Battaramulla Line (IW1)
- Fort – Union Place (along Beire Lake) (IW2)
- Mattakkuliya – Hanwella (along Kelani River) (IW3)

According to the Ministry Megapolis and Western Development masterplan the three inland waterways have to be studied for feasibility. Especially Wellawatta-Battaramulla (IW1) has the most potential to provide an urban transport solution. It intersects 6 main road including Marine Drive, Galle Road, Highlevel Road, Baseline Road, Nawala Road and Parliament Road out of which 3 of them are main 7 corridors. AS previous studies have been conducted in the past this transport solution could be implemented quickly once studies are updated with the latest traffic situations.

The Beira lake (IW2) is currently used for leisure boating only and may provide a water taxi across the lake which is of interest especially during congested periods on the road.

The Kelani River (IW3) passenger transportation would provide alternative transport solutions in a region where the public transport is poor. Due consideration has to be made in regard to environmental impacts prior to implementation as the main water intake for Colombo City is from Kelani river. The feasibility of the mode with electrified or solar powered boards can be considered when the study on the route is done. Prior to the canal boat system, the cleaning and dredging of the canals should be done in addition according to the Ministry Megapolis and Western Development masterplan. Parallel to the provision of boats, construction of boat stations, yards and access roads should be addressed. A proper type of boats should be used during this service and a proper regulatory mechanism should be established for the continuous monitoring and for the operation and maintenance processes. As this is transport solution may impact the environment, feasibility studies should cover this aspect and offer mitigation where possible.

R1. Perform feasibility studies for the inlandwaterways passenger transportation (taxi, cruising and crossing) on the three identified rivers in the Colombo district (Kelani, Beira lake and Wellawatta – Battaramulla Line)

National boating opportunities

The nation hold promises especially in the leisure boating sectors. Due to numerous touristic places and nice lagoons and river estuaries there are options to develop these touristic places with marina's, offering day-trip with leisure boats. Nearly each coastal district has options to develop this sector. It is however advisable to make a national plan for the tourism sector focussing on boating and marina's and identify first the most promising areas for developments.

- National rivers such as Benthota river (South District) with the tourist centre Aluthgama in its estuary is of interest to offer leisure boating and river cruising. Marina's can be developed to support this sector.
- Tourist attractions could be developed on the rivers like on Walawe river in Ambalanthola with Uda Walawe national Park in the hinterland.
- In the East, Lagoons and rivers near Batticaloa are numerous and will be subject to tourism and boating sector development.
- In the North East Trincomalee district offers numerous options for marina's and boating industry which has also been identified in the Trincomalee Masterplan.
- The northern province also numerous lagoons and options for marina's both in the Jaffna district and in the Mannar District.
- Finally Negombo area is earmarked for tourism development having nice beaches and river outlets. Also this area is earmarked for marina developments.

R2. Create a national overview for the development of the boating industry at river estuaries/ lagoons taking into account the development to touristic centra, local geography and attractiveness of nature and/or wildlife. Some place would be ideal for (speed)boating whlist other should be developed for ecotourism.

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7 Logistics hubs with Dry Ports & Corridors

7.1 Introduction

In this chapter the Logistics hubs with dry ports and corridors are explained.

The legal obligation is to declare all goods (imported and exported) correctly and pay the correct amount of duty before the goods are cleared and free circulations/ export is allowed. On goods, import and or export duties and VAT are to be paid.

The following approach has been used for this chapter:

- Paragraph 7.2 describes the institutional best practice on Logistics Hubs and Dry ports;
- Paragraph 7.3 describes the current situation in Sri Lanka;
- Paragraph 7.4 reviews Sri Lanka Integrated logistics hub concepts; and
- Paragraph 7.5 reviews the Colombo Trincomalee Economic Corridor.

7.2 International best practice

The international best practice is explained through explaining the concept of a Logistics hub where after the Dry port concept is explained.

7.2.1 Logistics Hub

Introduction

A logistics hub is a dedicated area where a variety of services is offered to different players in the supply chain. Logistic hubs can be developed either within or nearby the port area – close to the (container) terminals – or next to a (inland) dry port located more into hinterland, i.e. closer to production facilities or the consumer market.

Typical services

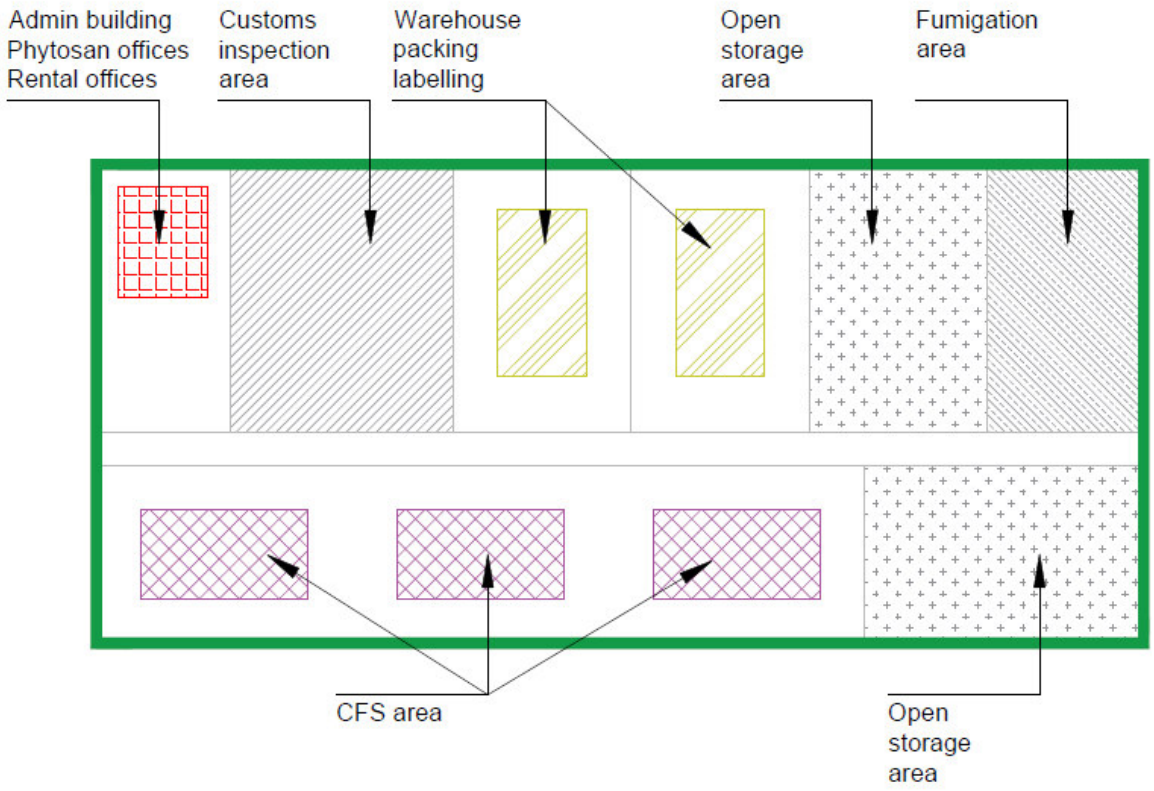
Within a logistics hub, a range of additional services can be offered to the clients:

- CFS activities;
- Multi Country Consolidation (MCC);
- Customs inspection;
- Warehousing, packaging & labelling activities;
- Open storage
- Phytosanitary inspection;
- Fumigation;
- Rental offices for agents or clients; and
- Empty depot**.**

Typical layout

The figure below shows a draft layout proposal of the Logistics Centre, indicating the various types of activities that can be organised within this area.

Figure 7-1 Logistics Centre Layout



CFS area

In this area, the typical CFS activities will take place. CFS stands for container freight stations, i.e. the area entailing both covered warehouses and open storage areas where containers will be 'stripped' after import, i.e. unloading the products out of the container before (the last miles) distribution to the client's destination, or where products will be 'stuffed' into containers before shipping the container overseas.

Multi Country Consolidation (MCC)

MCC activities are logistics services typically seen in container transhipment ports. Contents of transhipment containers from different origins are stripped and restuffed to aggregate cargoes with similar destinations, in order to optimize the contents of each container for further transport. In contrast to stripping/stuffing activities for domestic cargoes, MCC activities should be placed within the port as transhipment containers should be fully handled within the port area.

Customs Inspection

Depending on the local regulations and policies, Custom Authorities sometimes require a dedicated area to do in-depth inspection of the cargo and/or the containers. One can identify various levels of inspection based on different technologies and/or levels of automation with corresponding area requirements:

- Container scanning: X-ray scanners can scan the cargo inside a container fully automatically; a fixed drive-through X-ray tunnel installed on the main container terminal or a mobile X-ray truck are required to do the proper container scanning;
- Quick visual inspection: customs officers will open the doors of the container and do a quick check whether the type of cargo and the number of products is in line with the cargo documentation; this type of activities can be integrated with the gate-in and gate-out activities at the container terminal;

- Detailed physical inspection: customs officers will offload the container and place all the products separately on a temporary stacking area (e.g. under a shed) in order to do a detailed check on the type of products and the corresponding amounts of each product; this type of inspection requires a serious amount of space because every container needs to be parked at the specific customs inspection area (in most cases on top of a trailer or chassis) and a temporary storage area of about 30 to 40 m² needs to be reserved to unload the products out of the container.

Warehousing, packaging & labelling activities

Various types of logistics and commercial activities can be organised in the Logistics Hub area. Most popular type of activities are related to warehousing, packaging, unpacking or re-packing various types of products, labelling or stickering products, etc. This type of activities requires industrial warehouses. Depending on the type of product, sometimes a conditioned warehouse will be required. Typical size of a CFS or logistics warehouse is 3000 m.

Open storage

Not all the import goods and products discharged at the container terminals or the multipurpose terminals will be transferred directly to their final destination (at the client). Similarly, export goods will be collected and temporary stored before shipping. For this type of (temporary) storage activities an open storage area is required.

Phytosanitary inspection

In this area, verifications are carried out by agricultural authorities to verify a shipment has been inspected and is free from harmful pests and plant diseases. Phytosanitary certificates are issued to indicate that consignments of plants, plant products or other regulated articles meet specified phytosanitary import or export requirements and are in conformity with the certifying statement of the appropriate model certificate. Phytosanitary certificates should only be issued for this purpose.

Fumigation

Fumigation services prevent the spread of pests and minimise the risk of damage to (export) goods before shipment according to international (quarantine) standards.

Fumigation services require a dedicated – preferably isolated – space where the fumigant (gas) can be released into the container to fumigate both the products inside the container as well as the (wooden) floor and other parts of the inner side of the container. After a specific period, the container can be ventilated to allow the fumigation gas to escape and render it safe before shipment.

On average, for every container that needs fumigation, a dedicated space of about 50 m² will be required. Considered the chemical environment of fumigation activities, it is recommended to identify a dedicated area outside the container terminal for fumigation services.

Rental Offices for Shipping Agents or Freight Forwarders

Freight forwarders and shipping agents are the companies that arrange the importing and exporting of goods. In fact, the agent or freight forwarder acts as an intermediary between a shipper and various transportation services such as ocean shipping on cargo ships, trucking, expedited shipping by air freight, and moving goods by rail.

Shipping agents and freight forwarders are based either in the commercial centre of the port or in an office building within the Logistics Centre. Depending on the number of different agents and freight forwarders, the need for office area will range from 100 m² up to 500 m².

Empty depot

In most of the major container terminal ports around the world, specific areas will be dedicated for empty container depots. Typical activities at empty depots are:

- Reception and/or delivery of empty containers to truck, rail or barge;
- Maintenance and repair of the container equipment fleet;
- Cleaning of the (inner side of the) container;
- Sales and inspection.

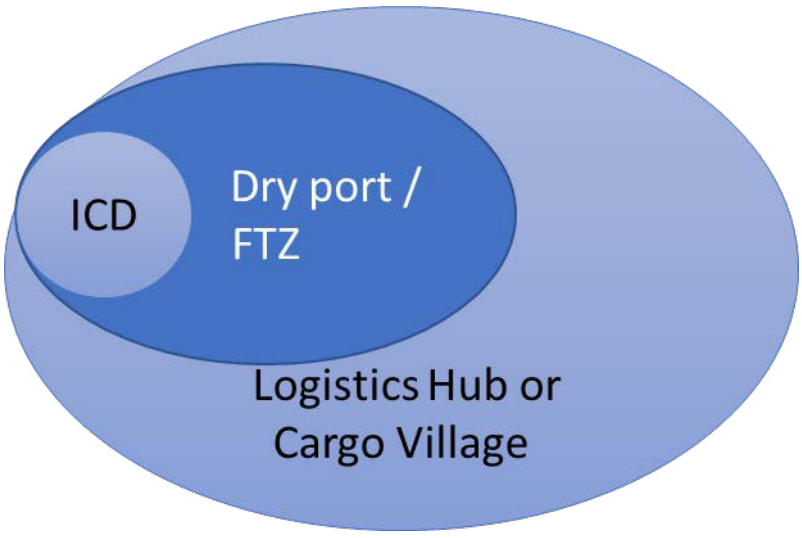
Empty container depots are mostly located nearby the logistics centre or commercial and business centres close to the market and are an essential part of the logistics chain, because they allow the importers to leave their empty containers and exporters to pick up empty containers for shipment in the close vicinity of the logistics centre instead of at the deep-sea container terminal. This saves on transportation costs and time.

7.2.2 Dry Port / Free Trade Zone

Introduction

A dry port is an inland located terrain which acts as a port, it has therefore bonded areas often also classified as Free Trade Zones (FTZ). The concept of a dry port (or FTZ) is strongly related to the 'extended gateway function', meaning that all customs procedures and inspections are taking place at the dry port, instead of at the seaport/border crossing. In other words, all custom procedures and inspections are executed in the dry port as if it was done at the seaport/border crossing. This requires the approval of all relevant authorities involved in the Sri Lankan transport chain, of which the Customs Authorities are the main stakeholder. Also, the legal regulations should facilitate the introduction of the dry port concept. The inland container depot (ICD) can be regarded as smaller subset of the Dry Port concept focussing on (empty-)containers.

Figure 7-2: Conceptual naming ICD Dry Port /FTZ cargo village



A dry port area contains all the services and operations that require a custom bonded zone (under custom regime). The logistics centre is usually located adjacent to the dry port area (or at separate locations) where services/operations take place that do not require a custom bonded area. This primarily relates to non-bonded warehouses, value added services and commercial offices. The total areas of the Dry Port /FTZ and surrounding logistics areas can be classified as "Logistics Hubs" or "Cargo villages" or "logistics villages". Economies of scale can be reached once logistical services and value added services are combined at these FTZs and Logistics Hubs.

Typical services

Within a dry port area or FTZ, the following services can be offered to the clients:

- Truck handling (loading/unloading containers/cargo from/to trucks)
- If available, rail handling (loading/unloading containers/cargo from/to trains)
- Stripping and stuffing of containers (container freight station)
- Bonded storage of containers/cargo
- Receipt and despatch of cargo; custom inspection and clearance
- Gate checks and security
- Container repair
- Workshop

Within the free trade zone (FTZ) often light manufacturing, assembly and value-added services are allowed providing benefits to importers and exporters established in the FTZ.

Dry port: containerised cargo and non-containerised goods

The forecast of containerised traffic forms the core of a dry port development. This is because (full) containers are suitable to transport under customs regime to the dry port location and typically require storage and de-consolidation activities. At the dry port (when ordered by the importer) the goods are inspected and customs cleared and further transported to the importer's own premises. This is considered one of the key functions of a dry port.

Transport of non-containerised goods under customs regime is more difficult to realise (e.g. sealing, track and trace, safety), and therefore in many cases non-containerised goods are often cleared at the seaport/border crossing.

Connectivity:

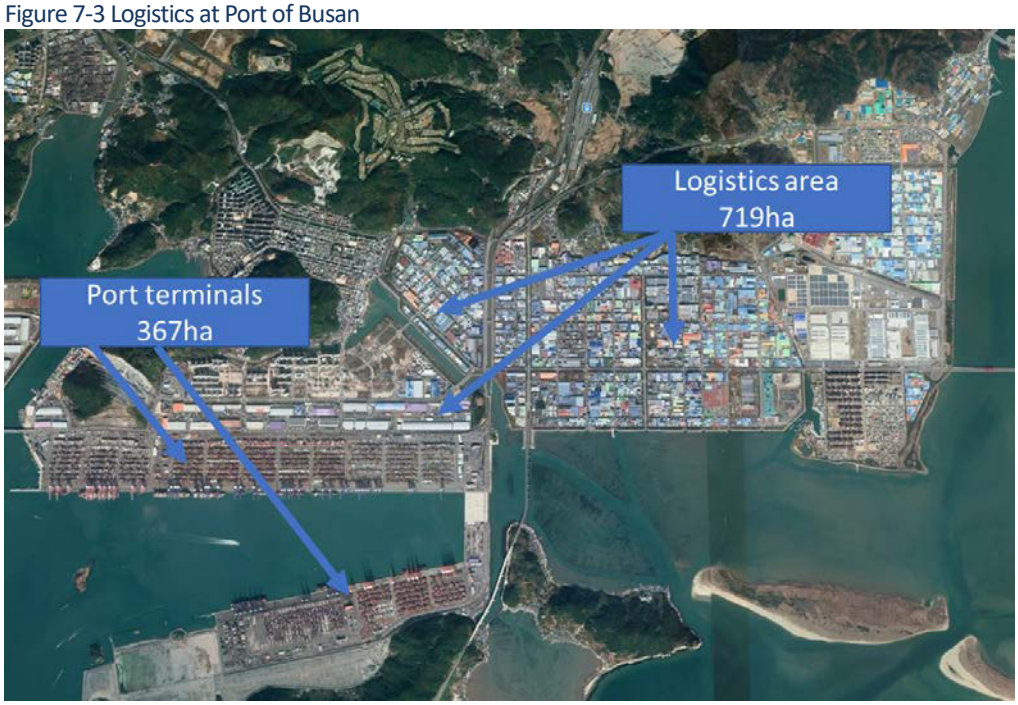
Dry ports can be either single modal – only accessible via road – or bi-modal – accessible by road and rail or tri-modal – accessible by road, rail and barge. Depending on the available infrastructure and the corresponding transport costs for each mode of transport, the most cost-efficient way of transport will be selected by the different players in the logistics chain. For comparisons reference is made to the Port of Busan (South Korea).

Table 7-1 Port of Busan and Colombo compared

Port description	Busan	Colombo
Throughput (2015)	12.9 million TEU	5.1 Million TEU
Gateway cargo	6.5 million TEU	1.2 million TEU

MCC cargo	1.2 million TEU	15,000 TEU
Transhipment cargo	6.4 million TEU	3.9 million TEU
Container terminals	367 ha (total port 408 ha)	125 ha (total port 202 ha)
Logistics area near port	718 ha	scattered
Utilisation logistics area	68 Companies: Logistics, Value added, Warehousing, MCC activities	Logistics areas scattered

Figure 7-3 Logistics at Port of Busan



The figure above shows that logistics areas are about times a factor 2 compared to container terminal areas. This would indicate that Colombo would require 250 ha of logistics land today versus about 480 ha to 700 ha once throughputs triple towards 15 million TEU and depending on the success of Sri Lankan Export strategies.

Key Success Factors of a dry port concept

To improve the logistics sector in Sri Lanka, the (to be developed) dry port(s) should meet certain criteria. These criteria are listed as key success factors for dry ports.

Extended Gateway for the (congested) seaport

The dry port should be a true extended gateway. This implies that a variety of services that are commonly provided in the seaport are transferred to the inland dry port. The main advantage of this is congestion relief of the sea port for these kinds of services. An important condition for a successful extended gateway is that the goods are allowed to be transported under a favourable customs regime. This entails that all customs clearance, including the physical inspections and administrative checks are executed in the dry port. Also, other inspections that normally take place in the seaport are to be executed in the inland port.

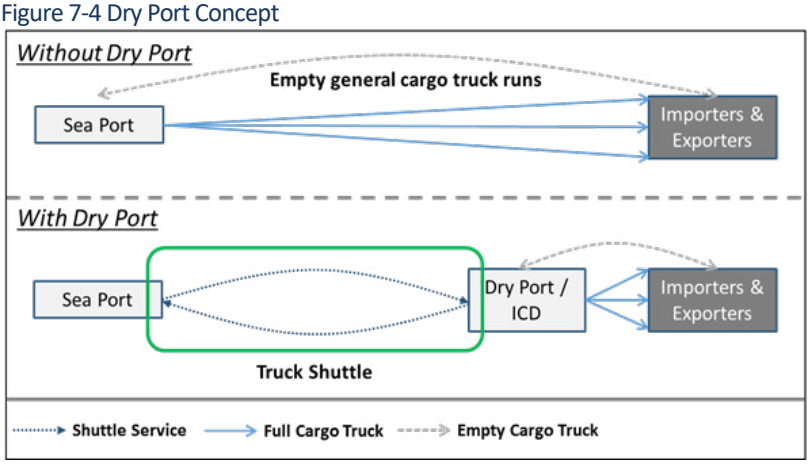
Cluster concept

The inland port should cluster all logistical services required in one location (customs inspection & clearance, stripping & stuffing, value added logistics, container freight station). Clustering all logistical services provides for a reduction in total transportation costs and time efficiency. A one-stop-shop offers a full suite of services to the end user.

Strategic location

The dry port should be located in the proximity of major consumer and industrial areas and in the proximity of infrastructure (road and/or rail). Short delivery time to the final customer destination is important to realise the most efficient supply chain of products. A direct and efficient link with the seaport is required to provide for an efficient transportation route. Ideally, the inland dry port is connected not only by road but also by a high-density transport mode such as barge or rail to provide for more cost-effective environmentally friendly method of transportation.

Figure 7-4 Dry Port Concept



Corridor: secure transportation channel

There should be a secure corridor between the seaport and the dry port. This could be realised with shuttling service with trucks, and in the long-term potentially via rail. A shuttling service executed by licensed trucking companies is a time and cost-efficient way to move full containers to the dry port. Containers can be monitored by customs more easily and licensing can lead to more safety. By using licensed truck companies, tracking and tracing through GPS seals is also possible. Once you have several Logistics Hubs along a major trunk route you can speak of a "Logistics corridor".

7.3 Current situation

Logistic Zones and Dry Ports

Currently, Peliyagoda is designated as logistical zone where warehousing takes place, but it is not yet offering full operational services associated with a dry port. Colombo can benefit from a central location Inland Container Depot (ICD) with a customs and CFS function, commonly called a "Dry Port". The facilities in Colombo are dispersed and in urban areas. This leaves room for optimisation of locations of empty depots, inland customs scanning locations, CFS operations and LCL handling locations. These functions can be combined in "logistics hubs" with specific FTZ classifications, but space availability around the existing Peliyagoda is an issue. Furthermore, connectivity to the importers and exporters locations, often located within the city is a logistical nightmare. Incentives should be provided to attract the major importers and exporters away from the congested urban city areas to establish them in at logistic hubs or cargo villages with ample space for economies of scale and with good connectivity to ports.

Geographically well located land plots for dry ports are needed to form a cluster of logistics hubs around a network of corridors which connect to the ports and the urban areas. These dry ports or FTZ, but also referred to as cargo villages, are used to ease congestion in the port and in urban city districts. The concept makes use of economies of scale for which ample space is needed to combine multiple functions and create synergies of clustering business activities.

7.4 Sri Lanka Integrated Logistics Hubs – Dry Port – FTZ – Corridor development

Integrated development

The National Export Strategy has identified six focus sectors for innovation and export diversification. In line with the realisation of (additional) main corridors, Free Trade Zones (FTZ) and corresponding Logistics Hubs / Dry Ports can be developed in the regions or areas identified as the best locations to deploy these additional activities and/or attract additional businesses.

In terms of area requirements, a small Free Trade Zone as such can be developed already within an area of about 20 hectares (200,000 m²). In combination with a dry port and a logistics centre, the area requirements will be considerably higher, ranging from 50 up to 200 hectares. As mentioned before, it is wise to cluster the Free Trade Zones and or Export Processing Zones to ensure synergies and spin-offs creating larger "Logistics hubs".

To secure a successful implementation of an integrated FTZ-Dry Port-Logistics Hub project, close communication and interaction between various Government Agencies, Western Region Mega Polis, UDA, Customs and SLPA will be of paramount importance. Apart from a dedicated Customs office within the FTZ-Dry Port area, electricity and water supply and basic infrastructure is required at the FTZ to ensure land plots can be conceded to importers and exporters. Connectivity with High ways and optional railways is further required as part of an overall freight corridor policy to connect to the ports. Housing for labour should be planned for in commuter proximity of the FTZ in logical areas not effected by future expansion of the FTZ and clear from any emissions related to the FTZ.

Four studies have mentioned above concepts to be implemented in Sri Lanka and reference is made to these studies.

- Ministry of Megapolis and Western Development Masterplan, November 2016
- Multi Modal Transport Project, ADB and Japan Fund for Poverty Reduction, 2012
- SLPA Port Development Masterplan 2016
- Colombo - Trincomalee Economic Corridor (CTEC), ADB November 2016

The latter study is detailed in a separate paragraph as it covers a wider region for development compared to dry ports solutions offered in the direct hinterland of Colombo by the other studies.

The studies highlighted following developments:

Table 7-2 Studies with Logistics concepts

Study	Content
Megapolis and Western Development Masterplan	Masterplan for the Western region covering: Overview of Western region, dimensions of growth, Strategic

Study	Content
	framework, Transport- energy and water, Housing and relocation of administration, Environment and waste management, The aero-maritime trade hub, "The high rise" central business district, industrial and tourist cities – Meerigama, Horana, Negombo, Aluthgama. "Techno City", "Eco habitat and plantation City", "Smart city infrastructure project", The spiritual development facilitation, planning regulations, way forward
Multimodal Transport Project	The latest 2012 Multimodal study financed and supervised by ADB and Japan Fund for Poverty Reduction. Volume I: Market evaluation, Engineering & operations. Volume II, costs, revenue financial analysis and economic appraisal.
SLPA Port Development Masterplan 2016	This masterplan shows the initial development proposals including 450 ha area for CFS and cargo value added services.
Colombo - Trincomalee Economic Corridor (CTEC), ADB November 2016	Development context, Vision of Sri Lanka, Role of the Corridor and corridor development framework, Analytical framework. Economic analysis (manufacturing and tourism), delineation and node selection framework, industry selection framework and shortlisting of industries, tourism as driver growth. Infrastructure planning for the corridor. Power, Transport and Urban. Regulatory framework assessment, Institutional framework, financing framework

7.4.1 Megapolis logistics hubs near Port of Colombo.

- **Megapolis -** The masterplan of the Ministry Megapolis and Western Development plans identify the creation of the "Logistics City" between the port and airport to cater to the logistics needs of both international nodes and creating the basis for new business development. The figure below outlines the phasing. In this study Peliyagoda is a phase 1 and Enderamulla is a phase 4 development.

The Western Mega polis has highlighted in their Masterplan two important concepts related to logistics.

- The Areo-maritime Trade hub concept.
- The logistics "city" at a Corridor between Colombo Port – and Airport

Areo-maritime trade hub concept

The Areo-maritime trade hub concept describes the role the Air Port and the Maritime City can offer to trade creating a "unique maritime, Aviation, Logistics and trade hub in Asia". The Maritime City at the port of Colombo and the "Airport city" development should cross benefit from each other being connected through a Port to Airport highway to be built through the "modera Bridge" across the Kelani river extending the to the Air Port Expressway. The maritime to air transport concept is commonly used when seaports and airports can benefit from each other economic and logistics powers. For example, in the Netherlands, the Port of Amsterdam, the city of Amsterdam and Schiphol Airport have a combined promotion strategy to attract business and tourism. The airport is used for export of fast and light cargoes such as flowers, vegetables, and fish. The Seaport provides for kerosene to the airport, has cruise terminals, RoRo and heavy general cargo berths. The city is the prime tourism attraction with heritage and cultural life. For Sri Lanka the Bandaranaike

International Airport (BIA) can bring cruise passengers within 40 min to the planned cruise terminal when road connections through the elevated highway have been established. The Maritime City can trade gems and garments and the hinterland provides for Tea and Rubber exports. Fresh fish (exports) and vegetables (import and export) can be transported efficiently through the airport and through the seaport. Cool storage facilities are required in logistics hubs for these trades.

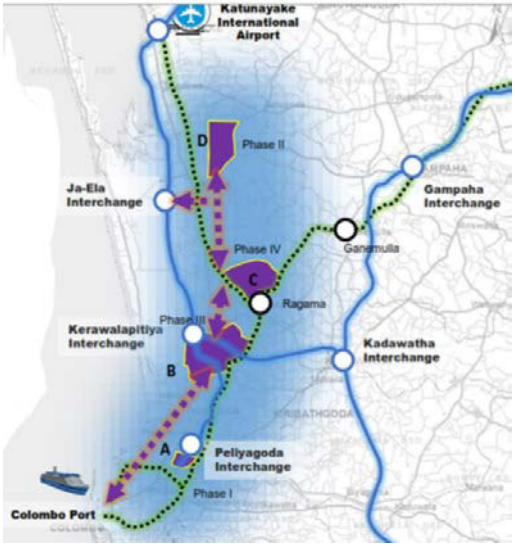
The Logistics city at a Corridor between Colombo Port – and Airport

The Western Mega Polis Masterplan outlines a concept plan for a logistics corridor. This encompasses several areas where logistical activities, warehousing, cargo distribution, value added industries, cold storage, light manufacturing, vehicle repair and other logistics activities can be developed. These developments together are mentioned as "Logistics Cities" in the masterplan. In principal these areas can be used according to the concepts described above as Dry port / FTZ and can become Logistics Hubs in future.

Table 7-3 Logistics Area

Phase	Logistics Area	In picture
I	Peliyagoda Interchange	A
II	Ja-Ela Interchange	D
III	Kerawalapitiya Interchange	B
IV	Ragama	C

Figure 7-5 Megapolis proposed Logistic Areas



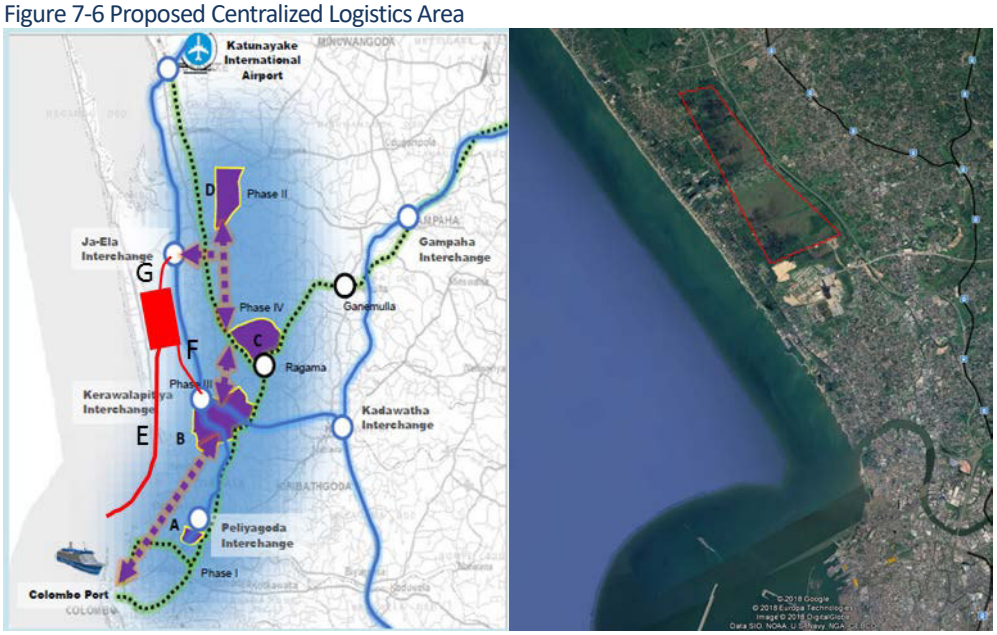
The logistics corridor concept plan will consolidate and link existing and potential logistics activities in the Western region. The four areas are to be connected through multi modal transport options such as dedicated roads, expressways and railway links for cargo and freight transportation. TheMinistry Megapolis and Western Development plans integrated residential clusters to provide housing near the employment centre in a good quality living environment.

MTBS Assessment:

The Logistics City development along road and rail makes sense for development and for the location of dry ports if sufficient land can be secured. The plan does have a major flaw that the expansion is geographically

separated over a number of areas without a clear reasoning. An alternative would be the acquirement of land north of the Muthurajawela power station, indicated red on the map below, to develop an integral Cargo Village as vast land (600 ha to 700 ha) relatively unoccupied/uninhabited and possibly available. This option ensures the accommodation of future growth on the same site, making use of economies of scale by utilising the infrastructure efficiently.

Figure 7-6 Proposed Centralized Logistics Area



Important is that the future port development "North Port" is connected with cargo corridors towards to the logistics areas. A so-called north corridor development (E in the picture) passing the Kelani River towards the Logistics area North of Kerawalapitiya interchange is required. Further the logistics area should be connected with Ja-Ela interchange (G in the picture) and Kerawalapitiya interchange (F in the picture). Future rail connection should also be planned for once Sri Lankan Railways plans cargo transportation by rail. The most logical path for the railways line would be along the road (E in the picture) and connecting to existing railway line near Ja- Ela Interchange.

7.4.2 Multi Modal study logistic hub proposal near Port of Colombo.

- **2012 Multimodal Study** - The latest 2012 Multimodal study financed and supervised by ADB and Japan Fund for Poverty Reduction identified Enderamulla as the most efficient location, but this study assumes a multimodal solution and includes a multimodal connectivity to Peliyagoda.

The main provision conclusion in 2012 was that the construction of a truncated Enderamulla ICD in 2020, together with the necessary complementary upgrades to the port railhead, the container control system and within the Peliyagoda ICD site, the project would be financially viable with a total cost for Enderamulla ICD of 403 million and a FIRR of 19%.

ADB

Technical Assistance Consultant's Report

Project Number: 50184-001
February 2020

Democratic Socialist Republic of Sri Lanka: National Port Master Plan

(Financed by the Japan Fund for Poverty Reduction)

The National Port Directions – Volume 1 (Part 5)

Prepared by

Maritime & Transport Business Solutions B.V. (MTBS)

Rotterdam, The Netherlands

For Sri Lanka Ports Authority

Asian Development Bank

The project mentioned that at least 70-75 TEU trains where required to meet long term capacity of about 1 million TEU handled by trains to and from Enderamulla.

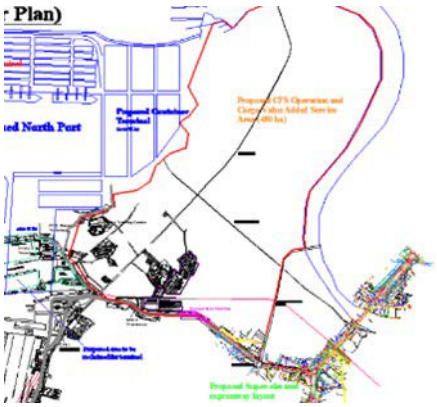
MTBS Assessment:
The dry port location is based on the use of rail mainly. Several issues had to be solved before this project could be lifted, major components were the railhead connection to Peliyagoda included in the proposal, land ownership issues, rail path allocation constraints, and lack of readiness by Sri Lankan Rail Authority has stalled the project in an early stage. Meanwhile the Elevated Highway project has come and is expected to solve part of the todays congestion issues.
Further, according to analysis on multimodal connectivity in the port, the efficiency component can be only be achieved when railheads are located near the terminals of the port to avoid double handling. This has been further detailed in the port of Colombo Masterplan. Should the Rail Authority implement the rail cargo solutions for the nation and the port in particular, then the port should be ready to accommodate by providing railheads near terminals. For South Port a rail track reservation is made for future connectivity (South port was basically designed without rail). The same applies to the proposed North Port development which should be planned with railhead connections. It is however to the Rail Authority developing a Rail Cargo section in their Masterplan to accommodate rail cargo transportation on the tracks in Sri Lanka. Especially in view of increased exports and port development is focussed first at South Port, increased truck traffic congestion maybe countered by shuttle trains to the Dry port(s). However due to the limited distances to Dry ports near Colombo, decisions to implement the multi modal connectivity are likely to be driven by economic returns rather than financial returns.

7.4.3 SLPA logistic hubs proposal near Port of Colombo.

- **SLPA Master Plan 2016 –** The SLPA "Cargo Village Concept" is designed at 450 ha located north-east of the port and south of the Kelani river in line with North Port development.

MTBS Assessment:
Though, logistics facilities adjacent to the port are preferable over an inland location, the area indicated is heavily populated. It seems unlikely that this land can be obtained. The assessment of 450 ha is reasonable in line with expected forecasts on container traffic and export and value added ambitions of the nation. The area should however be secured preferably at less inhabited land.

Figure 7-7 SLPA Cargo Village Concept



7.4.4 The role of SLPA in Dry Port Development and Exploitation

Currently, SLPA is involved in warehousing and handling of cargo. In a landlord port model, this activity should be performed by private parties. This development has already taken place in Sri Lanka, where cargo handling is recently liberalised. This frees up SLPA to fulfil a role as land lord in the dry port. The benefits for SLPA include:

- Being able to act as an impartial public entity.
- Port efficiency goals can be met by aligning dry port and port activities.
- Some revenues can be obtained from rent to invest in maintaining the dry ports.

7.4.5 Logistics road map

The above reviews of the multi modal studies and logistics concepts leads to a generic conclusion.
In order to have logistics functioning well within Sri Lanka a dry port concept should be introduced including ample space for the development of warehousing and logistics industries. These new locations have to be strategically addressed in view of the new export strategies of the Government.

First short term actions are required to improve current logistics. This includes quite a number of actions including new warehouse space in the port as short term solution and the development of Bloemandhal area for logistics as short to medium term solution. This is the only area where still ample space can be obtained in the proximity of the port and near rail connections. In the long run considerable space for logistics and related added value industries have to be created to cater for projected additional demand. Due to the fact that this is closely related to port expansion it should be secured well in advance. This area could be found close to the power station with hinterland connections to North port development by road and rail in the future. According to the Trincomalee – Colombo Economic corridr concept new dry ports can be created as part of the overall strategy on logistics. Each dry port should have a Free trade zone and shall act as "extended gates"[19] for the port.

The road map for logistics is here briefly described. It should be noted that this road map is closely related to the other part of this document such as the Trincomalee corridor development, the trade facilitation chapter, the warehousing chapter and the customs chapter, as issues and and discussions on these topics all contribute to an efficient logistics system.

In this paragraph the main actions for implementing an efficient logistics system are presented.
The main steps to improve the logistics in Sri Lanka are illustrated by the following activities split in short term actions, medium term action and long term actions. The activities marked with an asterix (*) would indicate that these actions would be in collaboration with other parties, authorities and institutions.

Short term actions (within one year):

1. Increase MCC warehousing capacity in the Port of Colombo
2. Improve the administrative documentation through acceptance of E-signature, digitalisation of documents and simple acceptance protocols
3. Improve customs related procedures (*)
4. Digitalisation of licenses
5. Ensure E-payment is allowed for all services
6. Create port community system (*)
7. Full electronic processing by Customs E-declaration, E-clearance, E-Payments (*)

[19] An extended gate is a facility in which the sea-going procedure on exports is already processed in the dry port. Customs clearance and sealing is already taken care of. The container should be able to be moved to the terminal without any additional administrative issues.

8. Customs to develop AEO scheme (*)
9. Improve efficiency on container scanning (*)
10. Implement electronic gate pass
11. Transfer MCC warehousing from BQ to new location[20]
12. Remove MCC and dangerous goods storage from BQ
13. Prepare for Bloemandhal area to develop warehouses and logistics
14. Install automation solutions (warehouse software) for goods descriptions and locations and introduce hand scanners systems.
15. Prepare for warehouse software to be connected to the to-be made port community system
16. Facilitate improvements on Free trade zones and investment incentives (*)
17. Formulate dry port action plan including defining strategically located land plots (incl. like locations, multi modal connectivity, free trade zone, bonded transport, warehouse strategies)
18. Ensure skilled labour for warehouse division

Medium term actions (2-3 years)

19. Establish modern warehouse facilities at Bloemandhal area.
20. Close warehouse IV and V and move to Bloemandhal area
21. Establish port community system for warehouse goods
22. Full electronic processing
23. Assign new areas for logistics in the neighbourhood of ports (For Colombo near power station)
24. Improve ease of doing business[21] through collaboration with authorities (*)
25. Prepare for land acquisition to become landlord on the dry ports
26. Prepare for green policies for logistics

Long term actions (>5 years)

27. Improve warehouse part of the port community system
28. Establish additional dry ports in line with formulated strategy and demand
29. Improve the green factor of logistics by implementing rules and regulation on engines used, type of fuel and concession regulation for private sector participation in the warehouse sector.

In Appendix X a detailed overview on timing of this roadmap is provided.

7.4.6 Recommendations

The container handling and Logistic activities in the port hinterland are dispersed and in heavily urban areas with little room for expansion.

R1. New logistics areas have to be assigned to complement the Port of Colombo and to facilitate the export strategy of Sri Lanka. Zoning for this should cover an area of about 450 ha in the first phase with options for further expansion.

R2. A case for centralisation of dry port areas should be made and less inhabited land seems available West of the E03. This would create optimal location to connect to New North Port development with dedicated cargo roads and linking the existing highways. Rail connection should be planned for in line with Sri Lankan rail Authority rail cargo transportation plans. Operational and financial feasibility studies with an underlying transport plan which includes the PAEH could offer further guidance.

[20] Unity terminal is the proposed location for short term additional warehousing

[21] The DB indicator is compiled with factors such as, starting an new business, dealing with construction permits, getting electricity, registering property, getting credit, paying taxes trading acress borders enforcing contracts, resolving insolvency.

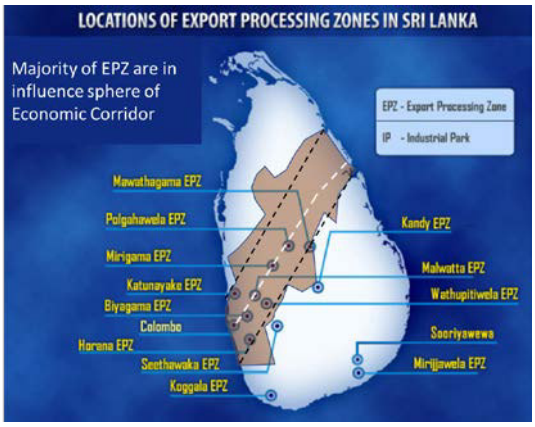
R3. It is recommended to assign SLPA as land lord of the single or multiple dry ports to enable to maintain a close connection with port planning.

R4. As mentioned in the"logistics road map" a detailed scheme or road map is proposed to create efficient logistics system. A timing overview is also presented in Appendix X . This entails the various steps to create efficient logitics in the future.

R5. Develop Bloemandhal area for logistics. This will ensure the option to develop in line with short term demand. The area should become a dry port area with bonded transport and with the development of a railhead in future.

R6. Secure additional land area near the power station for logistics developments in the future.

7.5 Colombo – Trincomalee Economic Corridor



The Colombo – Trincomalee Economic Corridor (CTEC) is a concept researched through ADB consultants and is based on supporting economic growth through facilitating with a network of FTZ/ EPZ along a main spine of highway expressway as a corridor connecting the Western Region including Colombo Port with the East Coast including Trincomalee Port.

The influence area is spread across 9 districts and impacts 14.2 million of population, about 70% of the total population and covers about 91% of the total industrial output of the country, according to the CTEC reports. The corridor is about 275km long or about 6 hours transit time at average speed of 45 km/h.

The Colombo - Trincomalee corridor is recommended to be supported by at least five elements on infrastructure:

R1. Connectivity to central region and industrial hinterland, proposed nodes and urban centres: A central Expressway along corridor spine A01-A06 with a 50km influence area on either side. Further multimodal strengthening of rail connectivity of trincomalee to dambulla and direct connectivity to Kurunegala would improve rail connectivity for Bulk-users near Colombo

R2. Urban infrastructure to support increase in urbanisation and enhanced quality of life. The Eastern corridor region infrastructure is one of the least developed with low road density and low level of urban infrastructure.

R3. Efficiency and effectiveness of water and power supply to support the competitiveness of industrial activity.

R4. Support infrastructure for Dry ports & inland terminals: Domestic container handling at the port could move inland to FTZ zones to reduce congestion at the port and to incentivize value added services along nodes at the corridor. These logistics hubs need warehouses and basic infrastructure on roads, watersupply and electricity (power) including waste managementplant and waste treament plants.

R5. Gateway capacity and efficiency: Port of Colombo will continue to remain the primary gateway for goods as well as for passeger traffic expansion with BIA and a second runway and Colombo Port is set to expand capacity and bring efficiency improvements.

Figure 7-8 Export Processing Zones

The Colombo – Trincomalee Economic Corridor encompasses the following main assets:

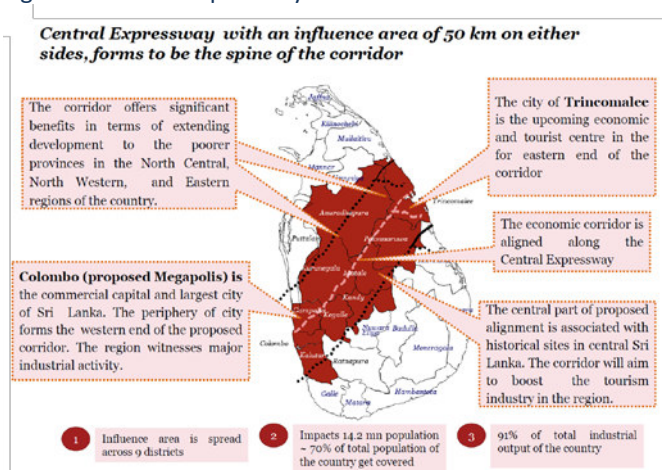
- Central Expressway and corridor development (to be developed)
- Focusing on Industrial sectors and value added industries (to be developed)

- One existing international airport, Bandaranike International Airport (BIA) (8.5 million passengers and growing at 6% CAGR with aircargo growing at 7% CAGR) to be expanded by a second runway to support future growth
- Two existing deepsea ports Colombo (dominant in EXIM containers and transhipment, 5.6 million TEU, 82 million tons) and Trincomalee dominant in bulk clinker, wheat, coal and refined products, 3.4 million tons). Both ports will be expanded in future leading to additional required logistical zones.
- Key existing tourism locations with historic sites, wildlife parks, beaches and religious sites.
- Skill development potential. Today trainings centres are now mainly concentrated in the western part of the corridor and eastern part needs capacity development of skill and vocational training.

Central Expressway and corridor development

The concept supports the national vision of creating a network of logistics hubs through main corridors attracting existing industries and new industries and to boost tourism in the region. The corridor would boost economy development through integration and synergizing industry, infrastructure, logistics and urbanisation through connecting urban zones with industrial zones and providing a favourable and competitive business environment. Furthermore, the corridor unlocks poorer provinces in the North Central and North Western and Eastern regions of the country.

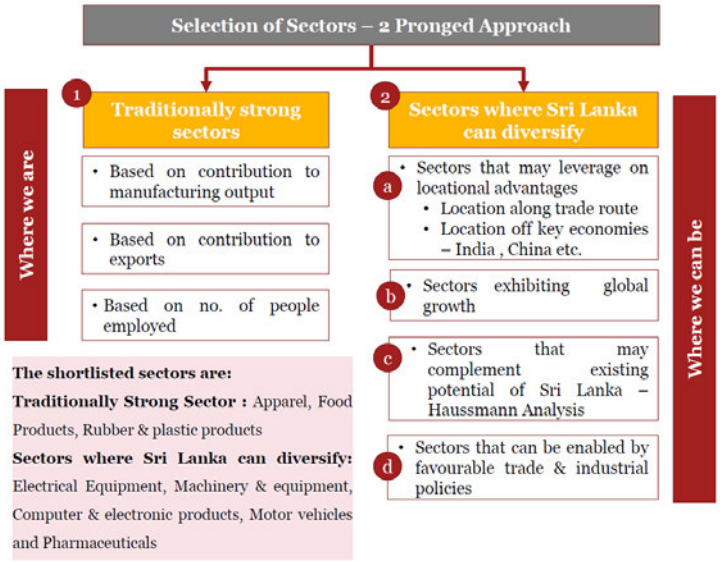
Figure 7-9 Central Expressway and influence zone



Focusing on Industrial sectors and value added industries (to be developed)

Through a two way method industry sectors and industries have been identified leading to the selection of 11 industries across 5 sectors for diversification apart from traditionally strong sectors like food, apparels etc. This have been illustrated in next figure.

Figure 7-10 Industrial Sectors development



The approach led to the following selection of industry sectors.

Table 7-4 Potential Industries

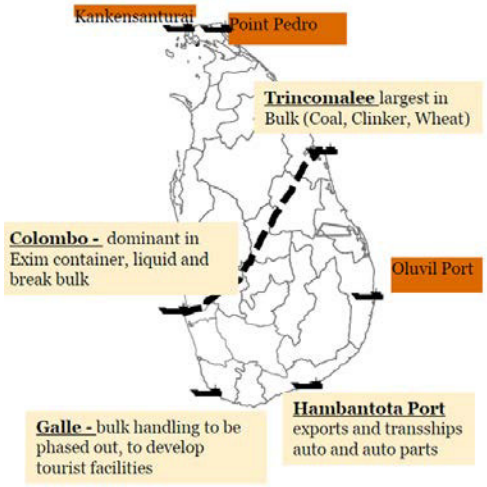
Sector	Industry	Trade route proximity	Regional synergies	Hausmann analysis	Global Growth	Final selection
Computer, electronic & optical instruments	Communication equipment	✓	✓		✓	✓
	Computer and peripheral equipment	✓	✓		✓	✓
	Electronic components	✓			✓	✓
Machinery & equipment	General purpose machinery	✓			✓	✓
	Special purpose machinery	✓				✓
Electrical equipment	Electric motors, generators, transformers	✓			✓	✓
	Electric lighting equipment	✓				✓
	Wiring& devices			✓		✓
Motor vehicles	Motor parts and accessories	✓	✓	✓		✓
	Motor Vehicles	✓	✓			✓
Pharmaceuticals	API & Formulations	✓	✓			✓

Source: CTEC report

Airport(s)

Central corridor region could utilise air cargo facilities to promote food processing, precision tools and luxury goods industry.

Figure 7-11 Ports and Economic Corridor



- Air cargo growing at 7% would require additional logistics facilities near the airport.
- A second runway will be required in future to accommodate growth.
- Integration with handling of sea cargo in coordination with port authority and operators could open up Sea-to-air transhipment potential.
- The current airstrip at Trincomalee is in restricted land area. Polonoruwa would need to connect with direct Road/rail links for air travel to become viable.
- Cruise passengers connect directly to the planned passenger terminal at Colombo port
- Crew changes for shipowners can be made easily through the airport and road connections
- Domestic airstrips could be developed to become part of the corridor network when feasible.

Source: CTEC report & MTBS

Ports

The two ports are relevant for the corridor concept: Port of Colombo and Trincomalee.

- About 35% of the total of 82 million tons cargo handled at Sri Lankan ports was Export-Import cargo (EXIM). Of which the majority handled by Colombo port.
- Gateway cargo is expected to increase also through the new Export Strategy of the Government
- Colombo port will be expanded to cater for future growth both on the gateway containers as well as for transhipment.
- Port of Trincomalee will be expanded to cater for larger break bulk commodities and bulk commodities
- The tourism function (cruise is developed in both ports).
- From a corridor perspective Colombo will continue to be the primary gateway for container traffic while Trincomalee on mainly bulk and break bulk cargoes. As such Trincomalee may specialize as "Energy Port"
- For Colombo the priority is to have direct highway connection through the PAEH and the New Kelani Bridge connecting to E02 and E03.
- For Trincomalee a port road is required to connect to logistic land near the port, A06 and the future expressway.

Source: CTEC report & MTBS

Logistic Nodes / FTZ / EPZ selected

After an assessment of the nodes based on a selection framework and shortlisting of nodes based on cost of development, a potential overview of nodes was prepared by the CETC report. The following nodes were selected along the corridor: Gampaha, Colombo-Kalutara, Kurunegala, Matale, Anuradhapura and Trincomalee. This is displayed in next figure.

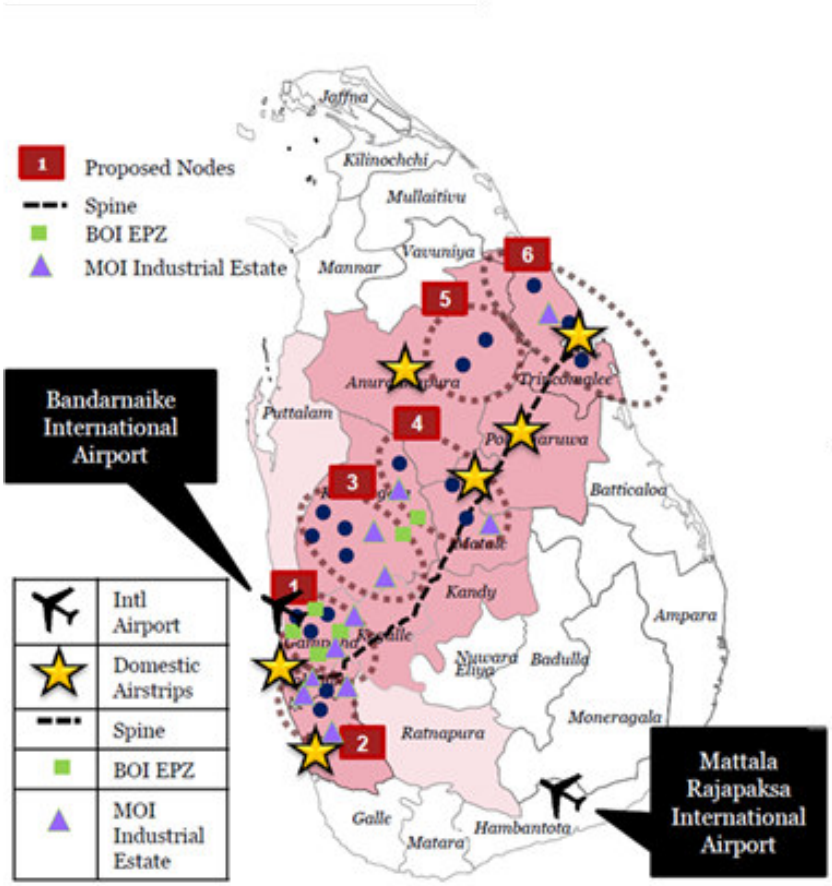
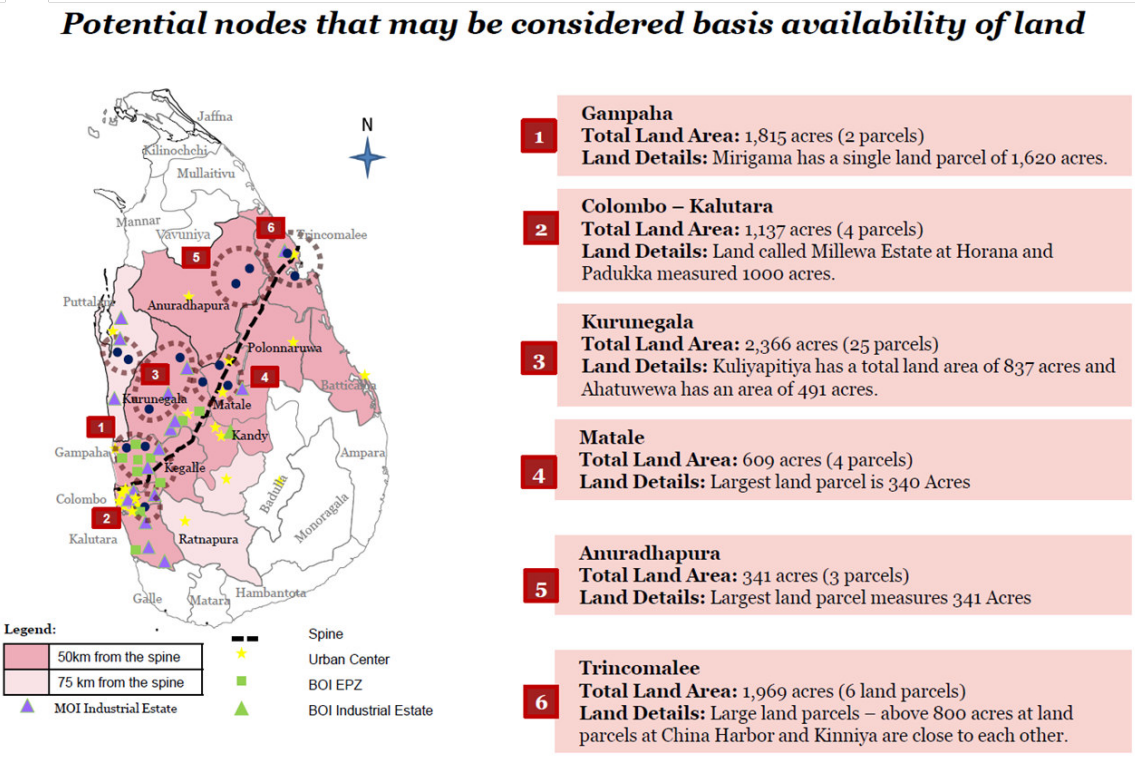


Figure 7-12 Airport and Economic Corridor

Figure 7-13 Industrial and logistics Nodes at Economic Corridor



Roads in the Colombo Trincomalee Economic Corridor

As mentioned, the main spine should be the Central Express Highway connecting the nodes with the two ports.

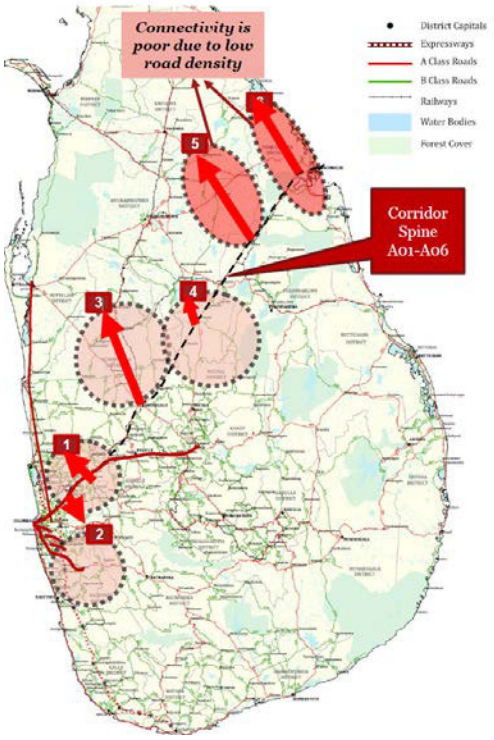
To connect the nodes with the express way the following connectivity observations have been made:

Figure 7-14 Nodes and Connectivity

Table 7-5 Existing Connectivity at Nodes

No	Node	Existing Connectivity
1	Gampaha	Connected through B class roads and E03 (toll road), Heavy congestion along major urban roads also due to container traffic.
2	Colombo – Kaltutara	Connected through both A, B and expressway (E01, E02), Heavy congestion along major urban roads connecting to the expressway.
3	Kurunegala	Land parcel at Kuliyapitiya and hettuwewa are not directly connected to Highway but B road connectivity to A10, A28 and A6 exists. Last mile connectivity may be an issue for some land parcels
4	Matale	Connected through A class and B class roads. No capacity issues identified.
5	Anuradhapura	Connected through A class roads with little traffic but last mile connectivity may be an issue for some land parcels.
6	Trincomalee	Low road density north of the corridor may require development of new tertiary and B roads. Trincomalee port road required towards the west to connect to A6 and future central expressway

Source: CTEC report



Other observations on roads:

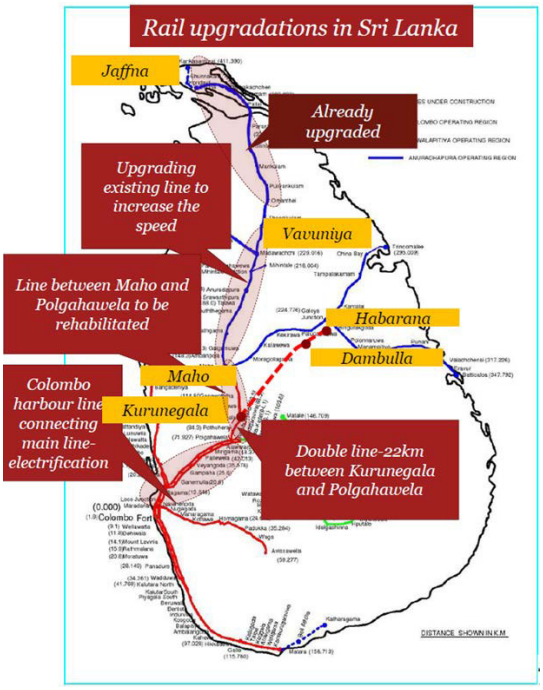
- Major truck road stretches of A01 and A02 near Colombo are heavily congested with mix of urban, suburban and regional traffic.
- A01 Colombo- kandy stretch faces congestion and capacity issues as primary access route for local industrial areas.
- A06 Highway to dambulla passes through urban settlements and experiences congestion due to mixing local short distance traffic with long distance traffic.
- A06 stretch between Dambula and Trincomalee is not very congested and further land area is available for expansion in the future to a full expressway.
- Majority of the industrial centres are 30-50km at distant from the spine.
- Most industrial areas have good connectivity through E01, E02, A01 and B class roads.
- Anuradhapura has the least road density in Sri Lanka and the local node will require connectivity to the spine and gateways.

Rail in the Colombo Trincomalee Economic Corridor

The following observations have been made:

Figure 7-15 Rail Upgrades

- Railways work with old rolling equipment.
- Rail freight movements are limited to specific arrangements for the supply of Oil, Coal and Wheat flour.
- Urgent need for track improvements to enhance track speed from 30 km/h to 100 km/h.
- Polgahewala to Maho junction has become a constraint to North-South as well as East-West connectivity. Line doubling is required.
- New line planned between Kurunegala and Habarana via Dambulla will reduce travel time by 1.5 hours to Trincomalee.
- Additional junction relay capacity is required between maho and Kurunegala to improve transit times.
- More than 40% of trains face more than 30 min delay.
- More than 60% delays are caused by infrastructural issues on rails and sleepers.
- About 30% of the overall track is under speed restrictions of 30 km/h due to significant safety risks.
- Existing rail mode share of passengers (5%) and freight (1%) is low due to network inefficiency and delays.



Improved rail connectivity to Trincomalee are required to facilitate efficient corridor with nodes connected through multi modal connectivity of rail and roads.

7.5.1 Recommendations

Above paragraphs on Dry ports / FTZ and Corridors lead to the following recommendations:

R1. The Central Expressway between E03 and Trincomalee needs to be developed and it's design and land acquisition is in process.

For the Colombo Trincomalee Economic Corridor, the Central Expressway needs to be developed (see picture below). It connects through Colombo Port, the PAEH, the 2nd New Kelani Bridge, to Gampaha and Kurunegala and follows A6 towards Trincomalee.

Figure 7-16 Proposed Central Expressway

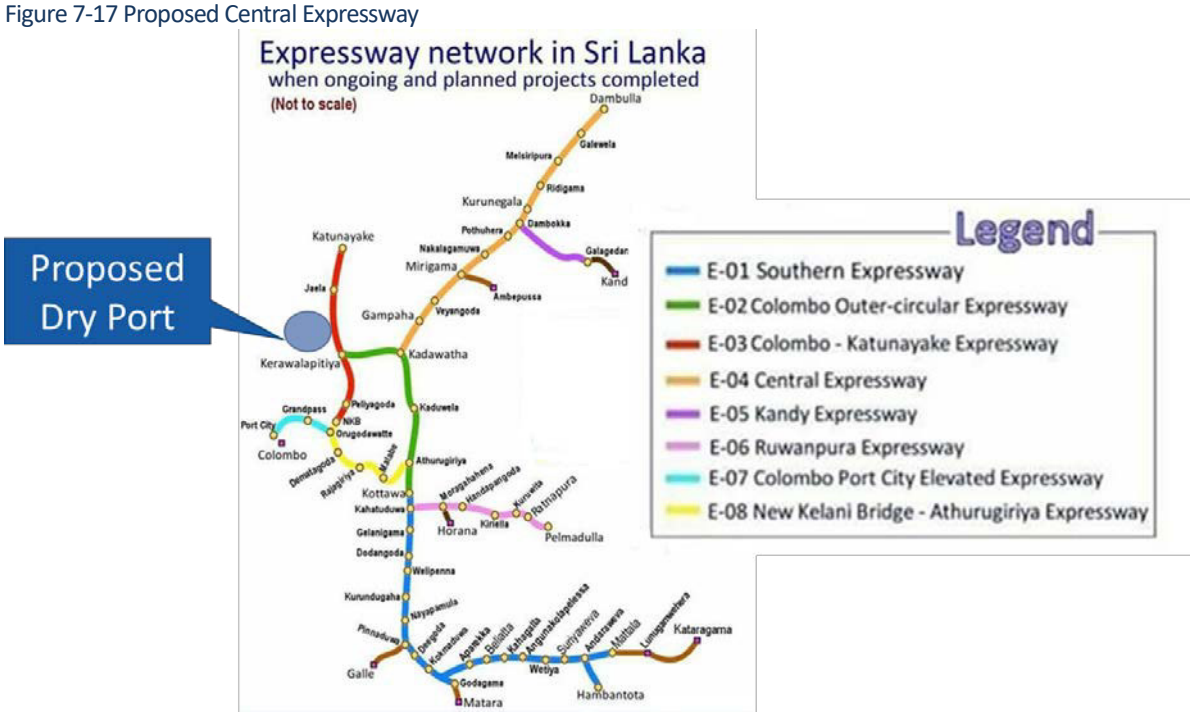
R2. Identification of land areas for new logistics zones/ industrial export processing zones in the proximity of Port of Colombo port (Colombo-Gampaha region).

The following priority applies:

- The first priority is to develop MCC warehousing in the port and near Bloemandhal Area (as specified in the Port of Colombo Masterplan)
- The second priority is to select land areas for new logistics zones in the proximity of the port. Proposals have been made in the masterplan of the Ministry Megapolis and Western Development but a centralised logistics land North of Kerawaiapitiya power station would also be proposed. In total about 450 to 600 ha may be required upto 2050.

  Following loaction is an option to develop a custom zone area which could be expanded to a cargo village or logistic zone or dry port/FTZ.

Figure 7-17 Proposed Central Expressway



Steps to identify these areas are as follows:

- Landuse planning : Identification of nodes and formalisation of land-use planning on logistics zones/industrial zones and urban zones through Governmental institutions like UDA and local districts councils.
- Land consolidation: Identification of specific land areas (acquisition and land consolidation)
- Creating institutional framework: develop institutional framework, who develops, operates and maintains the to be developed lands. Which PPP structures could be applied?
- Investment promotion and facilitation: Set up proper promotion for the marketing to potential investors.
- Create the appropriate trade facilitation to support the targetted industries choosen for settlement in Sri Lanka.
- Land area development: Develop logistical and or industrial land based, in lign with demand, with settlement requirements such as water, power, drainage and road connections to the Central Expressway and local communities. Operate and maintain areas.
- Urban infrastructure development: development of urban infrastructure, in lign with demand, in identified zones, operate and maintain.

R3. Identification of land areas for new logistics zones/ industrial export processing zones in the proximity of Port of Trincomalee.

The following priority applies:

The first priority is to select and secure land areas for new logistics zones in the proximity of the port. Proposals been made in the Trincomalee Masterplan. Similar steps apply as above.

R4. Additional dry ports / FTZ / EPZ and logistic zones should be developed along the spine of the Colombo – Trincomalee corridor.

The priority steps apply, similar to the steps mentioned above.

R5. Develop multimodality with rail connecting to the nodes with first priority to the western region selected logistical hubs. The rail development should follow the National Rail masterplan.

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PART D: Innovation, Technological Developments & Trade Facilitation

8 Technology and Port Community Systems

8.1 Introduction

This chapter describes the international best practice on Port Community Systems. Technology has advanced quickly and data is more easily shared between systems due to established protocols and uniform data elements. Moreover, many systems today are based on open software which allows users to create their own front end for monitoring and sharing information. In the Port sector challenges exists as there is discrepancy between state of the art systems having electronic front ends and dated systems often based on centralized main frame systems. The port community systems are introduced to create easy communication between varies parties in the port community so that information is entered only once and shared in the right fashion at the right time with each other.

The following approach has been used for this chapter:

- Paragraph 8.2 describes the institutional best practice on Port Community Systems;
- Paragraph 8.3 describes the current situation in Sri Lanka;
- Paragraph 8.4 covers the IT Way forward; and
- Paragraph 8.5 provides the recommendations.

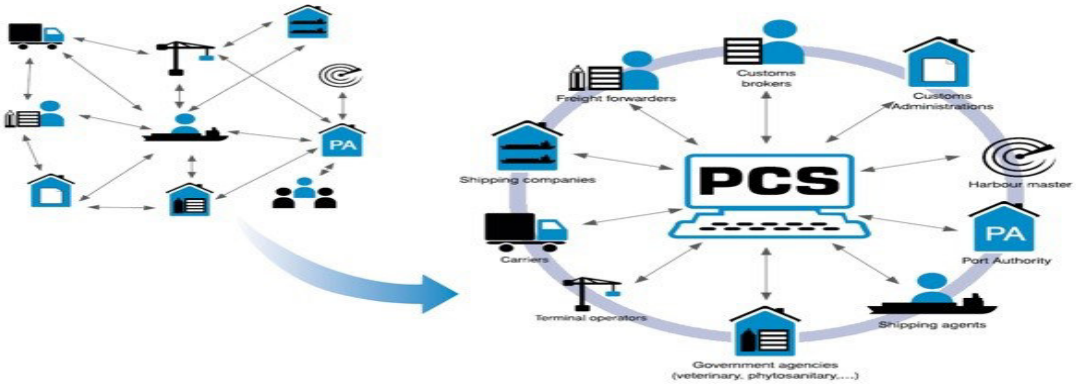
8.2 International best practice

Across the world, the implementation of port community systems (PCS), either in individual ports or as national systems is widespread. A Port Community System is an electronic platform that connects the multiple systems operated by various organisations that operate in a seaport or inland port community. It is shared in the sense that it is set up, organised and used by firms in the same sector – in this case, a port community.

A PCS offers for the electronic exchange of information amongst all port and logistics sectors and is recognized as the most advanced method for the exchange of information within a single or national port community infrastructure. A PCS has the ability to serve as a National Single Window or to integrate into a National Single Window. A PCS is therefore pivotal in the Single Window concept and will reduce duplication of data input through efficient electronic exchange of information. Moreover, it will cut communications and paper administration as information is enter once and re-used in multiple formats for users in the logistic chain.

The diagram on the left hand side shows the high level of communication and information exchange. The right hand picture shows the Port Community system where information is securely stored and shared between respective port stakeholders.

Figure 8-1: Schematic Overview PCS



In Singapore, South Korea and most of the European ports in which a PCS has been implemented, the port authorities in those ports played a key role in the creation and setting-up of the PCS or single window. The PCS in Rotterdam, Amsterdam, Antwerp, Barcelona, Hamburg, Le Havre and various other ports have been set up through involvement of the port authority.

Innovation drives automation and digitalisation

Today automation has come to a new era of development with the introduction of SMART applications mobile apps and the use of GPS data. The latter can bring advantages through for example:

- Tracking and tracing;
- Truck routing and avoidance of congestion;
- Truck on-demand (reduce waiting times at gate);

Information technologies also drive the modern information flows. Therefore, Port Authorities focus on digital information platforms such as port community systems to inform the port users.

Four main systems are mainly implemented by port authorities:

- Port community systems;
- Paperless custom;
- Digital bill of ladings (not only in container shipping but also in bulk shipping); and,
- Digital orders in the transport chain (container release orders, pick up orders etc.).

It should be noted that automation reduces unskilled labour employment, resulting in higher skilled labour requirements. This development changes the common labour setting in ports from low skilled to high skilled labour.

There is cultural resistance to change hence from an authoritative practice to system and procedure driven introduction takes time. For the Port Community System and related automation to reach the expected superior standards, there are requirements such as legal compliances, investment, approvals, customization and acceptances by parties involved. Introduction, implementation, alter course to provide an efficient process flow, investment on hardware, skill based training. These will therefore require, announcements and conferences to educate all stake holders.

A replacement of existing systems, methodology, computer hardware, operating systems, databases is therefore minimised if the missing but critical software is selected and introduced with a road-map. Therefore, a gradual but a prioritized project has to be constructed with clear objectives and milestones and determined investment. This will let selectors to use Data on a platform free environment, Computer resident or Cloud

Based, Mobile Technology supported, Push and Pull features for fast decision making. Information sharing, supervised payment gateways and meet legislations, please the regulators and supervisory bodies to receive alerts are a few procedures that need to be change in order to provide an excellent port community base solution.

A Port Community System has the advantage of linking other ancillary services using the benefits of "5G Wi-Fi connections set to be three times faster than 4G, starting with 450Mbps in single-stream, 900 Mbps (dual-stream) and 1.3G bps (three-stream). This huge growth in IoT and smart devices, 5G's speed and capacity will enable an even more rapid arrival of this connected future."

With the introduction of a Port Community System, parallel functions linking through automation to an electronic platform is achieved that connects the multiple systems operated by a variety of organisations that make up a seaport and extend to other business and national organizations engaged with national economic drive.
Port Community Systems can play a major role as Countries move towards the Single Window environment; adoption of new regulation and make valuable contribution to the harmonisation and coordination of reporting formalities, processes and procedures. Countries such as the Netherlands and Spain started their PCSs in the 1990s.

A Port Community Systems offers a standardised communication platform in order to improve the systems in terms of punctuality, reliability or costs and, on the other hand, the need to increase competitive position among ports. It lets good collaboration with the key authorities, as well as with stakeholders, potential customers and local trade associations. Users to the Port Community System will be trained through workshops with the end users allowing a fresh group of academics in modern logistics in supply chain.

Since the Port Community System (PCS) is ideally placed to form the foundation or backbone of the Single Window vision the number of ports connected to a PCS can integrate functions of Port of Colombo and extend to all national ports of Sri Lanka. Through this neutral and open electronic platform enabling intelligent and secure exchange of information between public and private stakeholders it lets improve the competitive position of the sea ports' communities leading to optimising, manages and automates port and logistics processes through a single submission of data and connecting transport and logistics chains.

Direct influence and immediate benefits of having a Port Community System

- Easy, fast and efficient EDI information exchange, re-use and centralisation, available 24/7/365;
- Customs has "service level agreements" with PCS users to manage the electronic exchange of information between different parties on their behalf;
- The Single Window allows parties involved in trade and transport to lodge standardised information and documents tightly integrated with reduction of paperwork by electronic handling of all information relating to exports, imports, transhipment, consolidations, hazardous cargo and maritime statistics reporting and declarations;
- Status information maritime and other statistics, control, tracking and tracing through the whole logistics chain;
- Transparency of Port procedures and processes and practices; and,
- Support the ambitions to meet global carbon reduction requirements.

The functionality of a PCS is aimed at eliminating unnecessary paperwork which can clog up cargo handling. Using electronic data exchange, the PCS is an effective real-time information system; fast, focused, flexible and multifaceted, it aims to improve efficiency at all stages of the process of manifesting, through vessel discharge and loading, Customs clearance, port health formalities and delivery in and out of the terminal. As well as the above, the PCS offers improved security, cost reduction and potentially more competitiveness for each user.

A Port Community System links the different actors of the logistic community and acts as a Risk Management platform for regulatory bodies like the Customs and the Ports Authority. It is an Inter-Organisation Information System, namely a Business-to-Government one that sits in between the key players of the Logistics Supply Chain to enforce the World Customs Organisation SAFE Framework around the world. The success of a Port Community System depends on factors ranging from its acquisition to the complete satisfaction of the different Stakeholders that form the Logistics Supply Chain. The success of such a system plays a fundamental role in positioning as a competitive regional trade hub in the region and providing at the same time, considerable benefits to the local business processes and the local logistics conglomerate.

The demands expressed can be facilitated with the use of advance information technology based programmes and equipment. Where it is possible, cloud based shared services and resources need to be considered. Proven products with the least modifications must be considered and where the manual practices were directly automated needs to be revisited and deeply analysed. With the findings introduction of simplified upgrades implementable at the shortest time can be considered. Where it allows, duplication work practices must be stopped. Drive for excellence and quality ISO and IMO objectives must be declared as goals and linked to the performance measuring matrix.

Reliance on handwritten notes, VHF messages, Voice Calls need to be regulated through data mapping and clearly entered to applications that are easy to use. Extra attention on mobile technology based apps will serve the customers in the foreseeable future.

Table 8-1: Proven Port Community Systems

Product Name	Origin	Modules	Remarks web site
PCS	Singapore	Multiple	https://www.portnet.com/WWWPublic/products.html
PORTBASE	Netherlands	Multiple	https://www.portbase.com/en/
Uni-Pass0	South Korea	Multiple	https://www.customs.go.kr
Global Institute of Logistics	U S A	Multiple	www.globeinst.org
Actual I T	Slovenia	Multiple	http://www.actual.si/?main=2
Indra	Madrid, Spain	Multiple	http://www.indracompany.com/en

Two examples will be mentioned here:
Please also note that the single window is also addressed in the chapter on Customs. There the South Korean example on their single window “UNI-Pass” is discussed.

Example: Singapore Port Community System

A PSA flagship IT solution – PORTNET PCS is the world's first nationwide business to business (B2B) port community solution and a winning entry in the National Infocomm Awards (2006). It has provided the logistics industry with a single sign-on network portal. Through it, PSA has connected shipping lines, hauliers, freight forwarders and government agencies, helping them to manage information better and synchronise their complex operational processes. From managing complex transhipment processes of shipping lines (EZShip), supporting slot exchanges among alliance partners (ALLIES™), enabling companies to monitor performance and make critical business decisions (TRAVIS™), integrating port documentations seamlessly with the haulage processes and workflow (Haulier Community System™) to providing a documentation portal between

shipping lines and shippers (CargoD2D™), PCS simplifies and synchronises millions of processes for customers moving their cargo through Singapore. Over 10,000 integrated users rely on the system's unparalleled capability to provide real-time, detailed information on all port, shipping, and logistics processes crucial to their businesses. PCS processes more than 220 million transactions a year. It saves about S$ 1 billion (USD 667 million) annually for the trading community … together with Singapore Telecoms, Port of Singapore Authority, and Civil Aviation Authority of Singapore … shipping agents, and air cargo agents), financial institutions (e.g., banks), and port and airport.

The efficiency of the Port is enhanced by IT and operational systems, and by the infrastructure Singapore provides in general. While one could develop parts of this system easily, it is their combination that makes it difficult for another Port to compete …

PORT OF SINGAPORE AUTHORITY's more complex plans can also be handled, by automating the communication between the port users and PSA as well as among port users themselves, PSA further extended the usefulness of PCS to the maritime community by linking it to various users and authorities.

Figure 8-2 PSA port community system

The PCS supports features such as:

- Flow-Through gate
- CITOS (ship and yard planning)

Flow-Through Gate

The Flow-Through Gate, introduced in 1997, is a fully automated system that identifies container trucks and gives drivers instructions within 25 seconds. It handles an average traffic flow of 700 trucks per peak hour, and 9,000 trucks per day.

After a manifest is submitted through PCS, the fully automated and paperless process at the gate clears trucks entering the port within 25 seconds, with the following steps:

- The truck arrives at the in-gate. The driver taps his PSA pass on the Self Service Terminal (SST) and verifies his identity through a fingerprint biometric reader or keys in his Personal Identification Number (PIN).
- The truck is weighed at the weighbridge.
- The gate picks up the truck's identity from the In-vehicle Unit (IU) at the dashboard.
- The gate's Container Number Recognition System (CNRS) captures the container number via Closed-Circuit Television (CCTV) cameras.
- The system checks the driver's identity, truck's identity, weight and the container number against the manifest and clears the truck for entry.
- The system sends a message to the driver's mobile phone or Mobile Data Terminal (MDT) on the exact position in the yard where the container will be stacked.

CITOS

Few examples of how CITOS directs port operations:

- Berthing System
- Ship Planning System
- Yard Planning System
- Resource Allocation System
- Flow-through gate
- Reefer monitoring

On a typical day, 60 vessels of different sizes call at the port. Although a high number of them arrive out of schedule, berth planning system allows most of them to be berthed on arrival. Planning begins 72 hours before the ship arrives, when the shipping line applies for a berth and sends ship stowage and connection instructions to PSA Singapore through PCS. Once berthed, the quay cranes unload boxes destined for other ports and load boxes brought in by other vessels. The prime movers are tracked individually via the Global Positioning System (GPS) and distributed dynamically among the vessels. The prime mover moves off to a container holding area in the yard. There, the yard cranes lift containers from prime movers and stack them in the yard. The sequence is reversed for delivery out of the yard to a connecting vessel. Containers are not stacked in a random manner. When the information is keyed into the system through PCS, CITOS automatically generates ship stowage plans and yard layout plans based on factors, such as:

- Ship stability (for stowage planning)
- Weight
- Destination
- Size
- Special requirements (e.g. reefers, dangerous goods, out-of-gauge cargo, tight connections)

This allows PSA Singapore to:

- Maximise land use and optimise container retrieval
- Track the location of each container
- Maximise resource productivity by planning ahead

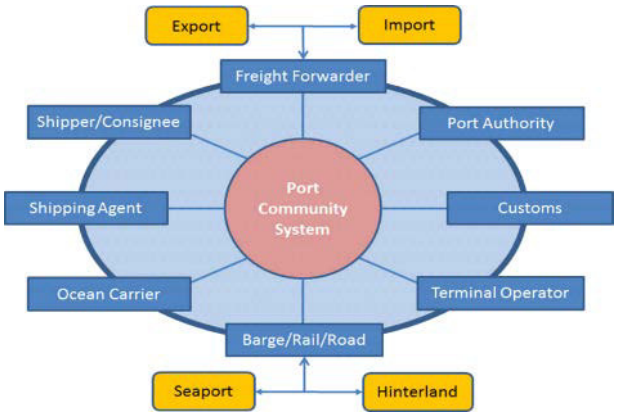
Example: Rotterdam Port Community System

Through the Rotterdam Port Community System, Portbase offers over 40 different services to approximately 3,200 customers in all sectors in the logistics chain. The system is the digital connection to all smart Dutch ports, has a national coverage and is available for all port sectors: containers, general cargo, dry bulk and liquid bulk. Everyone in the logistics chain can exchange information through PCS easily and efficiently.

Previously, companies had to organize matters such as pre-reporting a vessel, the status of a shipment, export documentation, loading/unloading papers or communication separately and by e-mail, fax or telephone. Thanks to the Port Community System, those days are over. Everything is now merged into a single system. This results in increased efficiency, lower planning costs, better and transparent planning, faster handling and fewer errors.

The services within the Port Community System focus on all port sectors: containers, break bulk, dry bulk and liquid bulk. All the links in the logistics chain can easily and efficiently exchange information through these services. The Port Community System offers each of these target groups its own package of tailor-made services. Through a service selector you can easily find the service you want.

Figure 8-3: Actors PCS



Source: Port of Rotterdam

The port base systems organize for example the flow of information to allow containers to swiftly move between terminals and modes of transport.

On Maasvlakte 2 for example, there are two new container terminals RWG and APM Terminals MVII and they request carriers, forwarders and shippers to electronically notify all relevant container information in advance. Portbase is the portal for this. The submission of all necessary information in advance applies equally to import and export cargo, as to trucks, trains and inland barges. Through correct pre-notification, the delivery and/or collection of containers becomes easier than ever. Every terminal visit by proceeds efficiently. Neither RWG nor APM Terminals MVII has a reception building or pneumatic dispatch; neither is set up to solve administrative issues or Customs matters at the gate.

The main features of Portbase in this case are:

- Organise export documentation
- Organise import documentation
- Truck and cargo arrival notifications
- Organize arrival and cargo to be delivered / collected by truck
- Organize arrival and cargo to be delivered / collected by train
- Organize arrival and cargo to be delivered / collected by barge

Other functions of Portbase are sharing information and send notifications between systems and between persons such as:

- Ship arrival/departure
- Barge arrival/departure
- Exchange notice of readiness
- Customs procedures
- Container Freight station notifications
- Container depots notifications
- Container and tank cleaning notifications
- Container arrival/departure notification
- Equipment interchange messages
- Container released for pick-up
- Finding information on auxiliary services such as agents and ship agents, bunkering, water supply, power supply, ship maintenance and repair, ship waste, supply industries, chandlery (spare part, provisions, nautical equipment, cleaning products etc.

How Portbase Works
Each service includes multiple service processes. These processes describe the required message exchange and interaction between the parties. This involves messages between systems (system messages) and messages between people (notifications). The platform ensures that the processes are in accordance with the established rules. Thanks to the central database is optimal reuse of data. Companies need to provide data, but only once.

Benefits
The Port Community System centralizes all information and the days in which companies had to develop and maintain a whole range of bilateral connections by telephone, fax and paper are over. All the information exchange in the ports now runs efficiently through a single hub. The services available in the Port Community System provide concrete savings in time and money from day one. The benefits:

- Greater efficiency;
- Lower costs;
- Better service provision;
- Better, more transparent planning;
- More rapid throughput times;
- Fewer mistakes;
- Optimal re-use of information;
- Available 24/7.

Security
Security is at very high standards with features such as: Information security manager, security audits, and the system is ISO-27000 (datacentre security) certified and the system has dual redundancy, so if one physical system fails the other takes over in real time.

Costs
Portbase is a non-profit organization. Companies only pay a fee for the use of services with demonstrable added value. These costs are minor compared to the advantages offered by the services. Financial support for services of strategic importance to the port is obtained from the general revenues of Port of Rotterdam and Port of Amsterdam shareholders. The service pages of this website in the services or a personal contribution.

Invoicing
Billing is monthly. Portbase makes prepay customer a realistic estimate of the number of anticipated transactions. Once a year off place (similar to the billing method of energy companies).

8.3 Current situation

Today no port community system is available. Digital communication is still limited and mainly through email. A lot of communication is done through phone and even fax is still used.
Many procedures require original documents stamped and signed which hamper the administrative efficiency and causes many delays.

The following tables illustrate the documentations required in the import of an LCL and the import of an FCL container.
It clearly shows that the system is too much depending on paper documents, inefficient and cumbersome.

Paperless procedures through digitalisation and innovation is required to create more efficient and transparent import and export procedures. A single window through a Port Community system is considered the way forward.

8.3.1 Manual documentation in the activity chain

In this paragraph two activity chains are explained:

1. LCL cargo clearance & delivery process
2. FCL import container: cargo clearance & container delivery process

The number of manual documents applied in this chain is illustrated. In the same table the modern practises are detailed to understand the difference between systems applied. The results are quite obvious; the number of administrative documents in the manual process is numerous, **up to seven copy documents to get to a delivery order, involving a lot of process time and administrative checks and administrative burden and limited transparency.** This compares to a **semi-automated paperless solution** in which approvals are made through the systems through status checks and status updates. In this way the administrative flow is reduced and paper is eliminated. Further the system becomes very transparent, each party involved knows the same status.

Table 8-2: LCL cargo clearance & delivery process

Process / Activity	Current situation Colombo	Benchmark International best practices
Cargo declaration	E-declaration or manual	E-declaration
Container arrival notification	Fax/Email from shipping line to agent	Automatic notification
Agent request for de-stuffing	From agent to terminal; advanced guarantee payment to SLPA	Online request from agent to terminal; based on existing guarantee running account
Cargo unloading/de-stuffing (out of container)	Manual check Consignee comes to BQ administration building to check (in cargo booklets) if the cargo has been de-stuffed from the container and moved to the SLPA warehouse	Online notification after de-stuffing
Import dues (to Customs)	Payment (cash or transfer); payment slip stamped by Customs. If cargo has been submitted to the warehouse, the consignee goes to Customs office (outside port) to pay the customs fee	Online payment
Port dues (to Port Authority)	Payment (cash or transfer); payment slip stamped by Port Authority. Consignee pays port dues to Port Authority at SLPA office (outside port)	Online payment
Delivery order (request from Consignee to SLPA to deliver)	Manual (3 stamps required) Consignee returns to BQ administration office to obtain a	Online

Process / Activity	Current situation Colombo	Benchmark International best practices
	stamp for the delivery order (after showing payment receipts of Customs dues and Port dues)	
Cargo delivery to Consignee	Manual Consignee goes to SLPA warehouse to pick up the cargo upon submission of • delivery order Customs • delivery order SLPA • customs declaration • copy bill of lading • gate pass • landing & delivery payment slip • storage payment slip Consignee waits outside warehouse until SLPA port employees bring (unpalletised) cargo to the entry of the warehouse; Consignee loads cargo into truck	Palletised Warehouse operator loads cargo with forklift into consignee's truck

Table 8-3: FCL import container: cargo clearance & container delivery process

Process / Activity	Current situation Colombo	Benchmark International best practices
Ship arrival; ETA from shipping line to Port Authority	Email/Fax	EDI (Electronic Data Interchange)
Manifest	E-manifest (BAPLIE) 99% online – 1% manual	E-manifest (BAPLIE) Online
Cargo customs declaration by consignee	E-declaration	E-declaration
Import dues (Customs)	Payment (cash or transfer) If container has been discharged at the terminal, the consignee goes to Customs office (outside port) to pay the customs duty	E-payment
Port dues	Pro-forma disbursement account Advanced payment (online) Ship's agent pays port dues to Port Authority	E-payment
Container arrival notification	Shipping agent informs consignee on arrival container in stack	Automatic notification
Handling dues	Terminal charges shipping agent for the handling Monthly settlement Shipping agent charges to consignee:	

Process / Activity	Current situation Colombo	Benchmark International best practices
	• Quay move • Stack move • Storage • Delivery move	
	Consignee settles payments (cash or online) before pick-up of the container; obtains landing a delivery payment slip	E-payment
Delivery order (request from Consignee to SLPA/terminal operator to deliver)	Consignee has to complete the delivery order by obtaining approval by: • Customs • Terminal operator • Ship agent	E-notification to Port Community System and/or Terminal Operating System
Port in-gate process: Truck sent for pick-up	Manual • Customs issues copy of gate pass (paper) to the agent/importer upon payment of custom declaration • Trucker needs port access pass from SLPA (sticker) • Wharf clerk provides copy of gate pass to truck driver (paper)	Security check • Automatic identification truck driver • Truck license plate
Terminal in-gate process: Container delivery to Consignee	Manual Truck drives to terminal to pick up the container upon submitting: • Delivery order Customs • Delivery order terminal operator • Dustoms declaration • Copy bill of lading • Dustoms payment slip • Copy of gate pass • Landing & delivery payment slip	(semi-) Automated Truck driver is invited to pick-up the container after finalisation of the online container delivery order Security check • Automatic identification truck driver • Truck license plate • Connecting container number to truck license plate
Terminal out-gate process	Trucker receives Equipment Interchange Report (EIR) after collection of the container	Trucker receives Equipment Interchange Report (EIR) after collection of the container, including gate pictures of equipment
Port out-gate process	Truck drives to Main Gate at port boundary Customs checking procedures • Wharf clerk delivers original gate pass to Customs (including truck license plate number and seal number)	Truck drives to port gate Security check • Automatic identification truck driver • Truck license plate

Process / Activity	Current situation Colombo	Benchmark International best practices
	• Truck driver delivers loading pass to Customs • Custom issues customs seal Customs issues new gate pass (to drive to Customs Inspection area)	
Customs Inspection	Three examination modes: • Green: no examination (5-7%) • Amber: quick examination (+90 %) • Red : full examination (3-5%)	Upon Custom request, truck driver needs to visit Custom scanning facility for examination

8.3.2 Key observations and bottlenecks

The following key observations and bottlenecks on systems are mentioned in this table. The emphasis has been made on the guidance of revenue generating support systems but also the observations on cost control systems aspects are included.

Table 8-4 IT systems on revenue stream - Key Observations

Category	Issue	Severity
IT systems on revenue stream		
General	Manual processes and paper based approvals cause high administration and time consumption	High
TOS	The TOS of JCT (Navis Sparcs 3.10 and Navis Express) are outdated and do not support modern yard utilisation, real time yard planning and web based applications, GPS and modern gate applications	High
TOS	TOS system to provide a dashboard management system with relevant management information (productivity and performances)	High
TOS	Ability to upload files and amend records within the permitted timeframe	High
TOS	System should be able for to bill activities directly on handlings and storage and share the invoice lines with the finance system.	High
TOS	Babplie files often have errors leading to communication, corrections by shipping agents	High
TOS/ harbourmaster	Berth planning system to be shared between container terminals and harbourmaster and linked to scheduling system of vessels on calendar planning	High
Gate automation	JCT has no gate automation, once TOS system is updated OCR gate systems become feasible (OCR and automated truck driver passes).	High
Damage control	Equipment Interchange Reports (EIR) are made manually. These reports lack photo's. Accident reports and claim handling is subject to become more efficient through OCR scanning.	Medium
Harbour master	Tug and pilotage recording and invoicing is subject to manual registration.	High
Harbour master	Ship registry, berth planning, mooring and de-mooring is not integrated with invoice recording. A Harbour Information Management System (HaMIS) is required integrating the ship registry file with actual ship history call records. The ship registry file is to be linked with the international ship file from IHS/Fairplay or Clarksons.	High

Category	Issue	Severity
Harbour master	HaMis system is lacking and planning on tugs and pilots including statistical data should be provided from HaMis to a management web based dashboard. Turnaround times to be integrated into the dashboard with information provided by the TOS systems (productivity & performances)	High
Warehouse	The warehouse LCL system is a manual driven process, no automation available (no barcodes scanning, no receipt alerts, no damage control systems, no track and trace)	High
Single window	There is no single data window for port users. Approvals in the information chain are based on manual procedures and stamped documents. Communication in the process consists of several rounds via phones and even by fax. System should share specific and allowed data between terminal operators and management information systems	High
Single window	Publications on procedures, rules and practices	High
Legal	Contract management system with alerts should be linked with TOS to respond effectively on disputes	Medium
Payment control	Systems to be linked with unrestricted Payment Gateway and Pay online and submit digital receipts.	Medium

Table 8-5 IT systems on costs stream - Key Observations

Category	Issue	Severity
IT systems on costs stream		
CRM	A Customer Relation Management system is lacking.	High
Manual document management	The manual document management system should be digitalised to avoid business based on hard copies.	High
Shift planning & rostering	Shift planning and rostering is done on a manual basis whilst services have to offered 24/7 optimisation is required in this respect.	Medium
WIFI networks	WIFI networks are lacking at various locations	High
Cable internet	Cable internet is often not reliable causing file transfer to fail	High

8.4 IT Way Forward

The new applications will use a common interface to push or pull only the relevant transaction to complete the business cycle of a process. Hence, the new applications run as independent stand-alone software solutions. They meet the mandatory condition of being "cloud based, modular, made for the purpose, mobile and internet ready, arrives with common interfaces to share transactions with other computer databases and applications, available 365x24, stores only the relevant information to provide the absolute information to the seekers. All applications such selected will meet "365x24 hours, stores only the relevant information provides the absolute information to the seekers. The efficient planning processes and procedures follow a strict logic, triggers recommendations, apply best practices of professional projections. Through digital certification, it linked to electronic transaction identification, records are visible to authorized organizations or officials. The information is transparent, reliable and traceable & reusable to the originating source for further analytics to improve productivity and efficiency".

With this approach SLPA will not need to customize and alter the design architecture of the new applications to interface to the currently used applications. This saves huge investment and time and prevents data mismatch, failure and downtime.

By negotiation SLPA is able to obtain the most favourable terms that will expedite the selection process and make the project to be based on a cost effective PPP with revenue generation ability. The software will arrive with interoperability and digital data interchange hence will be able to push information per the directives of SLPA. These applications arrive with many built in extra features, language translators, multiple calendars, email, ability to send out SMS, digital image storing, and many other built in functions. It also will continue to be enhanced as the owner cum operator will want to keep port users attracted to the application and make them becomes adoptive. E.g. (Current web based banking applications and internet banking software). These will simultaneously lead to applications able to provide national information for local and international trade through user friendly GUIs.

Though these applications can be replicated, if any other Port in Sri Lanka wishes to use the select the same application, it should be treated independently and should be altered to meet the requirements of that port.

The immediate benefit will be observed by JCT users. They will use the designated application for the purpose that is available real time, with no human intervention. For a service provided of the Port of Colombo, the provided service will be captured, measured, outcome recorded, invoiced, payment received through the automated payment gateway. There will be less disputes, no personal favours, alteration of levies or rates, and unauthorized intervention that brings disrepute or losses to SLPA. Since the private terminals have already automated, the service level improvement will be in par. Where there are inter-terminal charges, SLPA fees to collect for Harbour Master Services etc, this change will help to standardize and commonly improve professional service standards.

Mandatory Electronic Data Interchange by IMO - FAL convention

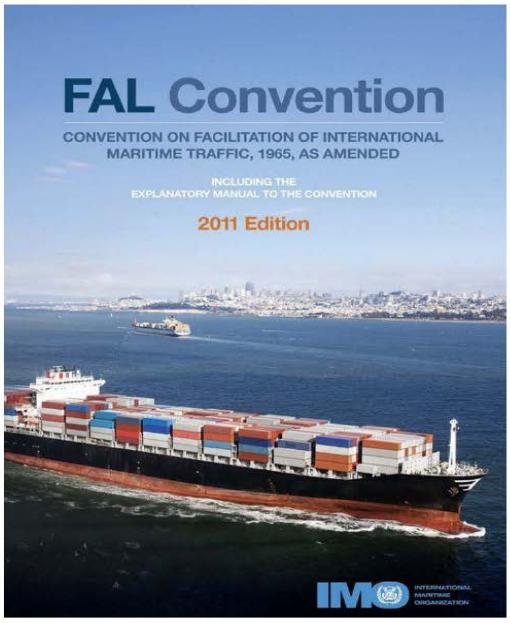
SLPA should take the offer that is in the horizon. The IMO will be promoting EDI as a mandatory requirement under the "FAL convention" for vessels to produce and shared with the Port of Call. This will be a Data Push Activity for the Port to update the TOS and also share with the other partners (Customs, Agent, Line, Harbour Master, etc). This promotion increases the efficiency of shipping and regulatory measures for safety, security and environmental protection contributing to clean oceans by elimination of unnecessary, disproportionate or obsolete administrative requirements. FAL 40 adopted new mandatory requirements on Electronic Data Interchange. According to the new standard, Public Authorities have to establish systems for the electronic exchange of information by 8 April 2019. A period of no less than 12 months for transition to the mandatory use of the systems shall be provided from the date of the introduction of such systems. A new Recommended

Practice encourages the use of the "single window" concept, to enable all the information required by public authorities in connection with the arrival, stay and departure of ships, persons and cargo, to be submitted via a single portal without duplication.

Figure 8-4: IMO FAL Convention

Recent amendments to FAL Conventions

- Amendments adopted in 2016
- It will enter into force in 2018
- **Mandatory** establishment of systems for electronic exchange of information **by 8 April 2018**
- Transition period of not let than 12 months (paper and electronic)
- States are encouraged to implement SW Systems
- Special event on ports on 4 June 2018



To facilitate the clearance of an inspection period for ships in ports, the FAL Committee has taken joint initiative together with other IMO bodies for the 'online access to certificates and documents required to be carried on board ships'. According to this new decision, electronic certificates should be treated as equivalent to traditional paper certificates, forms and the many local variants of these 'standard' documents around the world, and replace practices leading to bureaucratic overload and adding to the challenges that a master finds when the ship calls at a port.

The result of a possible future platform is illustrated here below. Note that the Single window or port community systems has been created on the left next to a new warehouse system, a new TOS system and a Management information system.

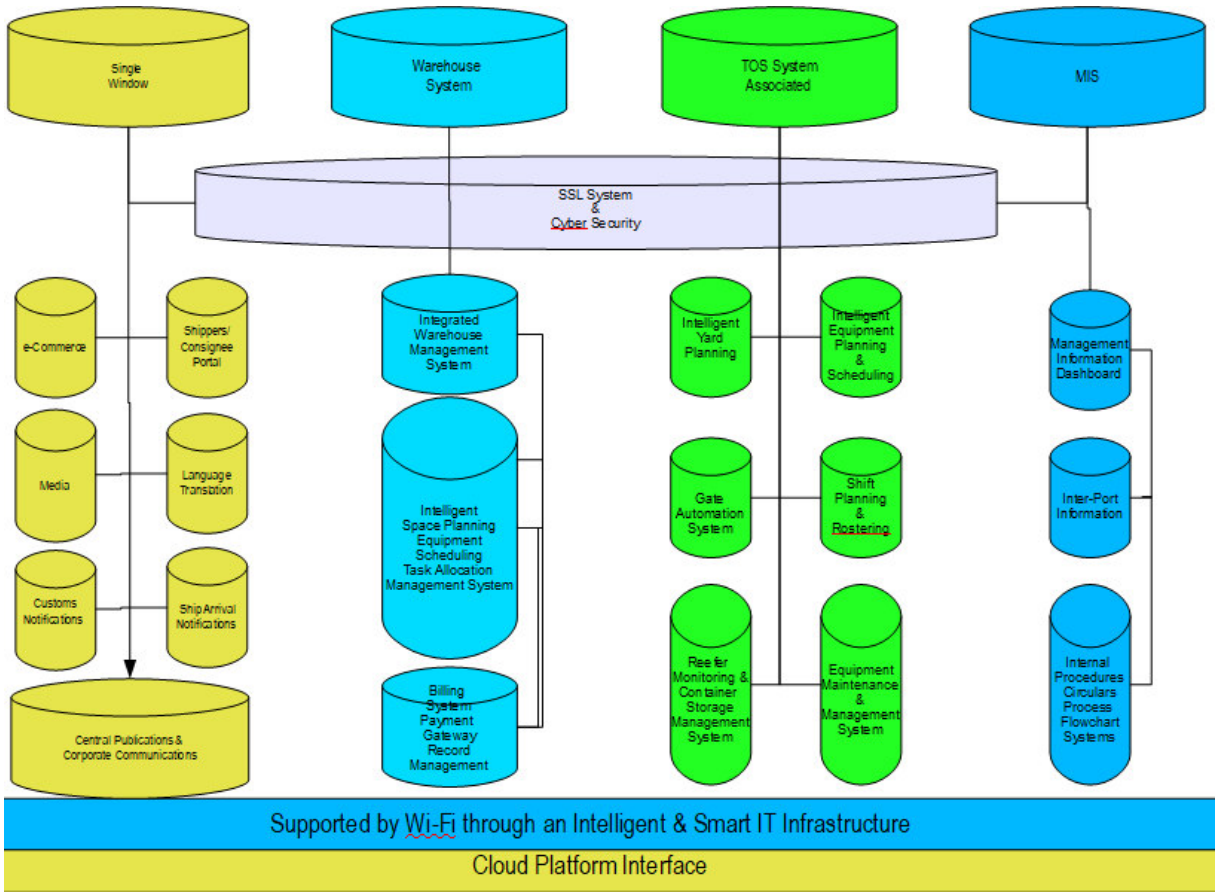
The systems are connected through web based cloud communication and has secured layers so that each data element has the right ownership whilst information can be shared and re-used by others. It is recommended to introduce a proven technology regarding the single maritime window.

To implement the system the following steps are required:

1. Information flow from ship agents to Maritime Single Window
    a. Streamlining the FAL conventions and the ship documentations according to international formats
    b. Mapping the information flow between ship agent's and port authorities
    c. Mapping any relevant other data elements in accordance with national legislation and procedures applicable to port levels.
2. Mapping all relevant data elements in accordance to other organisations
3. Determine status changes and time in the chain and authority of the data elements to update data elements

4. Ensure all logic situations related to the status of container are covered
5. Prevent from Cyber security
6. Data exchange through EDI
7. Test runs with major clients
8. Revise according to test runs
9. Go-life and roll-out

Figure 8-5: Possible Future Platform



8.5 Recommendations

Following IT system introductions are recommended to increase business efficiency and introduce paperless business environment:

R1. **MIS – develop MIS information system linked to single window**

- Management Information Dashboard - With functions to drill down and compare projected vs actual. Provide warnings for action, emails and alerts for action, division specific for quick action.
- Inter Port Information - To provide statistics and utilization, demands, productivity and performances. Other technical and business information, which only needs to be shared between terminals, will reside here.
- Internal procedure manuals, circulars, process flow diagrams, handbooks, business information, notices boards are enabled.
- Rental & Lease Agreements

- Business Intelligence for management decision making

R2. **TOS – Upgrade Navis Sparcs to N4**

- Intelligent Yard, Equipment, Shifts Planning and Gate Automation
- Operation & Utilization - of the Quay, Yard, Equipment, Storage, Business Intelligence, his allows pre-planning of the yard, assigning of cranes, and other handling equipment, manpower planning for optimum throughput.
- For billing information to be generated without human interference, instead to run as a procedure, and process based.
- Reservation and Priority services

R3. **Warehouse Management System**

- Introduction of a fully automated warehouse system that will systematically receive the cargo, and store in the pre-defined space. Automatically calculate storage and demurrage charges, advise to shuffle cargo to optimize floor utilization. This system to automatically send out the cargo information to the single window system to advice consignee to follow instructions and to make arrangements, includes booking reservation to clear after the dues are paid to a bank.

R4. **Single Window – Including sub systems works to provide the essential information**. They can be gradually incorporated and will be unrestricted for time of introduction and automation. The system and the demand will automatically drive the need. Always a proven system is recommended. Knowledgeable people have done this before.

- FAL convention – electronic data from ship to port
  Mapping data elements with various organisations and institutions.
- Customs link with Portal
  - Customs procedures
  - Information required by the consignee to clear his cargo
  - Customs e-declaration
  - Customs e- payment
  - Customs clearance notifications

- Shippers & Consignees Portal
  - Organise export documentation
  - Organise import documentation
  - Check status of the container
  - Truck and cargo arrival notifications
  - Vessel arrival/departure notifications
  - Exchange notice of Readiness
  - Container release notification

- e-Commerce - The list is unlimited and each subsystem can be selected from the master page. The business portal for all service providers and service seekers enabling a transparent fair playing ground customer service
  - Competitive and fair to all
  - Links approval granting organizations to speed up processes
  - National business Port information and data published for information sharing
  - Truck & Transport Services
  - CASA (Ceylon Association of Ships Agents)
  - Banks & Payment Gateways

- Contract Labour
- Private warehouses

- Media
  - Web Sites
  - Language Translation
  - Customs Notifications
  - Business Announcements
  - Financial Notifications
  - Contact page

- Central Publications & Corporate Communication
  - Port Legal Policies Procedures & Rules
  - Language Translator
  - Call Centre, Complaint Handling & Customer Services
  - Social Media & Library of References and Business Publications
  - Safety Rules, location maps & Calendar
  - Registration formats & online data input forms
  - Space Availability, public announcements, procurement & charts

9 Warehousing

9.1 Introduction

This section provides the current overview of logistics infrastructure (operated by SLPA) within the Colombo Port area, and defines the development needs to cope with future demand in terms of warehousing activities.

The following approach has been used for this chapter:

- Paragraph 9.2 describes the institutional best practice on Port Community Systems;
- Paragraph 9.3 describes the current situation in Sri Lanka;
- Paragraph 9.4 reviews warehousing demand; and
- Paragraph 9.5 provides the recommendations.

9.2 International best practices

Basically, all SLPA warehouses currently in use are very old and in a poor state except for the recently developed CFS I warehouse. It is important that future design and development of additional warehouses should be based on modern standards.

Design characteristics

In terms of design, the following typical dimensions are used in state-of-the-art warehouses:

- Length between 100m and 250m (depending on the type and size of products).
- Width between 80m and 120m.
- Height between 7m and 15m (free stacking height).

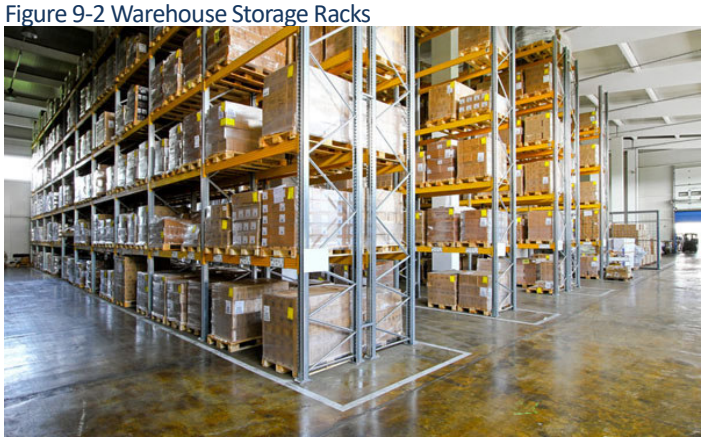
To facilitate a high performing truck loading and unloading process, the warehouses need to be equipped with truck loading bays or docks.

The docking platforms can be levelled to enable accessibility for various types of trucks and trailers. The (un)loading area is fully covered or sheltered, allowing for efficient all-time and all-weather operations, also for weather sensitive cargo.

Figure 9-1 Warehouse Truck Loading Bays

To minimise the required land area, the use of high stacking infrastructure and equipment is required. Modern logistic warehouses are designed for a free stacking height varying between 7m and 15m, depending on the type and size of the products.

Figure 9-2 Warehouse Storage Racks



The installation of storage racks will allow for multi-level stacking of the palletised goods and products. Depending on the configuration of the storage racks and the assumed maximum stacking height of a standardised pallet with corresponding maximum pallet weight, stacking will be allowed at 4 to 7 levels (including ground level).

Equipment

For each of the activities at the warehouse and logistics centre, specific types of equipment will be required:

Stuffing and stripping of containers: forklift 1.0-2.0 ton

A container with palletised cargo can be unloaded (stripping) or loaded (stuffing) with specifically designed small forklifts with a loading capacity between 1.0 and 2.0 ton.

Figure 9-3 Forklift

Due to its limited dimensions, this type of forklift is able to drive in and out the container and requires limited manoeuvring spaces. Depending on the type of products or commodities, the engine of the forklift can be either diesel-driven, gas-driven or even electric driven.

Loading and unloading trucks: electric pallet truck

This type of equipment is specifically designed to unload a truck or container filled with palletised cargo. Due to the availability of loading bays, the electric pallet truck can easily drive into and out of the truck, trailer or container chassis.

Figure 9-4 Electric Pallet Truck

This type of equipment is electrically driven, powered by a battery system. Current capacity of the battery system allows for an 8-hour shift of normal operations before (re)charging is necessary. Proper equipment fleet management and follow-up will be required.

Technical Assistance Consultant's Report

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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

(Financed by the Japan Fund for Poverty Reduction)

The National Port Directions – Volume 1 (Part 6)

Prepared by

Maritime & Transport Business Solutions B.V. (MTBS)

Rotterdam, The Netherlands

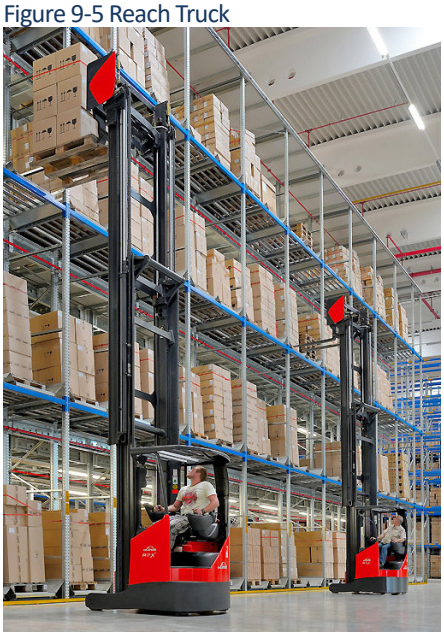
For Sri Lanka Ports Authority

Asian Development Bank

Warehousing and storage area: reach truck

A reach truck is a typical type of forklift that is used in warehouses to stack pallets up to 10 to 15 m high. Based on the specific technical design, a reach truck only needs very limited manoeuvring space, hence narrow aisles can be designed in order to optimise the stacking capacity of the warehouse.

Figure 9-5 Reach Truck



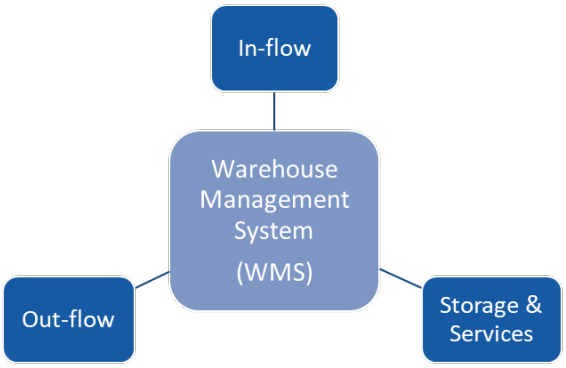
Similar to the electric pallet truck, a reach truck is electrically driven, with battery capacity allowing for an 8-hour operations shift without the need to recharge. This enables flexible planning and organisation of the available resources within the logistics warehouse.

Operational setup and organisation

Similar to a container terminal, a logistics warehouse is managed by a warehouse management system (WMS). The WMS system records every activity or process and manages all the individual (pallet) stacking positions within the warehouse. Additionally, the WMS system can be used to manage stock or inventory levels.

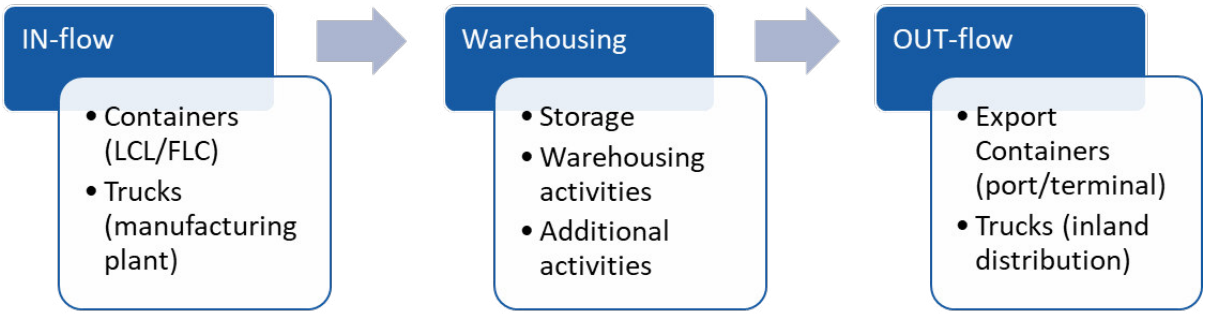
A basic overview of a warehouse management system setup is shown in the figure below.

Figure 9-6 Warehouse Management System



Subsequently, Figure 9-7 provides a high-level visualisation of the operational processes within a logistics warehouse.

Figure 9-7 Warehouse Logistics Process



Three main flows can be identified:

- Incoming flow: products or goods discharged from a truck or unloaded from a container.

- Warehousing cargo flow: storage of the palletised goods within the warehouse and – if applicable – registration/follow-up of additional value added activities like re-packing, labelling, price-marking, etc.
- Outgoing flow: products or goods leaving the warehouse via truck or loaded into a container.

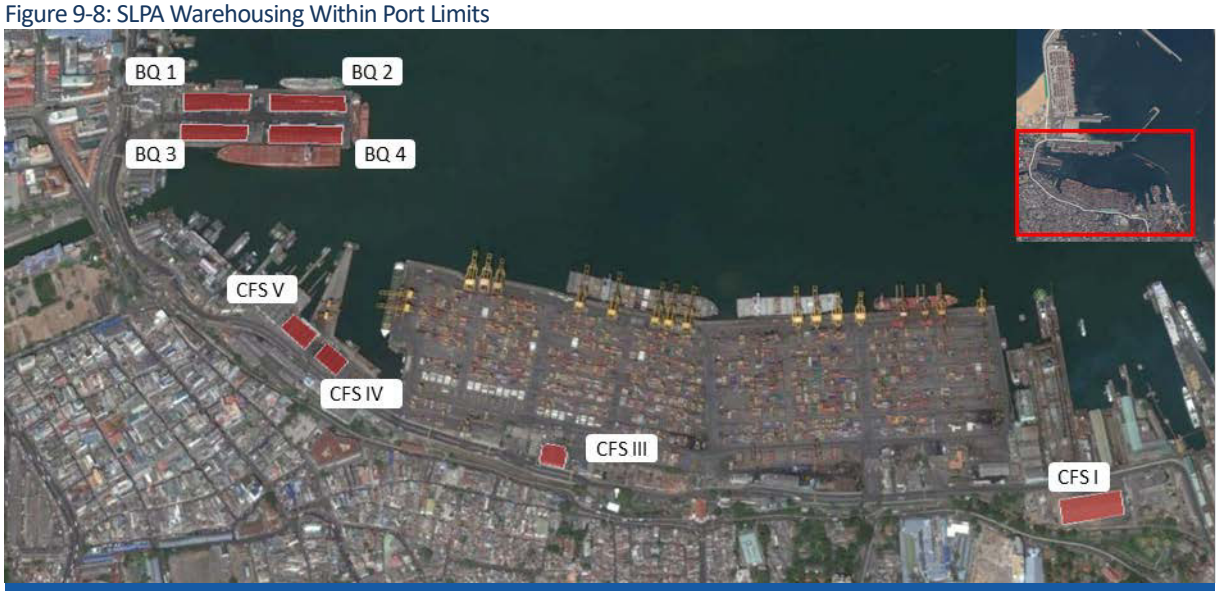
The use of pallets is one of the basic and most fundamental requirements of modern warehousing activities and operations. All incoming cargo or products that are not yet palletised need to be stacked on (standardised) pallets during or directly after unloading a truck or un-stuffing a container. A dedicated follow-up of pallet stock management is of paramount importance to carry on the logistics activities.

After palletising the goods, the content of each pallet needs to be inventoried and this data needs to flow into the warehouse management system. This can be done either manually, with barcode readers or with mobile data terminals, or automatically. Subsequently, the warehouse management system will determine a suitable stacking location for each of the pallets, depending on the stacking dimensions and the corresponding weight.

9.3 Current Situation

The figure below displays SLPA warehouses within port limits, with CFS I recently being constructed.

Figure 9-8: SLPA Warehousing Within Port Limits



Description	Type of Cargo	Capacity (m^2)
BQ1	General non-dangerous cargo	5,000
BQ2	Local cargo/Transhipment/Dangerous cargo	5,000
BQ3	General non-dangerous cargo	5,000
BQ4	Transhipment/MCC cargo	5,000
CFS I	General /Dangerous Cargo	7,000
CFS III	Bonded Cargo	1,300
CFS IV	General Cargo	2,388
CFS V	Bonded Cargo	2,397
CFS-Peliyagoda*	General Cargo	19,500
Total		**52,585**

*Not in figure

Currently, SLPA handles all LCL cargo at the CFS warehouses within the port limits and at its warehouse at Peliyagoda (outside the port limit). Recently, the LCL cargo handling has been liberalised, meaning that private parties can perform these activities as well. There is no operational constraint for private parties to deliver the same service at an equal or lower price. SLPA should decide if, and at which scale, it wants to continue its LCL handling activities in competition with private parties. SLPA could also act as a landlord for a new warehouse tenant that operates the areas it is assigned to by SLPA.

The following short term developments will take place regarding these facilities:

- The construction of the passenger terminal at BQ will lead to the closure of the warehousing facilities per 2019. The dangerous cargo handling will shift to CFS I. For MCC cargoes, a new warehouse is required. If SLPA wants to continue its LCL operations on the same scale, warehousing adjacent to the new MCC location is possible.
- CFS III, IV and V are to be removed due to the construction of the elevated highway as per 2018. If SLPA wants to continue its LCL operations on the same scale, warehousing adjacent to the new MCC location is possible.
- CFS I has started operations in the course of 2017, as a replacement of the previous warehouse that burnt down.
- Peliyagoda will remain operational for LCL/FCL cargoes.

Peliyagoda

The Peliyagoda facility was originally a UDA facility; hence, it was not designed and built for the task it is used for today. As such, the Peliyagoda facility has several (solvable) bottlenecks:

- Space constraints inside and outside facility.
- Higher roof is needed.
- No high racks with fork lifts to operate the facility.
- Stuffing is taking place next to warehouse in a smalls strip causing congestion at the section.
- Several employees on the floor are not involved in operations.
- Cargo is stalled inefficiently.
- Safety procedures are not adhered to by staff (e.g. helmets and such).

There are gains to be made by investing in equipment and warehouse tools for the facility to make efficient use of the space available. For the facility to compete with private parties it should adhere to industry standards.

Figure 9-9: Log ventures Facility (left)* - Peliyagoda Facility (Right)

*The picture is used for marketing purposes and might not reflect reality on the floor, but it does show the added value of racks

The table below presents the key observations and recommendations regarding the Warehousing and Logistics activities.

Table 9-1 Warehousing & Logistics - Key Observations

Category	Issue	Severity
Infrastructure	Transit sheds are used as warehouses but are not adequately equipped to handle the MCC and LCL cargoes. Additionally, layout / spacing of the transit sheds is not suited for the current operations.	High
Operations	Operations are carried out through manual documentation.	Medium
Equipment	Equipment is outdated and in poor state.	Medium
Systems	There is a lack of an efficient automated warehousing system.	Medium

9.4 Warehouse Demand

The table below summarizes the key assumptions that have been applied in order to calculate the future needs of warehousing capacity.

Table 9-2: Assumptions on MCC and LCL development requirements

Item	Unit	MCC	LCL
MCC Share of Transhipment Cargo	%	0.3%	-
LCL Share of Gateway Cargo	%	-	2.1%
Operational Days	# days	365	365
Dwell time (average)	# days	6	6
Occupancy rate of facility	%	70.0%	70.0%
Free stacking height (warehouse)	m	7	7

It is assumed that both the MCC share of transhipment and the LCL share of gateway cargo will remain constant throughout the projection period. The table below presents the results of the capacity calculations.

Table 9-3 Capacity Requirement CFS area MCC/LCL

Item	Unit	2016	2025	2030	2050
TEU Forecast MCC	TEU	8,047	21,614	27,113	67,186
CFS Area Requirement MCC	ha	0,25	0,29	0,37	0,92
TEU Forecast LCL	TEU	27,297	46,350	56,966	84,059
CFS Area Requirement LCL	ha	0,37	0,63	0,78	1,15

Currently, MCC of transhipment boxes mainly takes place at the BQ2 and BQ4 warehouses. These activities are an important service to the transhipment business, as transhipment boxes can be reshuffled to optimise logistics. With the transformation of BQ into a passenger terminal, a new facility should be developed; the new location should be close to the container terminals to limit trucking distance to and from the warehouse.

Two hectares (20,000 m^2) should be reserved immediately to ensure expansion options. The first phase should be a shed of approximately 8,000 m^2. The warehouse should be designed as high as possible to make best use of the land. In the area requirement calculations, a free stacking height of 7m is assumed. Possible locations for the new warehouse are discussed in the pre-feasibility for the BQ warehousing relocation in Colombo Port Development Plan.

9.5 Recommendations

Compared to the modern way of operating a logistics warehouse, the current SLPA infrastructure and corresponding operations are lacking efficiency. In order to increase the stacking density and upgrade the performance of the logistics services, palletising of the incoming and outgoing flows of goods is considered an absolute requirement. This service can be offered (and charged for) in case the incoming goods arrive at the SLPA CFS area in a non-palletised form.

The following recommendations can be made regarding SLPA's warehousing design and development:

R1. Port of Colombo: Design and construction of a **new warehouse to cover the MCC** operational requirements in the future.
R2. Port of Colombo: Investment in new equipment (pallet trucks, reach stackers) to **operate the logistics warehouse.**
R3. Port of Colombo: Procurement of a modern, state-of-the-art **Warehouse Management System (WMS).**
R4. All Ports: Apply the Warehouse Management System (WMS) to new warehouse developments.

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10 Trade Facilitation

10.1 Introduction

This chapter describes the trade facilitation. Trade facilitation is the simplification and harmonisation of international trade procedures. These trade procedures are defined by the World Trade Organisation (WTO) as the "activities, practices and formalities involved in collecting, presenting, communicating, and processing data required for the movement of goods in international trade".

In practice, this narrow definition is often extended to address a wider agenda in trade development and includes: trade policy issues, improvement of transport infrastructure, transparency in government transactions, modernisation of customs administration, removal of other non-tariff trade barriers including tax and standards issues and export marketing and investment promotion.

For this reason, SLPA would need to consider a variety of trade facilitation topics and issues in parallel to infrastructure developments to increase the port capacity and competitiveness. Potential planning of extension of the port activities into trade and logistics hub type of projects would only further emphasise the importance of creating a competitive trade environment for traders and investors.

The following approach has been used for this chapter:

- Paragraph 10.2 describes the current situation in Sri Lanka;
- Paragraph 10.3 describes the institutional benchmarks on trade facilitation;
- Paragraph 10.4 provides the recommendations and way forward.

10.2 Current situation Sri Lanka

10.2.1 Trade Policy and Tariff Regime

Exports and Imports

Sri Lanka has been extensively promoting exports since the late seventies when it moved decisively away from protectionist import-substitution trade policies. The export of manufactured goods grew rapidly, at around 20% annually, between 1976 and 1984, and 16% annually between 1989 and 2000. The Board of Investment (BOI) was established and continued to be used as a strategy to encourage Foreign Direct Investment (FDI) and boost manufacturing exports.

However, since 2000 taxes on imports were increased with the imposition of a range of new taxes, as well as increases in the rates of existing tariffs. The Customs Surcharge was introduced in 2001, the Ports and Airports Development levy imposed in 2002, and the Regional Infrastructure Development Levy (RIDL) introduced in 2007. Rates of the Commodity Export Subsidy Scheme (Cess), Nation Building Tax (NBT), Social Responsibility Levy, Special Commodity Levy (SCL) and VAT were progressively increased.

Although many exporters have exemptions on Customs duty, they are liable to pay other tariffs. These tariffs are thus a tax on exports, making Sri Lanka relatively uncompetitive vis-a-vis its peers. Consequently, the export performance also worsened. It has fallen steadily from a high of 33.3% to about 12.7% of GDP in 2016.

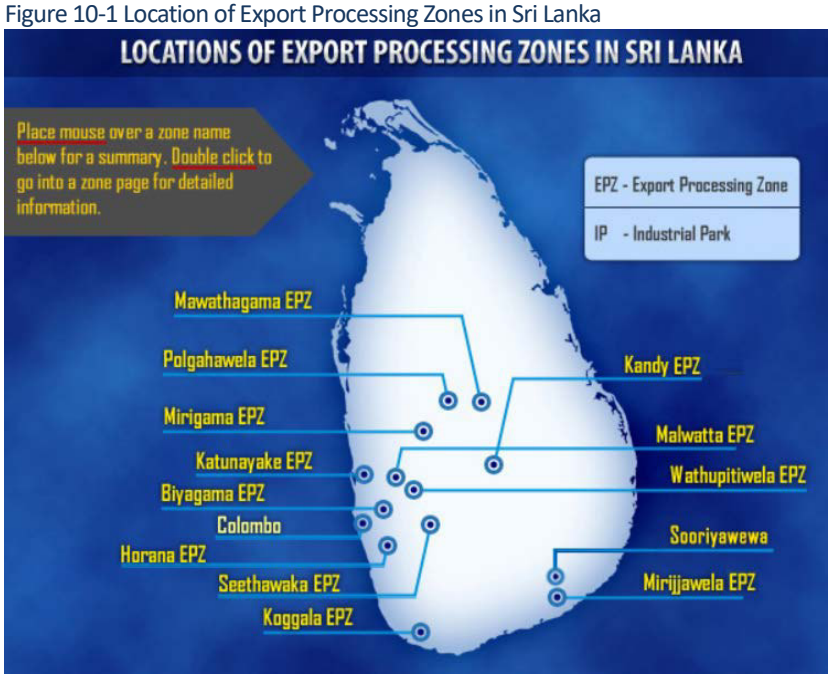
In addition, export development faces structural constraints in terms of the low level of manufacturing and value added to effectively compete with other Asian economies as reflected by the UN Industrial Performance Index – IPI. The IPI considers countries' productive capacity, the intensity of industrialisation and impact on the

world market. In the past 15 years, Sri Lanka went down six places in rank and currently holds position 75 out of 148 countries.

Export Processing Zones - EPZs

Currently, the Board of Investment administers 14 locations for Export Processing Zones (EPZs), i.e. industrial parks with preferential tax treatment and special economic zones. BOI administered zones – 14 locations. These locations are indicated on the figure below. Two additional zones i) MAS Fabric Park, Thulhiriya for Apparel and Related Industries and ii) Orion City IT Park in Colombo for knowledge services are privately administrated.

Figure 10-1 Location of Export Processing Zones in Sri Lanka



Source: NES

Free Trade Agreements (FTAs)

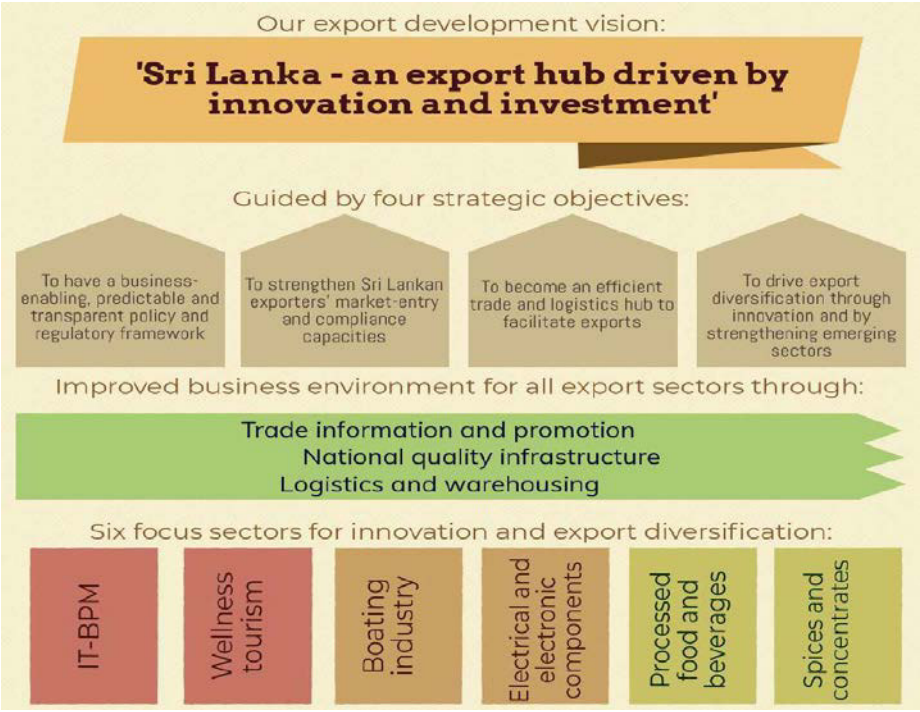
Sri Lanka has signed bilateral FTAs with India and Pakistan. End of January 2018, Sri Lanka signed a third FTA with Singapore. In addition, Sri Lanka is a member to four multilateral agreements: Agreement on South Asian Free Trade Area (SAFTA), Agreement on Global System of Trade Preferences (GSTP), South Asian Association for Regional Cooperation (SAARC) and Asia Pacific Trade Agreement (APTA). All FTAs enable customs duty-free trade for selected items.

In 2017, the EU awarded the Generalised System of Preferences (GSP) concession to Sri Lanka to be implemented until 2021. GSP is a preferential tariff system awarded to developing nations, to export goods to European markets at lower tariff rates. Under this tariff system, Sri Lanka has the opportunity to export 6,200 items to the European Union, tax-free. For example, 9.6% duty charged when exporting garments to the EU, will now be removed. Around 33% of Sri Lanka's exports are directed to the European Union.

National Export Strategy - NES 2018-2022

In late 2017 the country designed a new National Export Strategy that embodies the desire to move up on the income ladder as a modern, innovative economy driven by trade.

Figure 10-2 NES 2018-2022 – Strategic Objectives and Priority Sectors



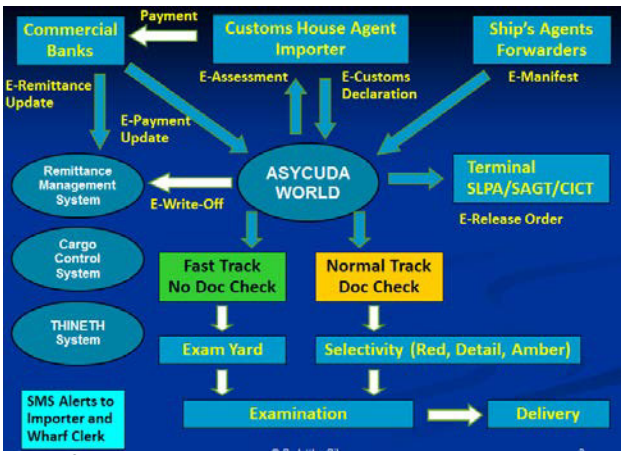
Source: NES

10.2.2 Institutional Development for Trade

In June 2014, Sri Lanka set up its National Trade Facilitation Committee (NTFC) to meet the requirements of article 23.2 of the TFA. The Committee is composed of 12 Government agencies and 7 PS Chambers and has the mandate to coordinate interagency activities for implementation of the TFA and other trade facilitation initiatives in Sri Lanka through public-private cooperation. NTFC is chaired by the Director General of Customs & Co-chaired by the Director General of Commerce and supported by the Cabinet Committee on Economic Management (CCM) and Ministry of Economic Strategy and International Trade (home ministry).

SLPA is one of the leading members of the Committee, and if actively engaged, it would have an opportunity to accelerate its trade and logistics agenda. The NTFC is a key facilitator for the introduction of the Single Window with the blueprint expected in late 2018 and the Trade Portal establishment that is expected in July 2018.

Figure 10-3 Status of Automation at Customs



10.2.3 Customs modernization

Sri Lanka Customs implemented ASYCUDA-World, though without national electronic single window functionality. The port system is limited and restricted to stakeholders participating in the logistics operations. Even there, the delivery order is still manual and not automated. Even with the use of ASYCUDA-World at Customs, there is still a reliance on paper documentation, resulting in duplication of information submission, additional costs and delays.

In addition to ASYCUDA-World, Customs has a number of automation systems: a cargo control system, a remittance management system, and the THINETH system (see figure below). Implementation of functional connections to the ASYCUDA-World single window has been ongoing as well

as the development of new electronic processes. For instance, the process of handling certificates of origin is being automated at the Department of Commerce (DOC) and the electronic signature has been introduced in accordance with the E-Government Policy.

Strategic guidance and oversight of the development of a national electronic single window operation are organised through a steering committee that reports to the NTFC.

10.2.4 Logistics Facilities

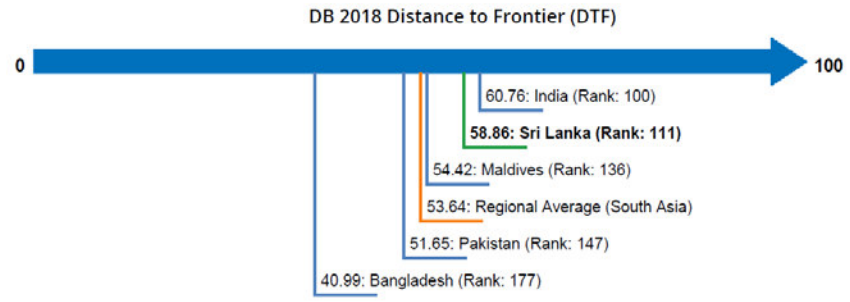
Large investments have been made in the logistics sector since the end of the conflict, particularly in the development of Colombo Port. More investments are in the offing through the Colombo South Port Expansion Project – which is expected to increase capacity by 160 percent – and the Hambantota Port Development. The Hambantota Port Development has made Sri Lanka an important transhipment hub for the Indian car market, with about 15,000 vehicles being handled each month.

The Katunayake airport continues to be a key passenger and cargo-handling destination in South Asia and the national airline is a leading carrier of passengers into the Indian sub-continent.

10.2.5 Sri Lanka in WB Doing Business Report

The Doing Business project provides objective measures of business regulations and their enforcement across 190 economies. Sri Lanka is ranked 111 in DB 2018 report and scored 58.86 on DTF indicator[22] which places it among the leading countries in the region, surpassed only slightly by India.

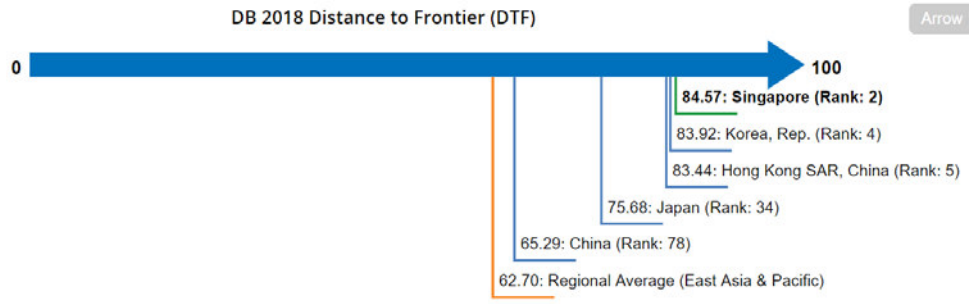
Figure 10-4 DB 2018 Sri Lanka Ranking



However, compared to its more developed Asian competitors in port and logistics business – as shown in the below figure – Sri Lanka lags behind. Singapore ranks 2 with DTF 84.57; South Korea ranks 4 with DTF 83.92 and China ranks 78 with DTF 65.29.

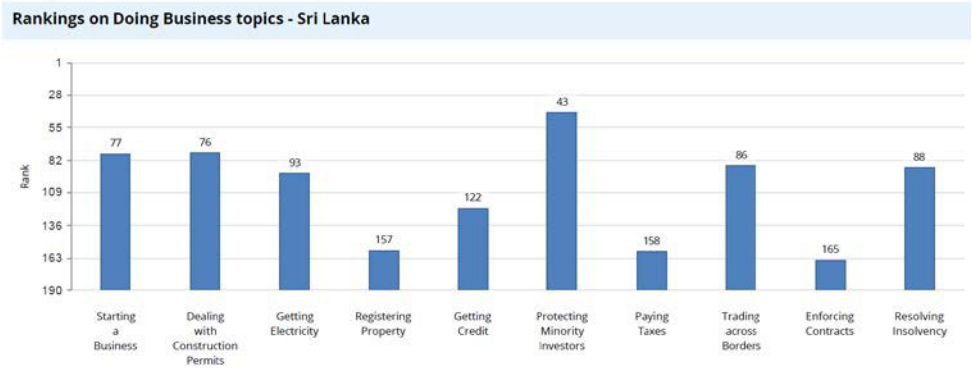
[22] The distance to frontier (DTF) measure shows the distance of each economy to the "frontier," which represents the best performance observed on each of the indicators across all economies in the Doing Business sample since 2005. An economy's distance to frontier is re ected on a scale from 0 to 100, where 0 represents the lowest performance and 100 represents the frontier. The ease of doing business ranking ranges from 1 to 190.

Figure 10-5 DB 2018 ranking of Sri Lanka competitors



The overall ranking is a composite index consisting of ten indicators, each representing a different aspect business environment. Sri Lanka scores relatively higher in areas such as protection of minority investors, starting a business, dealing with construction permits and scores low in the areas of registering property or payment taxes.

Table 10-1 Sri Lanka Ranking Per DB Indicator



Trading Across Borders is a useful indicator to analyse, particularly for SLPA, as it shows the functioning of the border systems. It measures the time and cost (excluding tariffs) associated with three sets of procedures – documentary compliance, border compliance and domestic transport – within the overall process of exporting or importing a shipment of goods.

Sri Lanka 2018 score is 86 which is the best result among comparator economies in the region (South Asia rank 126), but poor in comparison with the main port transport and logistics competitors such as Korea and Singapore (Table 10-2). The result for China is somewhat misleading as the WB DB report considers a country as a whole and does not provide separate measurements for the main logistic centres.

Table 10-2 DB Trading Across Borders Indicator Comparison

Economy	Trading Across Borders DTF	Trading Across Borders rank
East Asia & Pacific	69.97	102
South Asia	58.32	126
China	69.91	97
Korea, Rep.	92.52	33
Singapore	89.57	42
Sri Lanka	**73.29**	**86**

The ranking in WB DB report is widely accepted by investors and governments as a general reflection of the state of the business environment. Sri Lanka's overall rank for 2017 is 110. This implies that many areas require further improvement.

10.3 International benchmarks

10.3.1 Customs single window

China

The development started with the Shanghai's single window that was introduced nationwide in 2017. For the nationwide integration, the approach was adopted for each port authority to design its own integration reform as the foundation. A Single Window was then rolled out as the common platform on the 3M principle: Mutual exchange of information, Mutual recognition of control, Mutual assistance of enforcement.

The system now serves more than 200,000 companies every year and covers all trade ports with a total of 35,000 registered users and more than 100,000 daily declarations. It is operating under the management of the General Administration of Customs (GAC) and combines the functions of 11 agencies and provide 129 services ranging from declaring goods to checking business qualifications.

Singapore

The Singapore's National Single Window was launched in 1989 under name TradeNet. It allows various parties from the public and private sectors to exchange trade information electronically and integrates import, export and transhipment documentation processing procedures and enables the trade and logistics communities to fulfil their trade formalities.

Through TradeNet, Singapore Customs and other Competent Authorities monitor the movement of goods and enforce health, safety and other regulatory requirements. The introduction of TradeNet reduced the cost and time to prepare, submit and process trade documents, expedites the clearance of cargo and allows fees and taxes to be deducted electronically (Table 10-3).

Table 10-3 Time and cost savings with TradeNet

	BEFORE TRADENET®	AFTER TRADENET®
Processing time/permit	2 – 7 days	1 min or less
Fees charged	S$10 – S$20	Less than $5
Number of documents	3 – 35 docs	1 eForm/eDoc
Documents processed per day	approx. 10,000	more than 30,000

Source: Singapore Customs Authority

In 2007 Singapore launched TradeXchange, a Next-Generation of TradeNet®, designed as a multi-agency initiative led by Singapore Customs, Economic Development Board and Development Authority of Singapore (IDA). It is a neutral and secure trade platform that facilitates the exchange of information within the trade and logistics community functioning as an extended Single Window. It offers a single electronic window for integrated workflow, submissions and enquiries to the Sea Ports, Airports, Maritime Authorities, Customs and Competent Authorities

South Korea

The Korea Customs Service (KCS) has been operating a web-based clearance system 'UNI-PASS' since October 2005. It is all-in real-time trade facilitation system including the customs and national security information system. Development was gradual staring in the 1980s with the development of a large one-stop system and continuing in the 1990s with the introduction of Electronic Data Interchange (EDI) applications. When UNI-

PASS system was finally launched, it incorporated all previous developments in a web-based clearing system. Recently, UNI-PASS was further developed as a "smart system" with mobile, RFIDs and cloud solutions.

The UNI-PASS support system encompasses seven modules including: EWACS (Early warning and control system), IRM (Integrated Risk Management), CDW (Customs Data Warehouse), Data Mart (Data Intelligence Integration), KMS (Knowledge Management System), PMS (Performance Management System) and APIS (Passenger Information System).

10.3.2 Authorised Economic Operators (AEO)

An AEO is a member of the international trading community that is deemed to represent a low Customs risk and for whom greater levels of facilitation should be accorded. All countries that introduced the AEO as one of the risk management tools recorded significant reduction clearing times for containers.

The SAFE Framework of Standards to Secure and Facilitate Global Trade (the SAFE Framework) which was introduced in 2005 by the World Customs Organization (WCO), identifies standards and principles for adoption by all WCO members. More than 160 countries have implemented or have indicated their intention to implement the SAFE Framework, key elements of which are the concepts of Authorised Economic Operator (AEO) and Mutual Recognition.

While the countries choose different AEO modes depending on the number of operators and management difficulty, they all introduce rigorous approval procedure of the applicants and extended benefits for the authorized companies. Typically, the AEO model would consist of an export scheme having supply chain security as its principal focus and an import scheme having trade compliance as its principal focus. Both could be open to traders and service providers and membership of both should be voluntary.

The AEO concept is also emerging as a component of Free Trade Agreement (FTA) negotiations, with many countries seeking to establish a framework within their FTAs to facilitate the negotiation of mutual recognition arrangements. The table below compares the AEO models introduced by Singapore and China as best practice in design and operation.

Table 10-4 AEO Models compared Singapore and China

AEO Model	Singapore	China
Eligible Businesses	Singapore companies involved in supply chain activities (e.g. importers, exporters, warehouse operators, transporters, and terminal operators)	Customs brokers, consignors, consignees and processing trade enterprises. Logistics and transport companies are excluded
Focus	Imports and Exports, accrediting companies' security provisions	Imports and Exports
Types of Certification	two levels of certification: STP and STP-Plus.	5 classes where class A and AA is AEO status
Number of Participants	78 STP and 86 STP-Plus companies	3000 AA and 30000 A companies
Authorisation conditions	Security management system, risk assessments of their business operations, measures to secure supply chains,	Verification audit by customs; based on 35 criteria; from 4 categories (internal control, finance, compliance-record and security)

Mutual Recognition	Canada, Hong Kong, China, USA, Japan, South Korea, Taiwan, EU	Singapore, USA, Japan, South Korea, EU (pilot project)

10.3.3 Customs Duties and Taxes on Imports

Multiple of taxes imposed on importers in Sri Lanka are already described in paragraph 10.2.1 This section provides a comparison of the tariffs and taxes for importers in Singapore, China and South Korea. Singapore stands out as the only country without customs duty. On the other hand, Sri Lanka has the highest duty of the three countries combined with the highest effective VAT of 16.5%. Details on duties and taxes are provided in next table.

Table 10-5 Comparison of Customs duties and taxes

Description	Sri Lanka	Singapore	China	South Korea
Customs threshold	$3,200 (500.000 R)	$300 (SGD 400)	$800 (CNY 5,000)	$140 (KRW 150,000)
Average Customs Duty	Four-band tariff – max **30%**	**Duty free** (except cars, gas, tabaco/alcohol)	**8.4%**	**8%**
Value Added Tax	**15%** (on 110% of invoice amount),	**7%**	**17%**	**10%**
Excise Tax	22 % (other taxes PAL, ESC	3%-50% (cars lower tax, alcohol/tabaco high)	3%-50% (cars lower tax, alcohol/tabaco high)	10-20% on luxury items
Products having a higher customs tariff	**CESS 8%**	Duty free	3% to 80% import of automobiles high	agricultural products, seafood, tobacco, textile and clothing
Preferential Rates	FTA countries: India , Pakistan + multilateral agreements South Asia SAFTA, Asia-Pacific APTA	FTA countries: China, India, Japan, Korea, New Zeeland, Panama, Peru, Australia, Costa Rica, Jordan, Turkey, USA, Sri Lanka	FTAs countries ASEAN, Singapore, Pakistan, New Zealand, Chile, Peru, Costa Rica, Iceland, Switzerland, Hong Kong, Macao, Taiwan. Korea and Australia.	FTA countries: Singapore, USA, EU, Chile
Customs Classification	HS	HS	HS	HS
Payment:	At the time of Custom Clearance	Taxes paid electronically via GIRO payment system	Tariffs and taxes must be paid at the time of importing	In Korean Won 15 days after custom clearance

10.3.4 Specific policies by foreign competing ports for developing trade and logistics hub linked to the port

China: the success in turning Shanghai port into a major world trade hub

China's national strategy is to use Special Free Trade Zones (SFTZ) as a pilot test area for undergoing reform and testing new policies for FDI. One of the most successful zones is Port of Shanghai - Waigaoqiao Free Trade Logistics Park. The zone is located next to the port, covers 1.03 square kilometres and is the first site in China to integrate the function of a bonded area and a port. That allows companies to benefit from policies in both areas.

Figure 10-6 Waigaoqiao Free Trade Logistics Park

Objectives

- The priorities of the zone are to explore new routes and systems for China's opening-up policies, to accelerate the transformation of how government functions, to promote economic restructuring and to prioritise development steps to ensure effective but stable growth;
- Promotion of the city as a logistics hub.

Strategies

- Integrate the functions of a bonded area and a port;
- Amalgamation of four bonded zones—the Waigaoqiao Free Trade Zone, Waigaoqiao Free Trade Logistics Park, Yangshan Free Trade Port Area and Pudong Airport Comprehensive Free Trade Zone;
- Shaking the traditional concentration of logistics operations in the city's Hongkou District, where more than 3,500 companies in related industries contribute roughly 28 percent of the district's GDP.

Policies

The FTZ's original Framework Plan introduced several key policies in direct connection with the logistics industry: free trade logistics park.

Develop transhipment business

Although in terms of cargo volume, Shanghai is the world's busiest port only 5.5% of cargo was classified as international transhipment, compared with over half of shipments in Hong Kong. With the simplified Customs procedures adopted in the FTZ, this imbalance is likely to correct itself over the coming years.

Encourage production and logistics companies to establish in the zone

One of four bonded zones comprising the FTZ, Yangshan Free Trade Port Area offers state-of-the-art facilities and exemptions on import tariffs as long as goods remain within the zone. The port features 16 modernised berths with a total quay length of 5.6 kilometres and is joined to the mainland by the 32.5 km Donghai Bridge. Expansion of the port to a total area of 14.16 km² is completed in 2015, adding seven additional 50,000 to 70,000-ton berths. All companies registered before this date engaged in the domestic carriage, warehousing, or loading and unloading services can obtain an immediate refund of the levied taxes.

Benefits

The zone offers national treatment of foreign companies, facilitation of trade and investment process through financial incentives,

simplified approval process through one-stop commercial registration and simplified outbound approvals. For the services sector the activities in the zone would mean fewer constraints in business scope, relaxation in the shareholding limit and less stringent eligibility requirements.

Since the official launch of the Shanghai Waigaoqiao Free Trade Logistics Park in 2013, the zone has more than 4600 companies registered of which 280 foreign companies. The major banks such as HSBC, Deutsche Bank and Citibank opened branches in the zone as well as some of the largest world corporations such as Microsoft and General Electric.

Singapore: success of being a hub port in a vibrant location

Singapore has ten free-trade zones (FTZs) in five geographical areas operated by three FTZ authorities: PSA Corporation Limited, Jurong Port Pte Ltd and Changi Airport Group (Singapore) Pte Ltd. The FTZs, which include port facilities, air cargo terminals, and logistics areas, may be used for storage and repackaging of import and export cargo, and goods are transiting Singapore for subsequent re-export. Manufacturing is not carried out within the zones. Foreign and local firms have equal access to the FTZ facilities.

South Korea: Distribution Park Busan

Busan is one of the country's most successful free economic zone projects linked to port. It covers an area of almost 53 km² in Busan·Jinhae area (Busan Economic Zone). It is designed as an international logistics hub with globally competitive industrial infrastructure.

International logistic hub

Busan connects major feeder ports including 63 in Japan, 40 in China and six in Russia, handling transhipment for imports and exports. It has Busan-Gimhae International Airport, which won the Top Asian Airport Efficiency Excellence Award in 2014, offering a logistical advantage. By 2020, the New Port will have a total of 45 container berths with the capacity to handle more than 22 million TEU.

Industrial infrastructure

Approximately 90 percent of Korea's shipbuilding companies are located in the Busan area. They include Hyundai Heavy Industries, Samsung Heavy Industries, Daewoo Shipbuilding & Marine Engineering and STX. More than 50 percent of Korean automobiles are manufactured in Busan. The car manufacturers in Busan include the largest world brands such as Hyundai Motors, GM Korea and Renault Samsung Motors. In addition, around 40 percent of Korea's machinery and mechatronics companies are located in Busan. Eighty percent of the local aviation parts supply is produced here.

Figure 10-7 Busan Economic Zone

The FEZs offer a range of attractive benefits for foreign investors and developers including exemptions or

reductions in corporate tax, income tax, tariffs, acquisition tax and property tax. A detailed overview of the offered benefits is provided in the table below.

Table 10-6 Benefits for Foreign Investors and Developers in KFEZs

Foreign-invested companies in an KFEZs

Category		Benefits	Investment Requirements
National tax	Corporate tax Income tax	Tax benefits for 5 years • First 3 years : 100% exemption • The following 2 years : 50% reduction	Manufacturing : $10 million or more Tourism : $10 million or more Logistics : $5 million or more Medical institutions : $5 million or more R&D : $1 million or more Service : $10 million or more
		Tax benefits for 7 years • First 5 years : 100% exemption • The following 2 years : 50% reduction	Manufacturing : $30 million or more Tourism : $20 million or more Logistics : $10 million or more R&D : $2 million or more
	Tariff	100% exemption for 5 years	Imported capital goods only
Local tax	Acquisition tax	100% tax exemption for up to 15 years in accordance with local ordinances	
	Property tax	Tax reductions for up to 15 years in accordance with local ordinances	

Developer

Category		Benefits	Investment Requirements
National tax	Corporate tax Income tax	First 3 years : 100% exemption The following 2 years : 50% reduction	Foreign investment of over $30 million or a foreign investment ratio of over 50 %, and a total development project cost of over $500 million development
	tariff	100% exemption for 5 years	Imported capital goods only
Local tax	Acquisition tax	100% tax exemption for up to 15 years in accordance with local ordinances	Foreign investment of over $30 million or a foreign investment ratio of over 50 %, and a total development project cost of over $500 million development
	Property tax	Tax reductions for up to 15 years in accordance with local ordinances	Foreign investment of over $30 million or a foreign investment ratio of over 50 %, and a total development project cost of over $500 million development

Source: Korean Planning Office of the Free Economic Zones

10.4 Recommendations and Way Forward

10.4.1 Trade policy and business environment

Policy and regulatory framework issues

At the outset, the SLPA should agree on a Roadmap for development of logistics hub. It should introduce a concept of one Sri Lanka trade and logistics hub that links ports and inland Export Processing Zones (EPZs). For the implementation, SLPA should actively engage with other government institutions through NTFC and other forums to provide policy support to major changes that would support the establishment of port linked EPZ and stimulate investments.

R1. Develop a Roadmap for the development of Logistics hubs.

The plan should address following identified issues:

- Reduction of fragmentation institutional network: the purpose is to reduce cost and time of import and export procedures. China has only 11 agencies that provide 129 services, from customs clearing to issuing Authorised Economic Operator (AEO) authorisation. Sri Lanka has more than 20 agencies;
- Defining operational guidelines: to implement new or updated regulations and legislation such as Merchant Shipping Act;
- Unified Customs duty: unify the existing Customs duty and other pare-tariffs (PAL, VAT, CESS, Customs Surcharge, etc.) into a single Customs duty;
- Information Technology Agreement: join the Information Technology Agreement of the WTO to create a free trade in electronics, to attract FDI to this sector as shown in the examples of Singapore and China.

Support EPZs development and FDI

In the planning of the port linked EPZ development, SLPA has at its disposal the best experiences of the most successful ports such as:

R2. EPZ policies that attract investments from large logistic sector operators, banks and insurers as well as developers: national and local tax benefits including full exemption of tax for companies from priority sectors for up to 5 years with diversified investment threshold. Priority sectors for the port EPZ are food and beverages, spices and concentrates, IT/electronics and logistics;

R3. Solutions for easy establishment of foreign labour: the EPZs should offer to investors the opportunity to employ foreign high-skilled labour with fast-tracked permit procedures and more relaxed labour laws regarding termination of the contract;

R4. Lower investment threshold for manufacturing companies: manufacturing companies would have a lower investment threshold with the view of prioritising export sectors and value-added operations for the transhipment goods, especially targeting Indian sub-continent. The duration and size of the benefits will vary with the size of the investment. Detailed thresholds will be determined by better understanding type and size of companies with potential interest to establish in the EPZ;

R5. Use of modern technologies: base development on use of modern technologies to connect logistic companies, institutions, industries and service providers – Port community, Single Window, Trade Portal, Integrated trade platforms;

R6. Improve skills: improve skill base at SLPA through structured training programmes targeting skills required to run EPZs;

R7. EPZ promotion programme: design a modern EPZ promotion programme based on geographical advantages; the opportunities offered to traders by signed FTAs, trade and logistics hub concept, stimulating trade policies and strong investment incentives.

Other trade facilitation recommendations relate to the customs operations and are mentioned in the Chapter on Customs.

11 Customs

11.1 Introduction

In this chapter the role of Customs is described. Customs has an important role for the nation as import duties and export duties are collected and protects the country against illegal practises.

"Customs are present in all major ports in Sri Lanka. Their function is key as the custom regulations and procedures to import and export commodities may hamper the physical flow of goods when not efficiently organised."

The legal obligation is to declare all goods (imported and exported) correctly and pay the correct amount of duty before the goods are cleared and free circulations/ export is allowed. On goods, import and or export duties and VAT are to be paid.

The following approach has been used for this chapter:

- Paragraph 11.2 describes the institutional benchmarks on Customs practises;
- Paragraph 11.3 describes the current situation in Sri Lanka;
- Paragraph 11.4 provides the recommendations.

11.2 International best practice

The UNCTAD have adopted several guidelines to improve the effectiveness of Customs. The importance is to move towards digitalisation through E-Declaration and E-Clearance by use of the Single Administrative Document and supported by a Single (Customs) Window.

The international best practises are found in countries like South Korea, Singapore and in Europe. These countries have adopted systems which, generally speaking, strive for the same objective namely; *disconnecting the administrative flow for customs duties from the physical flow. At the same time the level of risks is to be determined, monitored and controlled by customs.*

Sample of South Korea

South Korea is using and own developed single window system called **UNI-PASS**. This is an all-in real-time trade facilitation system including the customs and nation security information system. It started with a large one-stop system in the 1980s emerged with EDI applications in the late 1990s. In 2005 the Uni-pass system was incorporated as a web-based clearing system and today it has been further developed as a "smart system" with mobile, RFIDs and cloud solutions. This means that the application can be opened at any PC, Smartphone or laptop device and is open each customer 24/7.

Uni-Pass system facilitates a one trillion USD of trade. About 180 million E-documents are processed real-time each year, serving 50 million passengers. The fully paperless and single window system saved an estimated value of USD 3.8 billion on logistic administration each year. Moreover, it reduced declaration and clearance time of goods from 48 hours in the past to only 1.5 hours. The export documentation time was reduced from 24 hours to only 1.5 minute.

Figure 11-1 South Korea Unipass

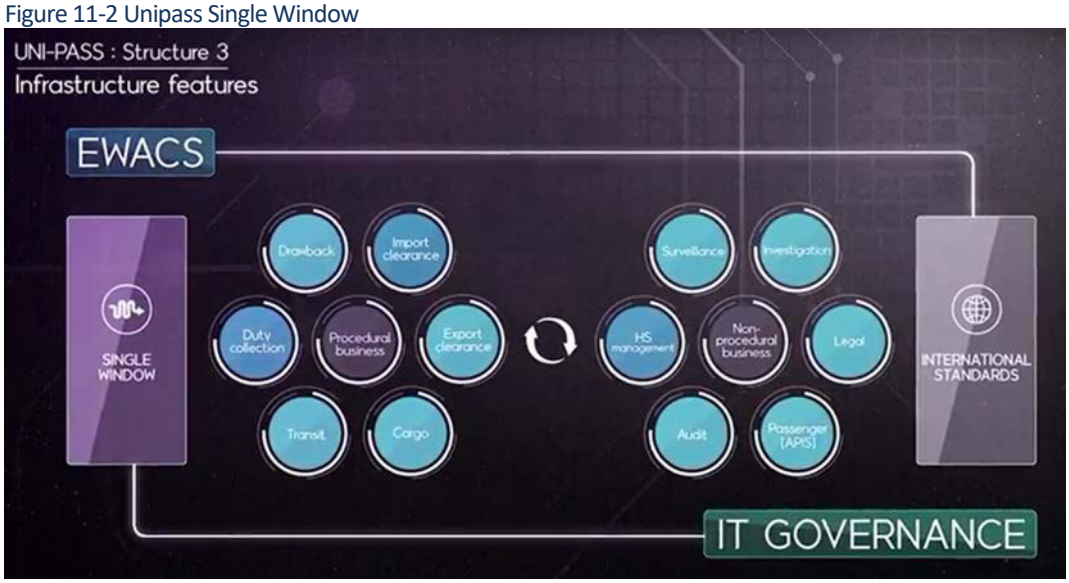
The system is organised with separate subsystems which interface with one Single Window and is compliance with international standards. The Uni-pass as single window has following supporting systems behind it:

Table 11-1 Unipass system elements

Uni Pass – Korea Single window support systems	
EWACS (Early warning and control system)	A system for early warning and control of goods and passengers. The system warns possible threats whilst goods/persons are still to arrive at the border.
IRM (Integrated Risk Management)	The risk system is based on a two-track system (safe and non-safe). It is an intelligent system which applies different risk management levels and is sorting businesses to their compliance levels. The non -safe category is monitored and/or physically examined.
CDW (Customs Data Warehouse)	The data warehouse system collects all information on clearance of cargo, passenger investigations, surveillance and audits. The system also collects external information on companies audits and prepares national statistical information.
Data Mart (Data Intelligence Integration)	The data Mart system analyses all intelligent information by linkages of Company, Cargo and Traveller information and provides intelligence support to find and trace illegal actions.
KMS (Knowledge Management System)	The knowledge management system provides intelligent information from external sources linked with investigation.
PMS (Performance Management System)	The performance system shows real-time performances of the customs and national security divisions for managers.

APIS (Passenger Information System)	The Passenger information system is an integrated personal data intelligence tool.

Figure 11-2 Unipass Single Window



The system has the following main features:

- One-stop customs clearance at 24/7 along the distribution chain
- Paperless
- Single window for large and small companies
- E-Declaration
- E-Clearance
- E-Payments from banks and via internet
- No examination at the border unless regarded as “non-safe” and container are scanned
- Open to customers all-time 24/7
- Fast, reliable, trade facilitation
- Real-time integrated risk management control system
- Intelligent real time tracking systems
- Risk factors are analysed through risk profiles which threaten public safety and trade stability (tax evasion, illegal foreign-currency transactions, smuggling of hazardous items, weapons and origin laundry.

Figure 11-3 Unipass Risk Control

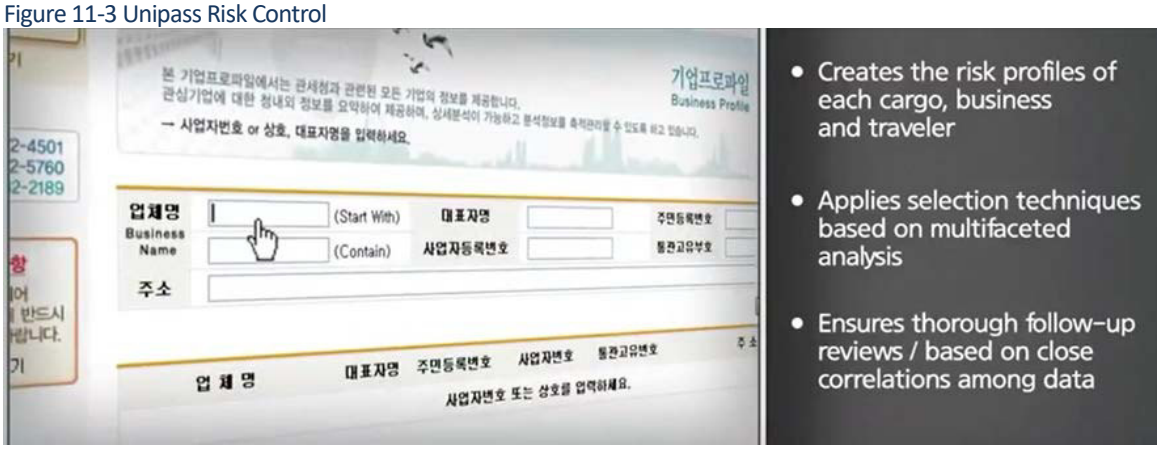
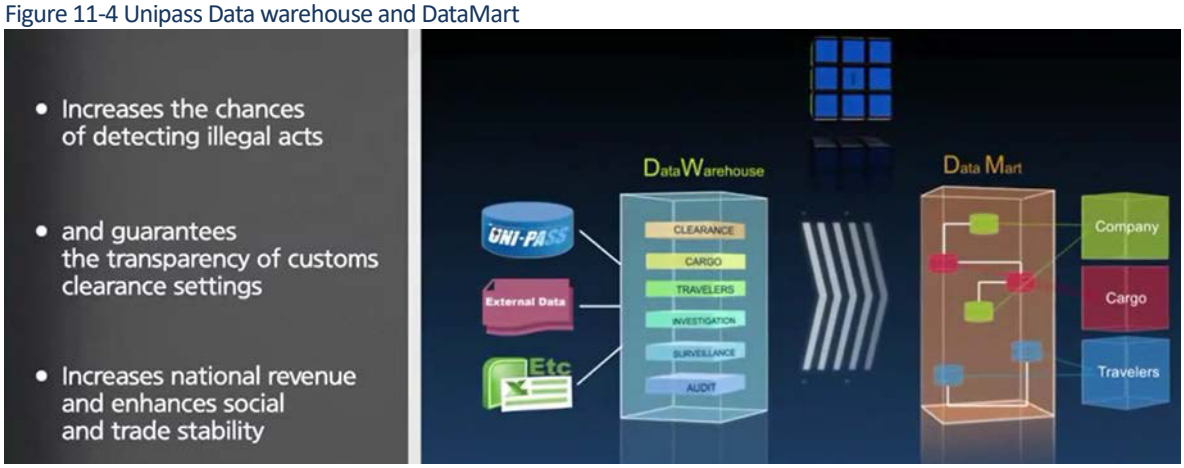


Figure 11-4 Unipass Data warehouse and DataMart



Sample of the EU:

The EU is characterized by many independent countries. They all work with a Single Administrative Document for declaration of goods based on the HS classification codes. Goods can be transported in bond and duties and VAT only needs to be paid in the country of destination. *Customs clearance takes place independently from the physical activities* by the ports or logistics service providers at warehouses. Often the logistics service provider is not required to obtain permission from customs to redistribute goods which makes it possible to operate the European Distribution Centre 24 hours a day, 7 days a week and 365 days a year. The goods can be declared independently from any delivery service.

This flexibility to warehouses is permitted by customs under strict requirements and depends on the type of license (in The Netherlands for example C-Custom-Warehouse or E-Custom-Warehouse). Consignees and shippers and logistic service providers are obtaining licenses for the digital handing of documents and payments. Full details need to be registered such as: value, tariff code, weight and origin. The customs clearance can be carried out via Electronic Data Interchange (EDI). Supplying customs with information this way allows customs to do more detailed checks on the clearances as well as the mutations of the warehouse inventory.

Clearance is done electronically, and examinations are limited based on risk management.

In the port of Rotterdam a few customs inspection areas have been created. The number of containers which are physically inspected is relatively low. This is because customs provides clearance electronically for the majority of containers and directs only high risk containers to the inspection yard based on risk management.

International Organisations encourage and support the adoption of modern Customs control techniques, using Risk Management principles. For example; WTO/Kyoto Convention and APEC Sub-Committee on Customs Procedures.

Controlling risks

Risk Management is the name given to a logical and systematic method of identifying, analysing, treating and monitoring the risks involved in any activity or process.

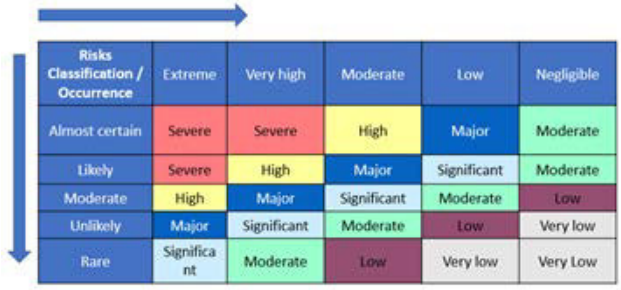
1. Establish the risks
2. Identify the risk
3. Analyse the risk
4. Evaluate the risks
5. Treat the risks

It is a dynamic process in which monitoring and review and communication and consultation goes hand in hand.

Customs should improve the risk management system with the focus on priorities and in decisions on deploying limited resources to deal with the highest risks. It not a matter to control all, it is a matter of identifying and controlling the high risk (risk/reward).

Monitoring and learning defines the goods into new classifications over time, resulting into less likely sectors with lower risks.

Figure 11-5 Risk Control and Classification



Risks Classification / Occurrence	Extreme	Very high	Moderate	Low	Negligible
Almost certain	Severe	Severe	High	Major	Moderate
Likely	Severe	High	Major	Significant	Moderate
Moderate	High	Major	Significant	Moderate	Low
Unlikely	Major	Significant	Moderate	Low	Very low
Rare	Significant	Moderate	Low	Very low	Very Low

Treating the risks is for port activities a very important element. High levels of physical examinations in the port leads congestion and space constraints. Through increasing the development of risk profiles and industry audits the random examinations will increase and the physical examinations can be reduced.

Figure 11-6 Treating Risk

Risk Profiles are developed as a means of putting risk management into practice at the Operational level. A risk profile is normally specific to a customs office. It describes:

1. The risk areas
2. Assessment of the level of risk
3. The countermeasures adopted
4. Activation date and review dates
5. Means of measuring effectiveness.

The profile information is used as the basis for the selection criteria. Documents received and processed by Customs, i.e., cargo and passenger manifests, goods declarations, are compared against the selection criteria through the use of automated systems. The action plan for physical examinations or random examinations is thereafter determined. In all the objective should be to increase the compliance and the control the level of risk.

11.3 Current situation

"Customs are present in all major ports in Sri Lanka. Their function is key as the custom regulations and procedures to import and export commodities may hamper the physical flow of goods when not efficiently organised."

The legal obligation is to declare all goods (imported and exported) correctly and pay the correct amount of duty before the goods are cleared and free circulations/ export is allowed. On goods, import and or export duties and VAT are to be paid.

Customs is organizing 53% of the Government Tax revenue budget which mainly consists of:

- Import duty
- Customs duty
- VAT
- Excise duty
- CIS charge
- Ports & airport levy.
- Nation building tax.

The securing of revenues is therefore an essential part of the nation's financial stability. Moreover, the control over irregularities, smuggling and preventing drugs imports are a national concern.

Customs perform the following activities:

- Collecting taxes and dues
- Clearance of cargo
- Sealing containers
- Scanning and inspection of cargo
- Creating release notes (for refunds/rebates)
- Anti-smuggling patrols (future)

Customs in Sri Lanka have implemented Asycuda (promoted by UNCTAD) in the period between 1992 and 1994. ASYCUDA has been live in Sri Lanka since January 1994. Today, the version "Asycuda World" is implemented and this is the latest version for customs applications worldwide and has the ability to connect through Electronic Data Interchange (EDI).

Several issues had to be solved during the process such as Implementation of the Manifest, Import/Export Cargo Examination, Border passing note and Import/Export CusDec submission and limiting input errors. For E- payments (online payments) two banks were connected, the Peoples Bank and the Bank of Ceylon. People's Bank branches also facilitate to connect Sri Lanka Customs through Peoples Bank's payment platform. Meanwhile Customs is working on several projects to support further use of electronic declaration and enhance the services such as on statistics portal and HS code finder. Despite this, Customs todays faces still many manual requests for customs clearance. Another issue is that many payments are still done through cash payments such as at the Customs Headquarters Banks by Bank Drafts. In the warehousing sector, cash payments are still the most dominant method. Finally, the road congestion towards the inspection areas is a major issue today. Due to various reasons (gate procedures, port access road congestion, and public road congestion the queue before the main gate is often more than 5 km!

Clearance of containers

Shipping agents send their E-declaration to customs in advance of the goods arriving in the ports of Sri Lanka. About 90-95% of all containers is declared through this principle. The clearance of container is done by

customs after payment of duties. The payment is either done through E-payment and or manually at the customs counter desk.

Inspection & examination

Today, the majority of containers needs to be inspected and containers are send to designated inspection areas. This procedure is rather old fashioned and typical belongs to many countries which have not implemented E-clearance and proper risk management. In those countries the space in port became too limited and that is why bonded inspection areas have been created outside the port zones to allow goods to be inspected and cleared at those areas. In Sri Lanka the same has happened during the 1980s and 1990s when clearance was not yet automated but meanwhile Customs has implemented Asycuda World, as system which supports E-declaration and EDI.

As such today, containers can be declared electronically and can receive clearance electronically.
Inspection and examination is done based on risk profiles. The consignments are selected under three categories as Green, Amber and Red. Amber and Red Channel selected consignments are subjected for the examination whereas the Green selected consignments are released without examination. Boxes are not inspected at the terminals. Customs assigns the inspection area when the container are (digitally) cleared and mentioned on the Gatepass issued by Customs. The Gatepass physically moves to the main gate at which time

Based on the risk profile, the containers follow following procedure:

1. Red Line: inspection at Gray Line I and II (about 1%) - The inspection in the Red Line concerns boxes with a high risk profile. Clearance is provided whilst they are at the terminal but containers are directed to Grayline I and Grayline II at the time of clearance. The areas of Grayline I and II have limited capacity for about 20% of the daily inspected containers. Currently around 1% follow this route.
2. Amber Line: directed towards inspection area Rank (about 92%) - The customs are sending cleared containers to inspection area Rank. About 1,000 containers are inspected daily at the inspection sides Rank, the site often receives more than 1000 per day based on the 92% share in daily traffic. Indicating that RANK site is insufficient to handle the traffic efficiently.
3. Green Line: are released from examination and go directly to consignees (7%) - The Green Line is provided to consignees with a low risk profile. Today about 47 Importers have been selected for the Green Line consisting of about 120 containers per day or 7%.

Regulations

Any import declaration has to be done by a registered and licensed entity to carry on the business as a Shipping Agent, Freight Forwarder or Non Vessel Operating Common Carrier (NVOCC). E-manifest can be obtained by registered and licensed importers and exporters. For import declarations by e-manifest, goods need to be submitted 72 hours prior to arrival of the first Sri Lankan port or later in case port of departure is within 72 hours prior to arrival in Sri Lankan ports.
The main regulations for importing goods by sea are illustrated here.

Table 11-2 Customs main regulations

Customs main regulations	
Manifest regulations	1. Customs Ordinance (Chapter 235) 2. Gazette Notification No. 1886/55 of 31.10.2014
Electronic Sea cargo reporting (E-manifest)	Gazette Notification No. 1886/55 of 31.10.2014

For full details on regulations please read the Customs Ordinance and the relevant gazette Notifications.

Charges of customs
The following charges are applied by Customs:

Table 11-3 Customs charge for each declaration

Custom charge for each declaration	Price
Commodity described by HS code, volume, items and weights	As per Tariff book
Computer charges	Rs. 250
Seal charges	Rs. 100
Over time (for Full Container loads only)	Rs. 1600

Rs. 250 is charged for each and every customs declaration for computer Charges and Rs. 100/- per containerized cargo as seal charges and Rs. 1600/- as overtime charges are applicable only for full container load(FCL) cargo.

When containers are send to inspection areas the transport is secured through (additional) seals at the container when leaving the terminal or port zone. Procedures are subject to improvements and further digitalisation.

Customs inspection zones are located at Rank Container Terminals and Grayline I & II. These facilities contain scanning materials. The map below shows an overview.

Figure 11-7: Overview Customs inspection areas

Facility	Cargo	Activity
Peliyagoda Warehouse	LCL Imports	Inspection
Bloemendhal Facility (to be developed)	*All Imports*	*Inspection & Scanning future development*

Facility	Cargo	Activity
Grayline II	FCL Imports	Inspection
Grayline I	FCL Imports	Inspection
Rank Container Terminal	FCL Imports	Inspection & Scanning
Trico Facility	Exports	Inspection
Port Scanning Facility	Imports	Scanning

11.3.1 Customs procedures

For this section the Port of Colombo has been taken as example as the majority of goods are transported/handled by this port.

Import Cargo

After declaration by the shipping agent, the customs duties need to be paid before Customs provides Clearance. The Gatepass is issued by Customs to the importer agent which inserts the truck number on the original Gatepass. The truck driver has a "port access pass" to enter the port with an empty truck for pick-up. With a copy of the Gatepass the truck driver is allowed to receive the import container at the terminal where the clearing agent has issued the "loading pass" and confirms the container number to the truck. The original Gatepass has now to be moved from the importer agent to the main gate by a wharf clerk which hands over the original Gatepass to Customs together with the Loading pass received from the truck driver in front of the main gate. Customs inspector then attach the seal and submits a new Gatepass to the driver.

Customs checks at the main gate;

1. Original Gatepass;
2. loading pass
3. Issues a seal number for Red and Amber inspections areas
4. Issues a new Gatepass for entering the inspection areas
5. Sometimes other documents are checked as well

Where the containers have to be examined was already decided and printed on the original Gatepass at the time of clearance.

The majority receives Amber line inspection which involves a medium inspection and those containers with high risk profile are inspected thoroughly through the Red Line procedure. Some trusted importers get an immediate 'green channel' which means that no inspection or scanning is needed others are directed towards scanning inspection facilities.

Note that Customs is not present/interfering at the terminal gates, all activities are done at the main gate and at the inspection yards except for exemptions.

Customs is preparing to move all their imports inspection facility to a newly to be realised Bloemendhal facility. In this case, the majority of boxes are aimed to be scanned in the port with new station scanners. The scanning of all boxes at the current facility would bring major logistic challenges as trucks would queue for this facility. Depending on the scanning results boxes are either send to the inspection facility or are released for public transport. The containers then sealed and tagged. Also, the Customs intend to work with GPS seals. This would allow customs to track the container whilst under transport to the inspection areas.

Export Cargo

All export boxes are examined at Trico facility in Colombo. Exports need to be inspected for the potential threat of smuggling (amongst others; smuggling of iron, fauna and cultural heritage items). 90% of the boxes pass through in 10 minutes at Trico facility. Customs need to check whether goods are indeed shipped out of the country, as rebates are given for exports based on this fact. For this reason, a releases note is issued.

Activities at Trico facility

1. Examination of container
2. Weighing of container
3. Documents checked
4. Seal for export
5. CDN (container despatch note)

At the main gate the seal and container number and the CDN is checked and stamped. With the CDN the shipper is able to get the rebate depending on the type of goods.

Customs plans to have export cargo scanning facilities in dry ports. The approved boxes can then be sealed and moved to the port and smoothens customs and logistic operations. The Trico facility will be used until that time.

Procedures and gate passes

The customs procedures are illustrated in the next two tables which describe the following processes.

1. LCL cargo clearance & delivery process
2. FCL import container: cargo clearance & container delivery process

This table is similar to the table as mentioned under IT, except here the customs actions are highlighted. The number of manual documents applied in this chain are highlighted. In the same table the modern practises are detailed to understand the difference between systems applied. The results are quite obvious, the number of administrative documents in the manual process is numerous, **up to seven copy documents to get to a delivery order, involving a lot of process time and administrative checks and administrative burden and limited transparency.** This compares to a **semi-automated paperless solution** in which approvals are made through the systems through status checks and status updates through a single window system. In this way the administrative flow is reduced and paper is eliminated. Further the system becomes very transparent, each party involved knows the same status.

The main observations on Customs are that there are still too many manual processes despite the e-declaration:

1. Cargo is only released after showing original payment slip issued by Customs which has to be manually processed.
2. Trucks may enter the port on a copy of the Gatepass to collect the containers after customs duty paid, also a manual procedure.
3. Cargo can only move out of the gate when original Gatepass is offered to the gatehouse which has to be handed in by courier-runner. The orginional document processing is a manual procedure.
4. A new manual gatepass with seal number is handed to the truck driver at the gate-out procedure which is to be handed-in at the the inspection area.

Table 11-4: FCL import container: cargo clearance & container delivery process

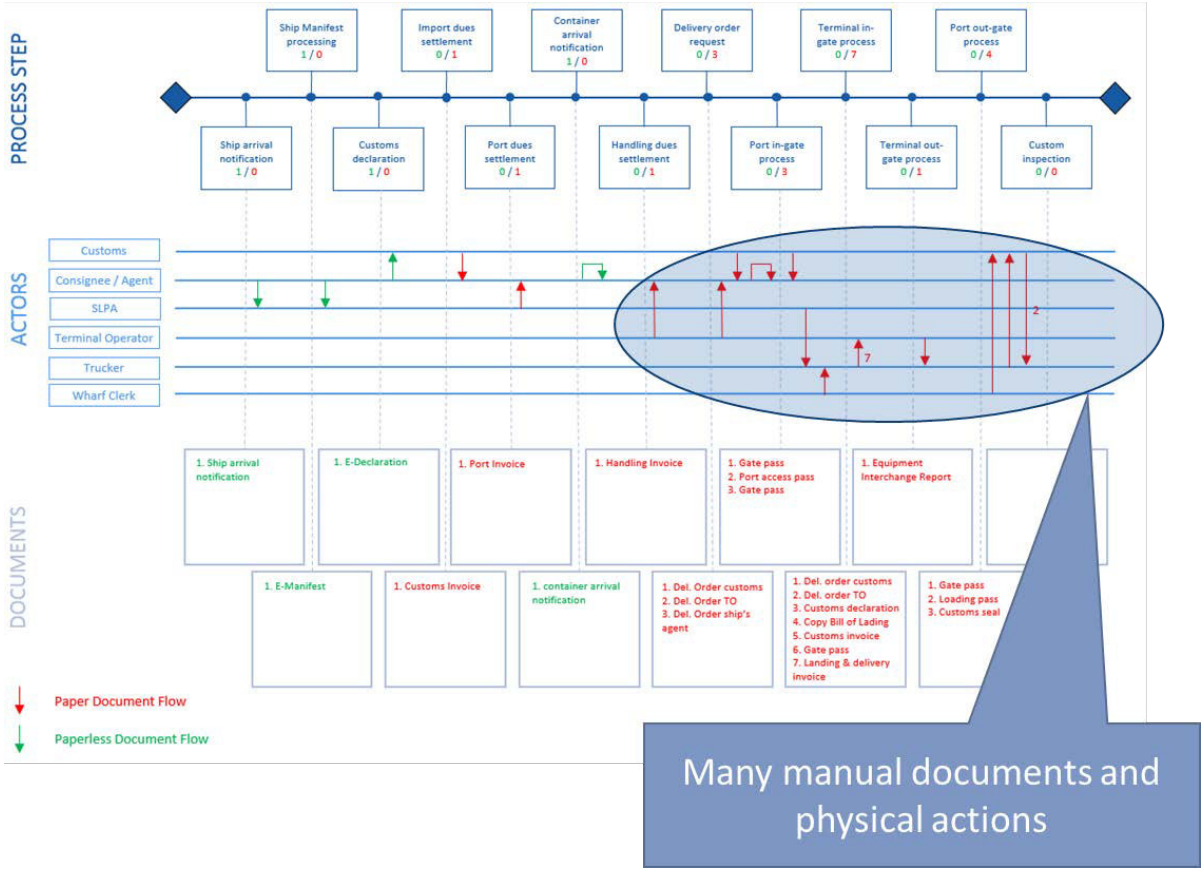
Process / Activity	Current situation Colombo	Benchmark International best practices
Ship arrival; ETA from shipping line to Port Authority	Email/Fax	EDI (Electronic Data Interchange)
Manifest	E-manifest (BAPLIE) 99% online – 1% manual	E-manifest (BAPLIE) Online
Cargo customs declaration by consignee	E-declaration	E-declaration
Import dues (Customs)	**Payment (cash or transfer)** **If container has been discharged at the terminal, the consignee goes to Customs office (outside port) to pay the customs duty**	E-payment
Port dues	Pro-forma disbursement account Advanced payment (online) Ship's agent pays port dues to Port Authority	E-payment
Container arrival notification	Shipping agent informs consignee on arrival container in stack	Automatic notification
Handling dues	Terminal charges shipping agent for the handling Monthly settlement Shipping agent charges to consignee: • Quay move • Stack move • Storage • Delivery move	
	Consignee settles payments (cash or online) before pick-up of the container; obtains landing a delivery payment slip	E-payment
Delivery order (request from Consignee to SLPA/terminal operator to deliver)	**Consignee has to complete the delivery order by obtaining approval by:** • **Customs** • Terminal operator • Ship agent	E-notification to Port Community System and/or Terminal Operating System
Port in-gate process: Truck sent for pick-up	**Manual** • **Customs issues copy of gate pass (paper) to the agent/importer upon payment of custom declaration** • Trucker needs port access pass from SLPA (sticker) • Wharf clerk provides copy of gate pass to truck driver (paper)	Security check • Automatic identification truck driver • Truck license plate

Process / Activity	Current situation Colombo	Benchmark International best practices
Terminal in-gate process: Container delivery to Consignee	Manual **Truck drives to terminal to pick up the container upon submitting:** • **Delivery order Customs** • Delivery order terminal operator • Dustoms declaration • Copy bill of lading • Customs payment slip • Copy of gate pass • Landing & delivery payment slip	(semi-) Automated Truck driver is invited to pick-up the container after finalisation of the online container delivery order Security check • Automatic identification truck driver • Truck license plate • Connecting container number to truck license plate
Terminal out-gate process	Trucker receives Equipment Interchange Report (EIR) after collection of the container	Trucker receives Equipment Interchange Report (EIR) after collection of the container, including gate pictures of equipment
Port out-gate process	**Truck drives to Main Gate at port boundary** **Customs checking procedures** • **Wharf clerk delivers original gate pass to Customs (including truck license plate number and seal number)** • **Truck driver delivers loading pass to Customs** • **Custom issues customs seal** **Customs issues new gate pass (to drive to Customs Inspection area)**	Truck drives to port gate Security check • Automatic identification truck driver • Truck license plate
Customs Inspection	**Three examination modes:** • **Green: no examination (5-7%)** • **Amber: quick examination (+90 %)** • **Red : full examination (3-5%)**	Upon Custom request, truck driver needs to visit Custom scanning facility for examination

Graphically the situation on manual procedures in the FCL flow is illustrated in next figure.
The red numbers illustrate the physical actions and manual documents in the administrative flow to retrieve a container from the port. The green numbers illustrate a digital process today.

At one stage about seven documents (or copies thereof) have to be presented to release a container. Further the physical actions to first present a copy of the gate pass and later to hand-in an original gatepass is a very old method and should be digitalised.

Figure 11-8: Container documentation flows



Transhipment Cargo

Customs does not inspect transhipment cargo which does not exit the container yard. To comply with international regulations radio-activity scanners are placed at the gates of terminals. Any MCC cargo can be selected for inspection in this regard. Due to interterminal traffic radio-activity may be detected and containers can be detained.

Scanning

Customs is using container scanning facilities to reduce the smuggling of goods and to increase the nation's safety. Containers are selected for scanning in case of doubts on the contents and or through random selections. The port of Colombo has three scanning facilities located at CFS 1 area. Two scanning machines are operational. Customs also operates scanning facilities at inland inspection areas such as at Rank Container Terminals and at Grayline I & II.

The scanning location at CFS1 is not ideal as inbound trucks have to make a right-hand turn at the main port access road to enter the scanning location and must turn back on the port access road again. This obstructs the flow of inbound trucks. Ideally the scanning of containers is done at an area where customs can take immediate action, that is at the same location as the container inspections areas.

In the long run, the role of the customs may be different once the bonded transport is allowed for both FCL and LCL and the transportation chain has become more trustworthy. The amount of physical checks shall be reduced. At the same time, the customs shall be more active at major shippers and consignees rather than at the port.

Table 11-5 Customs - Key Observations

Category	Issue	Severity
Customs		
IT	Asycuda World is able to handle E-declaration and uses HS classification codes for all commodities	Low
IT	They apply a Single Administrative Document (SAD) comparable to many developed countries	Low
IT	Asycuda World is able to handle electronic payments, yet the business is often still cash based	High
IT	Too limited consignees and shippers use the ability to do electronic declarations.	High
IT	Electronic clearance is not yet integrated in a Customs single window despite using the SAD	High
Gatepass	The Gatepass procedure is a manually intensive procedure which also involves wharf clerks to run around the trucks at main gate (safety issue). The original gatepass, the sealing and the issue of a new gatepass in all is rather a time consuming procedure.	High
Gate efficiency	The Main gate handles about 1 container each two to three minutes.	High
Logistics	High traffic queues of over 5 km are present at several days in the week. Next to manual procedures at the Main gate also the congestion in the city and in front of the inspections yards is causing this queue. Often the queue in front of the inspection area is all the way, from South Port to Grayline II.	High
Logistics	Inspection areas are scattered over several sites, often not easy accessible due to traffic. The scattered locations cause sub-optimal use of resources and planning. Customs is not able to control the truck flow as consignees themselves plan the truck move to the inspection areas.	High
Green line	A few shippers and consignees have been appointed to the green line which allows the container to pass directly without standard checks. Unfortunately, only a small part of the full container loads get the green line label, resulting in many inspections still today.	High
Inspection	The total capacity on inspection is limited to about 1,000 containers per day.	High
Scanning	Customs likes to implement 100% scanning (today about 70%). Scanning would increase the daily capacity of inspecting containers which is today limited to about 1,000 Containers per day. Today the scanning at the port is limited by only two mobile scanning trucks	High
Detention	Customs has own detention areas near the inspection sites. Also, in the port there are warehouses with goods under detention. The issue is here that these goods are not moved our frequently. Sometimes as auction are planned. The storage space in the port occupied by is Customs is for them free of charge. This space is however very valuable for the port and should be cleared if possible.	High

11.4 Recommendations

Customs – General

R1. **Customs should further improve and liberalise their activities** to create a split between the physical flow of goods and the administrative flow of goods. In this way, the import flow can be sped up and import duties can be paid once goods are in transport. Digitalisation of the import duties payments shall improve the flow of goods.

R2. Move to fully electronic Customs processing: customs entries are currently being filed electronically. Next step should be to move towards getting the appraisal/verification of Customs entry to be done electronically on the system. This obviates the need to visit the Customs office and will greatly speed up and simplify the processing of documents;

R3. Build modern set of incentives for customs officers: to facilitate moving to full online processing and increase transparency, a generous incentive scheme to reward Customs officials for speed in processing documents should be considered. Such a reward scheme could be based on the number of applications approved per day, to align the interests of the importer and the Customs staff;

R4. Allow pre-documentation as standard for all goods: currently, this facility is available only for perishable cargo; it should be extended to all cargo, to minimise bottlenecks when vessels arrive;

R5. Develop AEO scheme: SLPA could start promoting port level AEO scheme that could be extended to PA run EPZ. The scheme should include provisions to improve valuation and risk management and, in this way, reduce the congestions at the port. Modern customs management technology such as extended port single window can be employed to fast track AEO status to all export firms in line with the best practice. All new investors in PA EPZ should be considered for fast-track into the AEO scheme;

Customs - IT

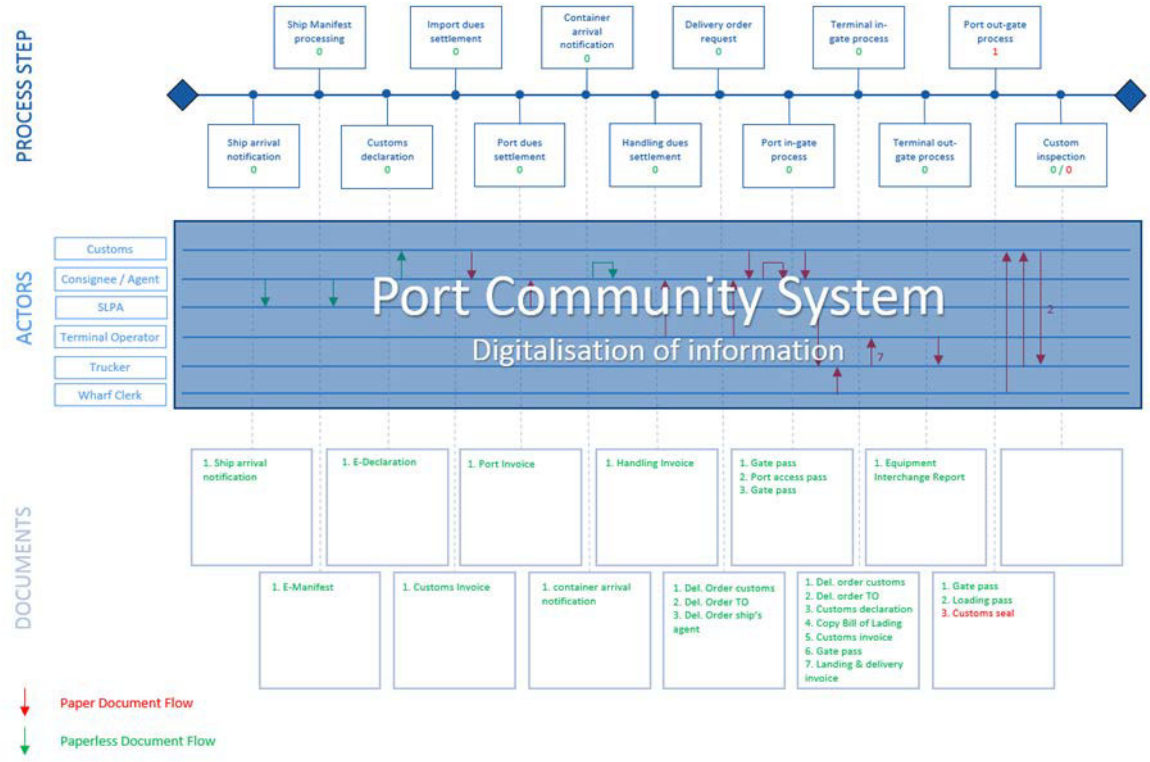
R6. Asycuda World is able to handle electronic payments and electronic payments should be encouraged. E.g. Customs should facilitate e-payment more and industry needs to be educated to use it.

R7. Customs is recommended to further improve the **customs single window** and become paperless. Further it is recommended to facilitate and promote the development of a **single maritime window** (with which customs in the future, would electronically distribute their clearances)

Reference is made to Figure 11-8: Container documentation flows

This illustrated many manual documents and physical actions. With a Port community system, actors will able to intervene through one system. This would resolve a large number of physical actions and duplications of documents. This is illustrated in next picture.

Figure 11-9: Port Community System



Customs - Clearance of goods

R8. **Goods Clearance should become independent of the physical flow**. By promoting the use of EDI, the E-declaration can be done whilst goods are in transport towards the port of entry. E-Clearance can therefore (based on risk management) already be provided before the goods arrive at the port. Customs in this respect should not interfere in the physical flow with exemption of the identified goods under the high risk profiles. Digitalisation is also the best method to reduce the level of bribery.

Customs - Risk management

R9. **Risk management is key in the allowance of free movement of goods** when clearance is provided.

R10. Risk profiles in Sri Lanka is still set at high levels. **Once more trust has been built into the system the share of the green line can increase**. This can be obtained by increase fines for trespassers and reduce the costs for trustworthy consignees. "Intervention squads" should ensure that Green line consignees are indeed occasionally checked. Charge on manual declarations should be made rather than at computerized declarations to create incentives.

Customs Gate efficiency

R11. **The gate procedure needs to be simplified and to become paperless**. This can be done through a digital gatepass. Seals with GPS will enable the truck to pass through a RFID identifier at the main gate. In that case the seal needs to be mounted at the terminal gates instead of at the main gate.

Customs Green line

R12. **The Green line should be promoted and increased through proper risk management**. Due to the large number of small consignees and the rapid changes of consignees this is not easy but it is the only way forward to a more efficient transport system. Large and or regular consignees should be promoted to the green line. Customs is advised to increase the Green line volumes supported by random scanning checks at newly assigned Green line users. In the end shippers and consignees shall have a full paperless interface with customs through their customs single window and physical inspection is dramatically reduced.

Customs Scanning

R13. The **terminal inspection should be reduced to a minimum** and more containers should be send through Green Line or through to the Scanning line. Reasoning is that space at the terminals is required for cargo operations.

A Scanning Line is to be introduced next to the Green Line based on proper risk management. This scanning is done before physical inspection is carried out and should have the aim to reduce the amount of physical inspection. Automate Customs inspections by installing scanners: replace physical inspection with electronic scanning as a standard procedure. The physical inspection should be based on modern risk management models.

R14. Customs likes to implement 100% scanning. This is not advisable when the set-up and operational efficiency is not in place and the scanning results in unacceptable queuing and waiting times. So, **the risk/reward of 100% scanning should be evaluated** as well as the cost incurred to society when 100% scanning leads to long waiting times of trucks as well as increased number of physical inspections.

R15. **The scanning is done preferably by fixed scanners in which the driver will exit the truck**. The health issue of exposure to radiation needs to be addressed and normally the truck-driver will exit the truck whilst the truck is pulled through the scanner.

Customs Inspection

R16. **Inspection should be concentrated among a few (preferably one) site(s**) to increase use of resources and planning.

R17. The area near Bloemandhal Area has been appointed for this. The total capacity on inspection should become more efficient to handle more containers simultaneously and have a **larger capacity by implementing fixed container scans** and to reduce the level of physical inspections.

Customs detained goods

R18. **The areas for customs detained goods should be allocated outside the port zone to free warehouse spaces.** Customs has several spaces in the port zone which is used for detained cargoes. These warehouses and spaces occupy valuable port land without any income for the port.

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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

(Financed by the Japan Fund for Poverty Reduction)

The National Port Directions – Volume 1 (Part 7)

Prepared by

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12 Navy

12.1 Introduction

In this chapter the Navy is described in short. The Navy secures the nation by performing coast guard and providing port security.

The following approach has been used for this chapter:

- Paragraph 12.2 describes the current situation in Sri Lanka;
- Paragraph 12.3 provides the recommendations.

12.2 Current situation

The Navy has a presence in the port of Colombo, Galle and just outside of the port of Trincomalee. The de-facto functioning of the Sri Lankan Navy as coast guard make them important for the nation's and port security. The navy actively performs the role for port security and is present at the gates of the port and with surveillance boats on the waters. Thus, close coordination with the Port Authority is essential. The navy reported shortage of mooring places in the port of Colombo especially in view of the ordered new larger vessels.

The Navy should have presence in all major ports necessary because of national safety and security and coast guard function. The Sri Lankan Naval fleet consists of a dedicated fleet comprising missile ships, combat ships, offshore patrol ships, support ships and inshore patrol crafts. They have ordered two large vessels of 105m in length which cannot moor at current facilities in front of the central Navy building in Colombo port. Meanwhile the vessels have been delivered to the Navy during the second half of 2017.
The most obvious location for the newest vessels are dedicated facilities in Hambantota and or in Trincomalee due to ample development space in these ports.
In the port of Colombo initially berthing space were foreseen at the cross berths near the JCT terminal. However due to the JCT modernisation the cross berth will be closed to create additional quay length. This has implications for berthing the large navy vessels. A solution is found to berth the new navy vessels at the existing passenger terminal in Colombo which is also often applied to visiting navy vessels from abroad. Further, the large navy vessels can be berthed at the BQ should no cruise vessels be present.

It is anticipated that the Navy will have presence in all major ports with dedicated or common mooring facilities as follows:

Table 12-1 Port and Navy facilities

Port	Navy facility
Colombo	Dedicated berthing and Headquarters
Galle	Dedicated berthing and facilities
Hambantota	Dedicated berthing and facilities
Trincomalee	Dedicated berthing and facilities
Oluvil	Common berthing and facilities
KKS	Dedicated berthing and facilities

12.3 Recommendations

R1. The coast guard function of the Navy is important to protect the Nation. In view of increased boating activities around the coast the Navy should prepare themselves for increased demand for surveillance. The influence phere in coastal waters is 200nm beyond which is regarded as international waters, as determined in the United Nations Convention in the Law of the Sea (UNCLOS).

R2. A permanent Navy basis should be implemented in Hambantota as this port is closest to international shipping routes.

R3. Additional berthing spaces to be developed in ports of Hambantota and Trincomalee for the largest navy vessels.

13 Auxiliary Port Functions

13.1 Introduction

Auxiliary functions in this report can be defined as: "All activities taking place which are stand-alone functions and activities taking place to support the primary commercial port operations." This boils down to the definition being all functions except for the commercial port operations. Sometimes auxiliary port functions can be a commercial activity on itself like, bunkering services or the crew change service in Galle.

The following approach has been applied:

- Paragraph 13.2 describes the benchmark against world class ports: The benchmark of Colombo port is based on the categories (i) shipping functions, (ii) logistics and industries, (iii) maritime community and finance, (iv) attractiveness and competitiveness;
- Paragraph 13.3 describes the current situation in Sri Lanka;
- Paragraph 13.4 describes the direct supportive functions: Description of all functions which are direct supportive to the commercial handling of ships. This includes tugs, pilotage and bunkering;
- Paragraph 13.5 describes the indirect supportive functions: All other functions which are not directly supportive to the commercial handling of ships like marinas and licensing; and
- Paragraph 13.6 describes the way forward for SLPA and auxiliary functions.

13.2 International best practice

In this paragraph an analysis is provided which compares Colombo port to other hub or excelling ports. This gains insight in how to boost the Colombo port cluster. The analysis is based on four main topics:

1. **Shipping Functions** – Which shipping facilities and activities are there in the port?
2. **Logistics and Industries** – What logistics and industries are there to support the port?
3. **Maritime Community and Finance** – How does the port community function?
4. **Attractiveness and Competitiveness** – Which policy schemes and physical connections are there to support the port?

The Colombo hub is compared to several ports with different characteristics:

- **Singapore** – As a global leading hub port
- **Tanjung Pelepas** – As a competitor of Colombo
- **Rotterdam** – As an example of large European port
- **Tangier** – As a transhipment hub
- **Athens** – As a transhipment hub

Each topic will have a list of (auxiliary) functions and descriptive. This will give an indication on which terrains Colombo can improve as a hub. Please note that this is still a long list for discussion with SLPA. The discussion will lead to a qualitive analysis on a selected number of topics which will yield concise recommendations for SLPA.

13.2.1 Shipping Functions

Shipping function of course form the basis for the maritime operations in a port. High quality facilities and world class facilitators can attract more business to the port. The following aspects are highlighted when reviewing the shipping function of Colombo port to the other ports:

- The number of shipowners is very limited also due to the limited national registry. Flag state control and port state control are provided through the Merchant Shipping Secretariat (MSS).
- In Sri Lanka there are no or limited ship managers registered.
- Bunkering is provided as a basic service in most ports but real hub ports such as Singapore and Rotterdam have become large bunkering ports. Note that from a (bulk) shipping perspective a discharge port is often more attractive than a port in the loading region.
- Bunkering of LNG has become a new feature at bunker ports.
- Cruise cluster is more oriented to touristic values in combination with airport proximity than to container hub ports
- Life rescue and emergency response units including heavy offshore tugs are welcome in large ports. The long distance between ports make it attractive also for Sri Lanka.

Table 13-1: Shipping Functions Characteristics

Item	Specification	Colombo	Singapore	Tanjung Pelepas	Rotterdam	Tangier	Athens
# shipping agents		Yes	Yes	Yes	Yes	Yes	Yes
# shipowners		No	Large	Limited	Large	Limited	Large
Flag state	# national flag registry	Limited	Yes	No	Yes	No	Yes
Shipowners society		No	Yes	No	Yes	No	Yes
Ship management companies		No	Yes	No	Yes	No	Yes
Bunkering	MDO, HFO, GO	Limited	Large	Limited	Large	Limited	Yes
Bunkering LNG	LNG	No	No	No	Yes	Yes	Yes
Cruise Cluster		No	Yes	No	Yes	No	Yes
Life rescue response unit		Limited	Yes	Yes	Yes	No	Yes
Offshore/heavy ship response unit		Limited	Yes	No	Yes	No	Yes
Fast crew response units		Yes	Yes	Yes	Yes	Yes	Yes
# Ship chandlery		Limited	Yes	Limited	Yes	Limited	Yes

Source: MTBS

13.2.2 Logistics and Industries

Large ports often have a main industry and specialisation or/and a logistics cluster attached. Logistics clusters boost port efficiencies and large industries boost port throughput. The following aspects are highlighted when reviewing the logistics and industries of Colombo port to the other ports:

- Warehousing at dry ports is a common feature for hub ports The CFS (container freight station) or distri-parks (cluster area with distribution centres) are located in the proximity of the quay. Sri Lanka has scattered dry ports in the city and no distri-parks inside the port boundary due to space limitations.
- Container maintenance and repair is offered in large (hub) ports. Colombo is lacking these facilities.
- Heavy industry, many large ports have a dedicated heavy industry such as refineries/chemical installations, power stations or steel factories. Colombo refinery industries have been surrounded by city developments. Due to the proximity of the city is it also not well located for new industries. Hambantota can be considered as the promising industrial port in Sri Lanka.
- Medium industry at port is often provided through (re)processing of commodities and semi-finished goods. A good example is the Prima Flour plant in Trincomalee. Colombo is lacking such facilities due to the space constraints in the port and the proximity to the city.
- Light industry; the prime examples are found in the logistic industry where packaging and labelling or other light processes are done to finished products. It would also encompass for example the handling of refrigerated or cold foods to pack and re-transport. The light industry is also the garment industry which an important industry for Sri Lanka (like in several surrounding nations)
- Offshore repair cluster. This cluster very much depending on the proximity to oil and gas fields. However, several ports in the world have seen the development of Offshore supply basis. This consists of terrains on which offshore companies assemble or even manufacture pipelines, repair oil platforms and other appliances used in the offshore industry. Ports in Sri Lanka do currently not have such activity.

Table 13-2: Logistics and Industries Characteristics

Item	Specification	Colombo	Singapore	Tanjung Pelepas	Rotterdam	Tangier	Athens
Warehousing (CFS) at dry ports		limited	Yes	Yes	Yes	limited	Limited
Container maintenance & repair		No	Yes	Yes	Yes	No	No
Empty depots at port		No	Yes	Yes	Yes	Yes	No
Heavy industry	Chemical cluster, steel cluster	No	Yes	No	Yes	No	No
Medium industry	Processing, manufacturing cluster	No	Yes	No	Yes	No	Limited
Light industry	Logistic cluster	No	Yes	Yes	Yes	Yes	Limited
	Food cluster	No	Yes	No	Yes	No	Limited
	Automotive cluster	No	Yes	No	Yes	No	Yes
Offshore support cluster		No	Yes	No	Yes	No	Yes

Source: MTBS

13.2.3 Maritime Community and Finance

World class parties as well as active local companies and financiers make for an attractive port environment boosting investments and activity. The following aspects are highlighted when reviewing the maritime community and finance of Colombo port to the other ports:

- The maritime society often also consists by the presence of the navy. Several larger ports in the world don have their navy at other dedicated (small) ports
- Ship newbuilding is an industry which is often carried out at large ports. Asian countries like Japan, South Korea and China have become the largest shipbuilding nations with dedicated ports as "newbuilding shipyards". Today the newbuilding segment faces oversupply due to the massive entrance of Chinese dock yards over the last two decades.
- Ship repair originated from history at many commercial ports to offer dry docks to support the repair of their own vessels and to offer repair services to foreign flag ships. Today the ship repair industry is characterised by private companies which often have also become regional or even global players. Colombo dock yard is a still a local player. Hambantota is also earmarked to attract the ship repair industry in later phases of the port development
- Financial services and insurance in the maritime industry are clustered around the financial centres in the world. London, Singapore, Rotterdam, Oslo all have dedicated shipping banks and insurance companies. The development of such financial infrastructure has also been subject to a number of Chinese ports such as Shanghai.
- Classification societies are often also centred around maritime cities such as London, Singapore, Hamburg, Oslo and Rotterdam. A nation without a flag state is most often not able to attract these classification societies, other than agencies of same.

Table 13-3: Maritime Community and Finance Characteristics

Item	Specification	Colombo	Singapore	Tanjung Pelepas	Rotterdam	Tangier	Athens
Navy Cluster		Yes	Yes	No	No	No	Yes
Marinas		No	No	No		No	Yes
Ship newbuilding	Newbuilding docks available	No	No	No	Yes	No	No
Ship repair	Repair docks available	Yes	Yes	No	Yes	No	Yes
Maritime training Centre	STCW	Yes	Yes	No	Yes	No	Yes
	Maritime University	No	Yes	No	Yes	No	Yes
Financial services	Shipping trading & chartering	No	Yes	No	Yes	No	Yes
	Shipping finance	No	Yes	No	Yes	No	Yes
	Large shipping banks	No	Yes	No	Yes	No	Yes
	Hull insurance	No	Yes	No	Yes	No	Yes
	P&I clubs	Limited	Yes	Limited	Yes	No	Yes
Classification society	Ship classification	Limited	Large	No	Large	No	Yes

International Organisation agencies	IMO, SOLAS, UNCTAD etc.	No	Yes	No	Yes	No	Yes

Source: MTBS

13.2.4 Attractiveness and Competitiveness

The regulatory environment and the policy facilities available are an important aspect of attracting investments. As well as regional connections. The following aspects are highlighted when reviewing the maritime community and finance of Colombo port to the other ports:

- Free trade zones have become an important feature at logistics hub ports worldwide. The Sri Lankan free trade zone policy is not adequate in this respect.
- Tax incentives should attract manufacturer and industries and forms a basis for ability to attract foreign direct investments. Most ports (through governmental tax regimes with trading nations) specialise into those products especially due to the tax advantages.
- Logistic performance index. This index prepared by the World Bank shows the ease of doing logistics in the country. Sri Lanka scores low on this ranking mainly due to road congestion and poor accessibility to hinterlands.
- Ease of doing business. This is a ranking from the World Bank to summarize the ease of doing business. It includes customs bottlenecks and bureaucracy in general. Sri Lanka is marked very low compared to other nations.
- Hinterland connections contribute to an efficient and large port.
- Airport proximity is important to create the port – airport relationship. This is very important for the cruise industry, the navy and for time sensitive products.

Table 13-4: Attractiveness and Competitiveness Characteristics

Item	Specification	Colombo	Singapore	Tanjung Pelepas	Rotterdam	Tangier	Athens
Free trade zones		No	Yes	Yes	No	Yes	Yes
Tax Incentive free trade zones		Yes	Yes	Yes	Yes	Yes	Yes
Logistics performance index: Efficiency of customs clearance process	1= Low, 5=High	2.5	4.2	3.1	4.1	2.2	2.9
Ease of doing business	Ranking per country	110	2	23	28	68	61
Physical Hub port?		Yes	Yes	Yes	Yes	Yes	Yes
Hinterland connections		Limited	Limited	Limited	Yes	Limited	Yes
Strong regional connections		Yes	Yes	Yes	Yes	Yes	Yes
Airport nearby		Yes	Yes	No	limited	limited	limited

Source: MTBS

13.2.5 Recommendations

R1. Port of Colombo lacks development space for **distribution centres and logistics**. This is either to be found in several sections North of Colombo (but preferably one) or at reclaimed land as part of north port development.
R2. Port of Colombo has to cater for new industries like the new **LNG powerplant**
R3. **Bunkering** is an auxiliary function which hold promises for the future. The port should prepare to offer this in a liquid bulk hub.
R4. Port of Colombo should be part of a **national unit which offer emergency response** and salvage through supplying heavy offshore tugs.
R5. The Sri Lankan **free trade zone policy** is not adequate and should be upgraded in this respect.
R6. **Tax incentives** are provided to new industries and port zones but a one-stop shop for FDI is required.
R7. Through **investments in the logistics chain** and port accessibility, Sri Lanka should move up in the ranking of the World Bank Logistic performance index.
R8. **Ease of doing business**. This is a ranking from the World Bank to summarize the ease of doing business. It includes customs bottlenecks and bureaucracy in general. Sri Lanka is to upgrade its position through implementing trade facilitation policies and a Single Window.
R9. The **airport to sea function** should be promoted to attract additional cruise vessels.

13.3 Current situation

This chapter will present a run-down of the auxiliary port functions where the role of SLPA is specifically discussed. The analysis will mainly focus on Colombo as the largest port, but requirements for other ports will be given as well. Navy and Customs operations will be discussed separately due to their autonomous function and importance.

The table below shows the auxiliary functions available at the ports.

Table 13-5: Auxiliary Functions Available at Ports

Auxiliary function	Colombo	Hambantota	Trincomalee	Galle	KKS	Oluvil	SLPA or 3rd Party
Tugs & Pilotage	x	x	x	x	x		SLPA
Bunkering	x	x	x			x	3rd Party
Water Supply	x	x	x	x			SLPA
Weighing and Scanning Facilities	x						3rd Party
Warehousing and CFS	x		x	x		x	SLPA
Logistic Zones & Dry Ports	x	x					3rd Party
Ship Repair Yards	x		x				3rd Party
Container Maintenance and Repair	x						3rd Party
Ship Registration & Classification	x	x	x	x			SLPA

Training Centre	x				x	SLPA
Crew services	x			x		3rd Party
Marinas		x	x			3rd Party
Ship Chandlery	x	x	x			3rd Party
Fire Department	x					SLPA
Financial Services	x					3rd Party
Medical Services	x	x	x			SLPA
Seamen club	x					3rd Party

It should be noted that fishery ports are under control of the Ministry of Fisheries and Aquatic resources and are therefore not part of the SLPA's portfolio.

13.4 Direct Supportive Functions

Under direct supportive functions the following items are discussed:

- Tugs & Pilotage
- Linesmen & Mooring
- Bunkering
- Water supply
- Weighing and scanning
- Ballast water treatment and waste

13.4.1 Tugs & Pilotage

Tugs and pilotage services at Colombo, Hambantota, Trincomalee and Galle are under the purview of Harbour Master of Colombo Port. All tugs & pilotage services are provided by the Sri Lanka Ports Authority. Tugs are used to handle vessels within port while pilot boats are used to carry pilot into and out of vessels. Depending on the pilot decision one or two tugs are allocated for the vessel.

Colombo port has 9 tugs of bollard pull that ranges from 40-65 tons. There are 5 tugs with 65 tons, 1 with 55 tons, 2 with 45 tons and a one with 40 tons. However, at present only 5 tugs are at operational condition. With current availability of tugs a maximum of 3 ships can be handled at a time. The main line vessels over 245m LOA require often two tugs[23] to manoeuvre the ship. Smaller feeder vessels can manoeuvre with assistance of one tug. Small ships under the 150m with bow thrusters commonly do not require tug assistance. Still it is up to the harbourmaster to assign tugs when conditions require this.
The tugs are stationed near the harbourmaster office (side south port) and near the navy berths inside the old basin. Adequate mooring space is available near harbour master office.

Table 13-6: Number of Tugs and Pilot Boats

Type	Unit	Colombo
Tugs	#	9
Pilot boat	#	3

Source: SLPA

[23] Depending on the wind, wave and climate conditions and whether the ship has bow trusters or not.

Colombo port requires one extra tug to ensure four ships can be handled at the same time this is based on a mix of small and large vessels handle simultaneously. Furthermore, it should be noted that the size of the vessels has grown (we now see many 400m vessels in the port) and that these ships at least require two 55-65t bollard pull tugs to be attached. The smallest tugs are not sufficient to assist them. A large bollard pull tug (e.g. 80t) can also be used in offshore salvage actions. With the development the port and the aging of existing tugs, additional tugs shall be required once more. Timely acquisition in line with port development is important to enable the new port capacity to become fully operational (e.g. WCT terminal development). Mooring spots to station the tugs boat should also be accommodated. This can be done near the harbour master office in South port where a service port has a 200m quay plus two additional quays of 100m each.

Table 13-7: Tug Characteristics

Description	Unit	Colombo
Bollard Pull	Tons	40-65
Length	m	32-36

Source: SLPA

Due to the increased vessel sizes handled by the port, the amount and sizes of tug services should be adjusted as well. Whilst the port now has 9 tugs, one more tug of 80-ton Bollard pull should be acquired to maintain good marine services in the short term. The new tug should also be able to handle the expected LNG vessels [24]and the support on the SBM, located outside the port. Vessel manoeuvrability should be tested in vessel simulators to understand the appropriate jetty configuration and the required type and size of tugs. This also applies for the container ULCS vessels.

Pilotage

Pilotage to all types of vessels calling port of Colombo are provided. The following table shows number of calls of vessels to the port of Colombo over the period of 2010-2016.

Table 13-8:Number of Vessels Called by category

Type	Unit	2010	2011	2012	2013	2014	2015	2016
Container	#	3,076	3,187	3,093	3,142	3,239	3,643	3,804
Conventional	#	56	68	52	38	28	45	40
Dry Bulk	#	206	202	195	177	189	172	194
Oil Tanker	#	245	284	258	133	134	164	191
Roll on Roll off	#	131	149	67	28	32	47	51
Other Cargo	#	34	45	71	16	11	05	-
For bunkering	#	68	65	51	50	25	30	29
For Repairs	#	47	30	35	36	38	43	46
Passenger	#	26	72	34	32	36	37	43
For Other services	#	21	22	14	15	10	11	07
Total	#	3,910	4,124	3,870	3,667	3,742	4,197	4,405

Source: SLPA

[24] The LNG vessels require special tug services due to the nature of the product.

According to the table it could be noted that total number of vessels calling the Colombo port has been increased at a cumulative annual growth rate (CAGR) of 2%. Out of the total number of vessels container ships show a CAGR of 4% from 2010-2016.

Table 13-9:Revenue from pilotage service

Description	Unit	2010	2011	2012	2013	2014	2015	2016
Colombo	Rs. Mn	661.470	682.127	790.844	850.484	964.735	1,092.813	1,428.173
Annual Average Ex. Rate	LKR/USD	113.0647	110.5652	127.6034	129.1099	130.5606	135.9378	145.6016
Total	**USD**	**5,850,367**	**6,169,455**	**6,197,672**	**6,587,287**	**7,389,174**	**8,039,066**	**9,808,773**

Source: SLPA

Salvage

Due to the proximity to the east-west shipping lanes Colombo, Gall and Hambantota are well positioned to have salvage tugs stationed. It is therefore recommended that tugs have the availability for salvage capabilities. For salvage operations, the port is currently not equipped with sufficient powerful tugs. However, salvage operations may well be an additional service package to be offered by SLPA.

Maintenance of tugs and pilot boats

The maintenance of tugs is currently performed by SLPA shipyards. It is advisable that the ship maintenance is outsourced to appropriate companies. The maintenance of these vessels has become very specialised and is best performed by shipyard professionals. It is the recommendation the seeks options for outsourcing the maintenance. Additionally, instead of purchasing the vessels it is possible to have a bareboat charter or through time charters.

Recommendations

R1. Given the growth in demand for pilotage services, **it is recommended to purchase an extra tug of 80 ton Bollard Pull.** This could also avoid the costs of hiring tugs from private suppliers. The tug can be used for Mega container ships capsize bulkcarriers and for Ocean salvage/ emergency response.

R2. **SLPA should reduce the crew size** assigned for tugs which is well above the required levels.

R3. It is advisable **to outsource the maintenance activities** of tugs in order to provide continuous pilotage service.

R4. **Tugs which perform salvage operations should be additional to the port operations** in order to the keep the port towage operations running whilst a salvage operation is executed. Salvage tugs to be stationed at geographical strategic locations like Port of Colombo, Hambantota and Trincomalee.

R5. It is recommended **to form a company which is a fully owned subsidiary of SLPA to carryout pilotage services** in the long run as the company structure would be flexible and effective in operations and finance decision making. It should be independently operated as a profit centre.

13.4.2 Linesman & Mooring

Linesmen and mooring can be regarded as service to ships which should be aligned with the berthing operation of ships, hence this belongs to the harbour master function.

13.4.3 Bunkering

Port of Colombo being situated in strategic location of world naval routes has the enormous potential for bunkering service. Ship bunkering is a key auxiliary service that a maritime hub can provide for global shipping

industry. Port of Colombo provides bunkering services through land based storage supplies and floating storage supplies. SLPA is not providing fuel to vessels commercially other than the bunkering facilities in JCT. Even though these services are important, today not a lot of vessel make use of the service. To increase the bunker operations the price of bunkers and the efficiency of supplying bunkers should be addressed adequately. SLPA must promote additional Bunker operators to supply this service. JCT has 13 fuel tanks that could store HFO 380, HFO 180 and MGO fuel categories up to a total capacity of 35,000 MT. The company supplies fuel directly to vessels and sell fuel to other companies that provide bunkering services. Ceylon Petroleum Corporation, a public entity also provides bunkering services through oil bank at JCT.

Observations

Bunkering services in port of Colombo are provided by diverse public and private entities. Jaya Container Terminals Limited, a 100% owned subsidiary of SLPA has 13 fuel tanks that could store HFO 380, HFO 180 and MGO fuel categories up to a total capacity of 35,000 MT. The company supplies fuel directly to vessels and also sell fuel to other companies that provide bunkering services. Ceylon Petroleum Corporation, a public entity also provides bunkering services through oil bank at JCT.

Table 13-10: Bunkering supplies by JCT Oil Bank

Description	Unit	2014	2015	2016
Total discharged	MT	350,329	425,401	470,380
Total loaded	MT	343,076	436,030	461,431
Total handled	MT	693,405	861,432	931,811

Source: SLPA

It could be noted that volumes handled by the JCT Oil Bank has shown a remarkable growth. The CAGR from 2014-2016 stood at 16%.

Private suppliers of bunkering include six licensed suppliers. Marine Environment Protection Authority issues licenses for private suppliers to carryout bunkering services. Private operators provide bunkering services through barges.

Table 13-11: Licensed private bunkering suppliers

Register No	Company Name	Name of Barge
2017/Bun/01	Moceti International (Pvt) Ltd	MT LMS LAXAPANA
2017/Bun/02	Lanka Maritime Services Ltd	MT LMS DUNHINDA
2017/Bun/03	Lanka Bunkering Services (Pvt) Ltd	MT SEAFALCON
2017/Bun/04,05	Lanka Marine Services (Pvt) Ltd	MT MADURU OYA, MT LM NILWALA
2017/Bun/06	Interocean Energy (Pvt) Ltd	MT KANDY, MT OCEAN GALLE, MT OCEAN TRINCO, MT SHERMAC
2017/Bun/10	Lanka IOC PLC	MT KANDY, MT OCEAN GALLE, MT OCEAN TRINCO, MT SHERMAC

Source: Marine Environment Protection Authority

Limited capacity for bunkering supply is a major issue that needs attention. More storage facilities enable to buy large volumes with discounts so that bunkering supplies can be made at competitive prices. However, it needs to be cautious on the development of Hambantota port which has more locational advantage than

Colombo as it is being in proximity to naval routes than Colombo. Hambantota port has a capacity 51,000MT to store bunkering fuel. When Hambantota port is fully operational, there could be lower demand for bunkering services at Colombo which has a capacity of 35,000 MT at present.

Future of Bunkering in Colombo

This in contradiction to Singapore which has developed itself as major hub for oil storage and supplies to vessels. It is expected that the number of vessels which bunker in the port of Colombo will increase in the future once competitive prices can be offered. Another opportunity is the supply of LNG to vessels. LNG will be handled by a planned LNG terminal which is to supply LPG through gasification to gas fired power stations. LNG as fuel for ships is earmarked to become a large fuel source for ships in the future. In this respect, the port should prepare to offer these new services in the future. This also includes drafting the Port By-laws on handling LNG, one of the regulatory functions of SLPA.

Also, the demand for MGO and MDO is expected to increase due to the new and greener engines on board vessels. The IMO is promoting the reduction of emissions such as Sox and NOx and ship owners are increasingly reluctant to invest in cleaner engines.

Recommendations for the port of Colombo

R6. It is recommended **to develop capacity for bunkering services at Colombo port** considering short and medium term needs having duly assessed the services of competing ports such as Hambantota.

R7. **LNG** being a new source of fuel for ships which is currently being tested, could become category of fuel that port of **Colombo must be ready in the long run with appropriate capacity**.

R8. It is recommended SLPA to form **joint venture company with Ceylon Petroleum Corporation**(CPC) to benefit from synergies of both. SLPA has the infrastructure while CPC has the speciality in supplies. The newly formed joint venture company should be independently operated as a profit centre.

Figure 13-1 State of LNG Bunkering in Ports

State of LNG Bunkering in Ports

Source: www.lngbunkering.org

European ports are investing heavily in LNG bunkering facilities, such as the Montoir-de-Bretagne (France) terminal. GATE LNG in the Netherlands has also been offering this functionality since the second half of 2015

(for ships as small as 5,000 cm). In Asia, only de port of Incheon offers bunkering facilities. Receiving LNG terminals with two jetties can provide bunkering services and completing transhipment.

13.4.4 Water Supply

SLPA provides water supply to vessels within port limits on request. Out of harbour water supply is not provided by SLPA. Only CICT and ECT have direct water pump connections at the quay. Water supply is provided by two means using a sump at each terminal and by water barges. But due to the low water pressure to pump water into vessels other terminals still use barges of 500 tons to supply water to vessels. SLPA purchases water from Water Board Sri Lanka to provide these services. Modernisation of the water supply and especially the barges and their pumping rates are subject for improvements.

Water supply using barges are carried out by Bandaranayke Quay(BQ). BQ has 4 barges with capacities ranging from 110-130 thousand metric tons as provided in the table below.

Table 13-12: Capacity Water Supply Barges

Name of Barge	Unit	Capacity
WB 15	MT	110
WB 16	MT	120
WB 17	MT	120
WB 18	MT	130

Source: SLPA

At present, only one barge (WB 15) is under operational condition. Barges are berthed at the water section west of BQ (Prince of Wales jetty and Kings jetty) which has a depth of 4m. One tug for each barge is used and sometimes one tug pulls two barges. Water is supplied to the vessels including those at terminals of JCT, ECT, SAGT and occasionally for CICT despite the availability of sumps at those terminals. It is due to operational issues of sumps located at terminals. At present a water supply of 300-400 MT is provided per day in average. It is expected that this demand would reduce once all operational issues of sumps at terminals are sorted. Water is supplied to vessels at the rate of 8 USD per ton. Currently the municipality is in the process to deliver water to SLPA at high pumping rates. SLPA considers making water available at JCT. It shall be important that construction of these water supply pipes at the quays of JCT shall not interfere with the day-to-day operations. It should be noted that barges will need to remain available in future to supply water within the port limits but possibly also at anchorage.

Table 13-13: Water Supply Volumes

Description	Unit	2010	2011	2012	2013	2014	2015	2016
Volume	Tons					89,452	81,925	956,77

Source: SLPA

Recommendations for the port of Colombo

R9. **Port of Colombo: Water supply should remain in the same location**, but investments needed on water barges & pumping capacity

R10. **New quays should be equipped with water supply abilities once developed in ports.**

R11. Other ports should have water supply services as well

13.4.5 Weighing and scanning facilities

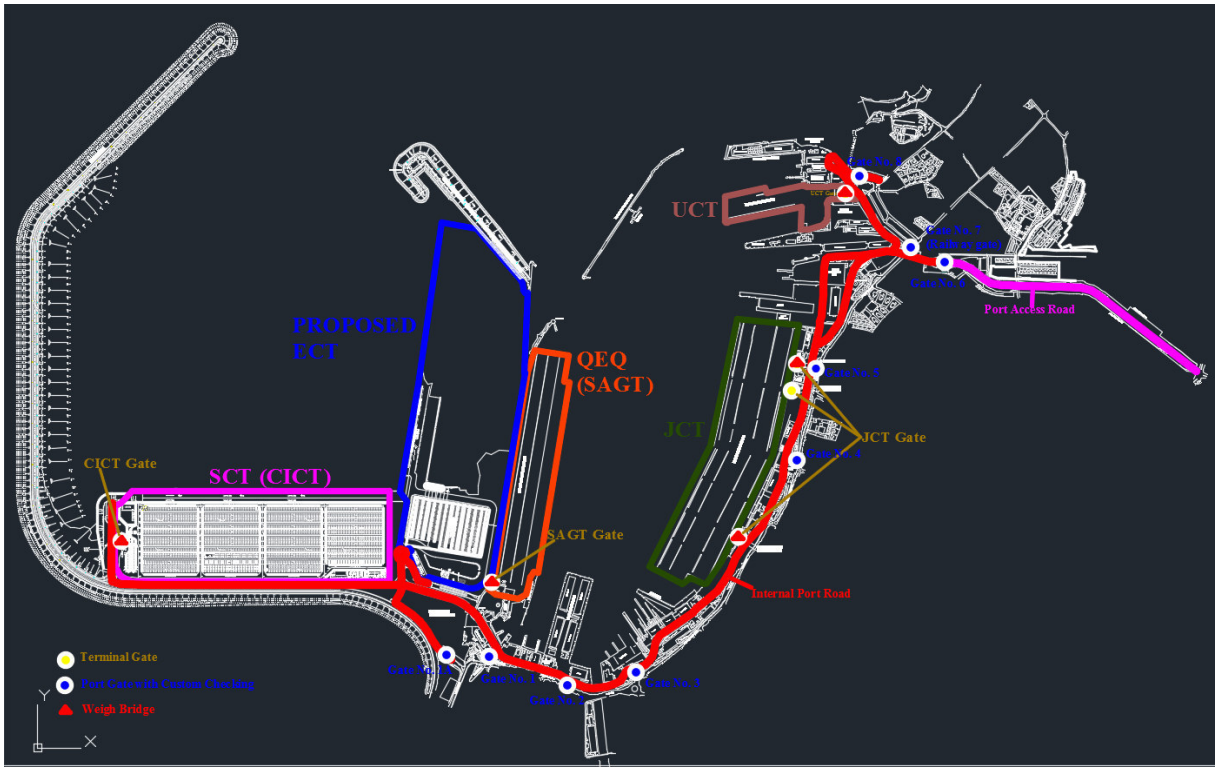
The SOLAS amendment for verification of container mass (VgM) came into force on 1st July 2016. This implies that all containers must have a certified weight and therefor Shippers and port operators and port authorities require certified weighing systems. Furthermore, the communication of this information needs to be integrated with the terminal software.

Terminals Operators must have a VGM facilities as each container should be verified otherwise they are not allowed to be loaded on a vessel. This often implies that the terminal checks in advance whether containers can be accepted at the gate-in or not. Weighing facilities at or near the port are required to ensure containers can be weighted appropriately.

Colombo port has weighing facilities at the entrance of the terminals as indicated in Figure 13-2 namely:

- Two at JCT entrances
- One at SAGT; and
- One at CICT
- At the grain facility at PVQ
- At the BQ facility
- At the UCT facility

Figure 13-2: Location Weighing Facilities



Source: SLPA

Furthermore, weighing bridges for export containers and common trucks are available in front of the main gate. The port of Colombo has ample weighing facilities. However, the digitalisation and the integration of information should be organised.

Recommendations for the port of Colombo

R12. **Terminals operators** must have a **VGM facilities** as each container and each port should be verified otherwise they are not allowed to be loaded on a vessel

R13. The **digitalisation** and the **integration** of information of **weighing facilities** should be organised

13.4.6 Ballast Water Treatment

The IMO International Convention for the Control and Management of Ships' Ballast Water and Sediments, adopted in 2004 and commonly referred to as the Ballast Water Management (BWM) Convention, was ratified by a minimum of 30 member states representing at least 35% of the world's merchant shipping gross tonnage on 8 September 2016. It enters force one year after this date, on 8 September 2017.

The BWM Convention applies to all vessels that carry ballast water and are engaged in international voyages. It establishes global ballast water management requirements and permits national, regional and local authorities to apply their own regulatory framework in their respective territorial waters. Requirements are defined for both ballast water exchange and ballast water treatment.

The SLPA needs to accommodate the BWM regulation through facilitating the set-up of ballast water treatment facilities. Waste management and treatment is an important element for port authorities. Not only the waste collection from ships also port is often the ideal place for waste treatment facilities. In many countries, worldwide waste-to-energy facilities have been allocated in ports and in nearby areas.

Waste management in the port is important to be available adequately and efficiently. Today the service to collect ship's waste, oil and oily waters is done through third party providers.

Waste treatment is not common for the ports of Sri Lanka today. Many waste areas have been allocated near urban areas without proper waste treatment facilities. The port of Colombo because of the limited space, a proximity to the city is not suitable for waste-to-energy or other waste treatment facilities.

Other ports in Sri lank may develop these facilities pending on their logical and geographical position. The advantage of waste -to-energy facilities is that they provide heat and or energy which can be used by industries in the port.

Recommendations

R14. Investigate the **BWM regulation** and the way SLPA can conform to this at each port.

13.5 Indirect Supportive Functions

Under indirect supportive functions the following items are discussed:

- Ship Repair Yards
- Container maintenance
- Ship Registration and classification
- Training Centre
- Fishery ports
- Marinas
- Licensing
- Ship chandlery
- Fire Department
- Medical Services
- Financial Services
- Seamen club

13.5.1 Ship Repair Yards

Port of Colombo has ship repair yards for vessels maintained by private parties. Colombo Dockyard PLC, a private party provides ship repairing services. SLPA also maintains repair yards for minor repairs of its own ships. Some private parties such as Master Drivers Company are engaged ships repairing under water activities.

Observations

SLPA owned ships such as tugs, pilot boats, mooring boats, etc. A slipway of 15m in length is used for underwater repairs. The slipway is also rented out to private parties for repair services. Minor repairs of SLPA ships are carried out by Marine engineering division. The division has well equipped workshops. However, with the ongoing constructions of elevated road, it is expected that certain buildings and facilities of the department would be demolished.

However, for major repairs of SLPA ships, they are directed to Colombo Dockyard PLC. SLPA is the fifth largest shareholder of Colombo Dockyard PLC owning 3.04% of shares. Ship repair services for vessels are provided by Colombo Dockyard PLC which is in port of Colombo adjoining to the land of SLPA.

Table 13-14: Dry Docks Colombo Dockyard PLC

Dock	Length (m)	Width (m)	Depth over blocks (m)	Capacity (DWT)	Cranage (t)
No1	213	26	9.7	30,000	25
No2	107	18.5	6.7	9,000	25
No3	122	16	5.5	8,000	10
No4	263	44	8.9	125,000	50

Source: SLPA

The port registered the following amounts of ships for repair annually.

Table 13-15: Number of Ships for Repair

Shipyards	2010	2011	2012	2013	2014	2015	2016
Ships for repair	68	65	51	50	25	30	29

Source: SLPA

The ship repair and maintenance industry has become specialised. With the growing special vessels operated by SLPA, dredgers, tugs and pilot boats it already becomes sometimes mandatory to have maintenance done at special shipyards simply because SLPA slipway is not able to handle them.

SLPA should therefore consider having the periodic maintenance their own tugs and pilot boats and other marine equipment done by third parties to concentrate to their core activities. By doing so it will also highlight the costs involved with such operations. Other options are available such as selling or leasing the existing facilities to third parties.

Several plans exist for the development of ship repair yards in Hambantota and Trincomalee. This should be offered by 3rd parties based feasible business cases. SLPA could also outsource the maintenance of its own tug and other service boats.

Recommendations

R15. SLPA should consider to have the **periodic maintenance of their own tugs and pilot boats** and other marine equipment done by third parties in order to concentrate to their core activities.
R16. It is advisable to **rent-out ship yard facilities** during idle times.
R17. It is recommended to **monitor Marine Engineering division as an identified business segment** of SLPA with separately tracking of revenue and costs.
R18. It is recommended to investigate to obtain **more stake in Colombo Dock Yard PLC** in the long run to be benefited from repair services given to the SLPA as a related party as well as a share of the overall profits of the company from its total operations.
R19. At Trincomalee, ship repair facilities for small vessels are to be developed under PPP
R20. At Hambantota ship repair facilities for large vessels is planned
R21. At port of Oluvil ship repair for small boats is planned

13.5.2 Container Maintenance and Repair

Container maintenance is done at empty depots around Colombo by private parties. Container Maintenance & repair facilities are provided by diverse private parties at port of Colombo. This include suppliers such as Ceylon Oceans Lines Ltd, Star Link Services Pvt Ltd, ACE Containers Pvt Ltd, Mclarens Logistic Ltd, etc. SLPA does not provide container maintenance & repair services at port of Colombo.

It is expected that the container maintenance and repair facilities remain with the private sector and shall be concentrated at empty depots and cargo villages.

Recommendation

R22. **Container maintenance & repair** services to remain with the private sector and promoted to be near Ports and Logistics Hubs.

13.5.3 Empty Depots

Shipping lines and container leasing companies manage their container supply network through empty depots in proximity to ports when space in ports is expensive or costly. The management of empties is especially important in Sri Lanka (Colombo) where the empty stock is large due to the imbalance of trade. In many countries, the empty depot function is consolidated at dry ports. This is addressed in the Colombo Development Plan.

Recommendation

R23. Container empty depots to be facilitated at newly developed Dry ports.

13.5.4 Ship Registration and Classification

Ship registration and the classification of ships is currently done manually by the harbour master office. Many Port Authorities work with global fleet databases to ensure that their ship file is complete and updated.

Implications for the port of Colombo

The current manual system is prone to mistakes and cannot capture the modernisation of the marine functions at the Harbour master. Ship recognition and identification should be support by a fleet database that ensures updated information on the vessels' particulars and classifications.

The system is also needed to be integrated with a vessel traffic management system (VTMS) which allows for actual and online vessel positions and berth allocation features. The VTMS should be able to show which vessels is planned for which berth and should be able to show directly the position of dangerous goods.

Recommendations

R24. Ship recognition and identification should be supported by a **fleet database** which ensures updated information on the vessels particulars and classifications. This applies to all ports.

13.5.5 OPL and Crew services

Out of Port Services (OPL) like crew services are performed from mainly Galle and Colombo. The port of Galle is located near East -West shipping routes and crew changes can take place without the main vessels to stop at a port. Fast response boat can reach the vessels from the port of Galle. Crew changes also occur at Colombo port but is happens often the port of call. The proximity of the airport near Colombo makes it convenient for the shipping line to use this port.

Recommendations

R25. OPL and Ships crew services are important for the vessels that pass Sri Lanka on route. Fast crew services can be further expanded from Galle and developed in Hambantota. An efficient connection with the airports is required.

13.5.6 Training centre

SLPA operates Mahapola Ports & Maritime Academy which offers diverse training programmes to both internal employees of the port and external parties. The academy is located within the Colombo port.

Observations

At present, it offers 127 courses in the fields of cargo operation, equipment operation, Management, Information systems, Technical, Safety, Seamanship (STCW), NAITA Apprentices and Engineering cadets. The academy is the only institute in Sri Lanka that provides Competence Discharge Certificate (CDC) for seafarers. It should be noted that the training centre is crucial for Sri Lanka as it provides all port personnel and seafarers. However, with the modern demands of crane drivers and other personnel, the private terminals train and educate their employees mostly elsewhere. As the Colombo training centre is not able to offer such specialist education, the SLPA, as container terminal operator, faces the disadvantage of having lower educated personnel.

Out of the enrolled students 80% are internal staff of the port while the balance is external. Internal staff are offered courses at free of charge while external parties are charged for courses. Main revenue generation of the centre stems from external students. At present major part of cost of running the academy is recovered from the generated revenue. It plans to be self-sufficient next year onwards.

Facilities & persons of the academy are presented below.

Table 13-16: Training Centre facilities

Description	Unit	Value
Lecture Halls	#	9
Auditorium	#	1

Workshops	#	1
Training yards-Equipment/fire	#	2
Labs	#	5
Library	#	1
Simulators (Ship/Fire)	#	2
Resource persons	#	20

Source: SLPA

Demand for training programs offered by the academy are presented below.

Table 13-17: Demand for training centre services

Description	Unit	2010	2016	CAGR
Total students enrolled[1]	#	3,451	5,205	7.1%
Training duration[1]	Man hours	685,844	829,504	3.2%
Revenue earned -External	LKR Mn	13.16	19.26	6.6%
Revenue earned -Internal	LKR Mn	***5.61	23.39	
Revenue earned-Total	LKR Mn	24.38	42.65	9.8%
Annual Average Ex. Rate	LKR/USD	113.0647	145.6016	4.3%
Revenue earned in USD	USD	215,617	292,902	5.2%

1. Excluding on the job training
* Including Maritime Training Institute Oluvil
** Including Maritime Training Institute at Oluvil & Training Institute at Badulla
** *Including Maritime Training Institute at Oluvil & Training Institute at Badulla & Matara
Source: SLPA

At present the academy provides only certificate level courses and diploma courses. Academy has planned to go beyond Diplomas to include Higher diploma and degree level courses. It has already started discussions with foreign universities in China & Sweden for affiliations arrangements. Expansion plans also includes establishing five additional labs for air-conditioning repair, welding, computer-virtual training, engine simulation and language training.

The training centre is advised to find synergies with other training institutes in the world to create a level of exchange of training programmes and to stay in touch with international educational improvements and technological developments. For example, IT, has become a very important element in the business and learning programs are lacking behind on this issue.

Private shipping and port institutes have emerged in the world of seafarer's education. A good example is the set-up of international of maritime academies by the Rotterdam's maritime educational institute STC. It has set-up several maritime training institutes in countries like South Africa, Oman, Vietnam and Philippines.

Modern training centres do often use simulators to educate and train the students with port cranes and vessel simulators. The investment in simulators is however quite large. It is therefore advisable to upgrade the curriculum with simulators courses at locations elsewhere.

Recommendations

R26. It is recommended to market the courses provided by the Centre among **external students to generate revenue** and sustain as a self-sufficient centre.
R27. It is advisable to **improve the current status of the centre** to campus through external affiliations and finding synergies with other training institutes in the world.
R28. It is recommended to restructure the centre as a **fully owned subsidiary company of SLPA** in the long run which independently operates as a profit centre.

13.5.7 Fishery

Fishery forms an important source of animal protein to the population. Fishery harbours are scattered around the country and around 830,000 people were employed in the sector in 2015. The production in 2016 totalled 530 thousand tons with 22 major fishery ports around Sri Lanka. The fishery harbours are under control of the "Ministry of Fishing and Aquatic resources"

North of the port of Colombo a fish port is located. With the possible development of North Port, a new fish port has been commissioned. For the port of Colombo, no fish handling is foreseen other than attracting refrigerated containerized exports. The facilities for cool storage and fish factories are expected to be developed at places like KKS and Oluvil. The port of Colombo may take advantage from this by receiving refrigerated containers through a coastal shipping concept should this be more advantageous than road or rail transport.

Recommendations

R29. SLPA has no business with fish port developments unless being requested to provide infrastructural assistance outside of the port by the Ministry of Fishing and Aquatic resources.

13.5.8 Marinas

Colombo port being utilized as a commercial port does not have assigned facilities for marinas, however on request harbour master of Colombo port directs cruise ships and leisure boats that occasionally calls the port to idle berths.

Marinas form a non-essential part of a port and must be separated from commercial activities to ensure that pleasure boats do not interfere or cross larger commercial vessels. This is mainly due to safety concerns when amateur ship sailors enter a commercial port. On the other hand, the demand for Marina's is growing. The port of Colombo lack proper marina facilities and the nearest marina port is Galle.

The demand for Marinas near Colombo is eminent. With increased wealth of the population, it is expected that this market segment is growing. Further, Colombo is an interesting place to visit for pleasure yachts and to make day trips along the shore.

As stated above the commercial activities in the port do not combine with pleasure yachting. As such Marinas should be developed outside the commercial port. In the port city development, recreational marinas have been planned.

Recommendations on marina's

R30. It is recommended to develop **marina facilities outside the commercial port** boundaries of port of Colombo to minimize disturbances to commercial activities and possible accidents.
R31. A new marina is to be planned at Trincomalee
R32. At Galle the existing marina is to be upgraded
R33. At Hambantota a new marina is planned

R34. At Oluvil small boats moorings are projected
R35. At KKS small boats moorings are projected
R36. It is recommended to make a PPP construction for each for the large marina's in the nation.

13.5.9 Licensing

SLPA provides licensing for private parties to enter in to the port & provide ship supplies charging a fee. In addition to ship chandlery licensing, SLPA carries out annual registration and issue of licenses to launch operators, marine surveyors, minor and major repair workshops, oil and oily water garbage reception facilitators. Number of licenses issued for these different services are provided in the table below.

Table 13-18: Number of Licenses Issued by SLPA

	Unit	2010	2011	2012	2013	2014	2015	2016
Ship Chandlers License	#	64	76	76	78	90	*	*
Ship Repair License	#	121	119	124	138	151	*	*
Dockyard License	#	71	73	73	76	74	*	*
Survey License	#	38	39	36	38	39	*	*
Boat License	#	30	33	47	42	49	*	*
SAGT & SAGT & Another License	#	-	-	21	19	47	*	*
Total Number of Licenses	**#**	**324**	**340**	**377**	**391**	**450**		

Source: SLPA

* Data Requested but not provided

Recommendations

R37. The **licenses should be digitalised** where possible. An online system should show the status of licenses.

13.5.10 Ship Chandlery

Chandlery is the supply of consumables, goods and spare parts to ships. Chandlery is provided by private parties in the port of Colombo under licensing of SLPA. The ship agents organise ship chandlery for their customers.

Recommendations

R38. It is advisable for ship chandlery service **to remain with private parties** as the SLPA should focus on core value added activities.

13.5.11 Fire Department

SLPA operates a fire department at Colombo port which is under the purview of the harbour master. Fire department provides services within the land as well as for vessels. A fire department is an essential element at the port. The fire department for ports is not directly comparable with a city department due to the characteristics of various commodities. Hence, it is logical that the fire department is port specific. In other well-developed nations or for very small ports, the city fire department is so well organised that they also do the port firefighting (always with own department). However, the execution of an emergency plan always remains under final responsibility of the harbour master.

Observations

The fire department has a tug for firefighting and three fire engines. The department has 140 staff at present including 20 new recruits. Estimated time that it takes fire department staff to arrive the furthest end of the port is 8 minutes. In addition to attending emergency incidents, the department provides standby services for dangerous cargo handling, oil tankers and gas tankers, etc. Number of calls attended by the fire brigade of the SLPA are provided below.

Table 13-19: Demand for Fire department services

Description	Unit	2010*	2011	2012	2013	2014	2015	2016
Fire Response	#		15	5	14	14	10	32
Navy Rehearsal test calls	#		2	-	-	3	3	7
Emergency Calls	#		25	15	29	34	26	159
Stand By Duties For Oil Tankers	#		121	118	111	115	153	175
Stand By Duties For Gas Tankers	#		23	21	21	32	32	50
Stand By Duties For Hot Works On Vessels	#		1,486	1,071	1,309	57	908	705
Stand By Duties For D/C Handling	#		30	19	7	12	2	4
Supplying Water To Wash Piers/Warehouses Etc.	#		56	61	42	76	47	31
Pumping Out Water	#		33	18	12	1	2	3
Oil Pollution Control Work	#		2	3	7	117	22	17
Inspection Visits To Oil Tankers	#		807	728	621	143	646	675
Combined fire drills & Other	#		1	-	2	-		3
Total Calls	**#**	**1,800**	**2,601**	**2,059**	**2,175**	**604**	**1,851**	**1,861**

*For 2010, data not available

Source: SLPA

Recommendations for the fire departments

R39. At Colombo the fire department should be strengthen with adequate number of **firing engines and staff** considering the development of more terminals at Colombo Port and expected increase in oil tankers of LPG & LNG.

R40. At all ports in Sri Lanka the Fire department service should continue to be provided by SLPA as an **essential service** under harbour master control.

R41. It is recommended to **financially monitor fire division** as an identified business segment of SLPA with separately tracking of revenue and costs.

R42. **Emergency response plans** should be updated for all ports in Sri Lanka.

13.5.12 Medical Services

There is a hospital in Colombo fully financed and operated by SLPA which started more than 20 years ago. The assets are on SLPA's balance sheet and the employees, including doctors, are on SLPA payroll. The medical division within port of Colombo provides OPD services, dental services and minor accident surgeries. The division provides services only for port employees. However minor accidents of any port user also attended by the division.

Observations

The division has eight bedded wards and four ambulances. It caters about 150 patients per day. All services to the employees are provided at free of charge. Staff composition of the division is as follows.

Table 13-20: Staff at Medical Centre

Category	#
Doctors	6
Nurses	2
Pharmacists	3
Dispensers	5
Nursing aids	26
X-ray operator	1
Radiogram	1
Drivers	13
Administration	6
Work assistants	9

Source: SLPA

Division provides 24 hours service under three shifts. Improvement needs of the division includes the need of recruiting three more permanent doctors to the staff. The following table shows the number of patients attended by the division from 2011-2016

Table 13-21: Demand for medical services

	Unit	2011	2012	2013	2014	2015	2016
No of patients attended	#	32,428	35,901	31,862	31,060	33,439	31,276
No of Employees	#	72	66	63	61	63	68
Expenses Incurred	**LKR**	13,527,447	15,818,969	16,998,564	18,908,849	18,111,000	20,646,603

Source: SLPA

Average number of patients catered during 2011-2016 stood at 33,000. Medical division has used 66 employees in average to cater its services. Annual expenses incurred have been increased at a CAGR of 9% over the same period.

It is rather uncommon to still have a port hospital which is for all port personnel and still under responsibility of the Port Authority. In other countries, the hospital is privatised whilst still offering services to employees but only in a limited setting. The port authority, as employer, does not pay for services and the employees can choose which health care they like to take. In a transition period, often the Port Hospital offers packages of health care to port employees at interesting discounts.

Health care is important for employees of the SLPA. However, it is today uncommon to run a hospital under the umbrella of the Port Authority. It is advisable that the port authority outsources the social health care of its employees to private or public/private Hospitals. In that case the hospital becomes a concession within the

Port of Colombo. It should be noted that a medical centre (whether run by private sector or not) remains an important asset within the port unless the hospital can be located very near to the port.

Recommendations

R43. It is recommended that port authority should consider **outsourcing medical services** to private/public entity to focus on more value added activities.

R44. SLPA **employees** should be given **medical insurance** covers to reimburse the medical expenses obtained from private entities. The cost of medical insurance cover could be shared between SLPA and employees in appropriate proportion.

13.5.13 Financial Services

Banking services are provided by Bank of Ceylon, Peoples Bank, Hatton National Bank and Sampath Bank at port of Colombo.

Observations

Three premises on free of rent basis have been given to the Bank of Ceylon with the approval of the management to maintain cash collection centres for the payments to be made to the authority depending on the requirements of the Authority. These premises are situated in the permit office, canal yard and Peliyagoda warehouse complex. Routine banking activities are not carried out within these centres and except for banking activities for port users. The salaries of port employees can be obtained from banks and banking activities are maintained within the port premises for the welfare of the employees.

These banks are only used by port users and by the employees of the authority. Accordingly, 02 premises where ATM machines of the Hatton National Bank and one premise maintained by the Bank of Ceylon has been given on nominal rent.

Banks should be an integral part of the logistical chain. Many elements of today's transactions still depend on manual and paper transactions. In future, the electronic transfer and electronic payment notification should prevail allowing cargo to be smoothly released without delays on related to financial unclarities or disputes.

Even though digital payment should prevail it is expected that Banks near custom inspection areas, and warehouses are still required to facilitate a transaction should electronic payments fail.

Recommendations

R45. SLPA should promote **electronic payments** among port users by providing required platforms at all ports.

13.5.14 Seamen Club

A seamen's club offers crews of international vessels to leave the ship and stay at the club. It is often a designated location within the port. At present a seamen club is operated by Mission to Seafarers a private party outside the port. SLPA only provides permission to seafarers and family members to visit the port.

Recommendations

R46. It is advisable for the **seamen club** activities to remain operated by private suppliers.

13.6 Way Forward SLPA and Auxiliary Functions

The table below indicates the auxiliary functions in the port of Colombo and what the role of SLPA should be in each function. This is a recommendation on the role of SLPA on the items outlined in the previous paragraphs.

Table 13-22: Auxiliary Functions Recommendation

Auxiliary function	Colombo	Current Operations	SLPA Future Operations?	Main considerations
Tugs & Pilotage	x	SLPA	✓	Maintenance outsourcing
Linesman & Mooring	x	SLPA / 3rd Party	⊘	Private sector
Bunkering	x	3rd Party	⊘	Best operated by private sector
Water Supply	x	SLPA	⊘ ✓	Investments needed on barges & pumping capacity
Weighing and Scanning Facilities	x	3rd Party	⊘	Customs & private operators
Warehousing and CFS	x	SLPA	⊘	Competition from private sector
Maintenance workshops	x	SLPA	✓	As long as demand exists
Logistic Zones & Dry Ports	x	3rd Party	⊘	SLPA not as operator but as land lord
Ship Repair Yards	x	3rd Party	⊘	Outsource as much as possible
Container Maintenance and Repair	x	3rd Party	⊘	Private sector
Ship Registration & Classification	x	SLPA	✓	SLPA to invest in VTMS and databases
Training Centre	x	SLPA	⊘	Should operate as a standalone entity, SLPA remains as main stakeholder
Fishery Port	x	Min. of Fish	⊘	Private sector, ministry of fishing
Marinas		3rd Party	⊘	Private sector
Licensing	x	SLPA	✓	Future need less, open port boundary, secured terminal areas
Ship Chandlery	x	3rd Party	⊘	Private sector
Fire Department	x	SLPA	✓	Under harbour master's control
Medical Services	x	SLPA	⊘	Merge with public medical institution
Financial Services	x	3rd Party	⊘	Private sector
Seamen club	x	3rd Party	✓	Private sector
Ballast Water Treatment		-	⊘	SLPA should facilitate

Appendix I TOR Overview

Tor Ref	Nr.	Text TOR	Draft NPD	Final NPD
(i)	1	Review the national long-term economic development strategy and other national plans of Sri Lanka; consult with Sri Lanka Ports Authority (SLPA) and identify visions of Sri Lanka port sector for the next 30 years.	X	
(ii)	2	Review the latest cargo forecast under other recent studies and prepare a national cargo and passenger transport demand forecast for next 30 years. Container cargo demand includes export, import and transhipment cargo. The estimation of fuel cargo needs to take into account the energy mix change in the nation, development plans for power generation plants and demand from industries around the ports, among others. Passenger demand includes those for cruisers, pleasure boats, and yachts. Based on origin and destination statistics of domestic cargo movement provided by SLPA, conduct a preliminary assessment on the modal split for major routes and competitiveness of inland waterway and coastal shipping.	X	
(iii)	3	Conduct a market assessment of the auxiliary functions required for a container hub port, including ship repair, ship registration and classification, logistics and other value addition services, bunkering, and financial services; evaluate the feasibility of introducing such functions into Sri Lanka's ports.	X	
(iv)	4	Identify strategic non-container commodities for which Sri Lanka's ports can be a distribution and/or processing hub in the region, following market assessment of such commodities.	X	
(v)	5	Identify major functions and roles which each port should play, including those for container, non-container, and passenger. Propose strategies and determine segregation of duties among all Sri Lankan ports focusing on type and size of cargo handling capacity. Development of new ports may be included.	X	
(vi)	6	Assess the infrastructure of individual ports and identify the lag in cargo and passenger handling capacity and development needs as well as assess development constraints including spatial and environmental constraints. Prepare a list of short-term prioritized projects (3 to 5 years) with cost estimation, following consultation with SLPA, and conduct preliminary feasibility studies for the projects.	X	X
(vii)	7	Propose institutional changes for trade facilitation to strengthen Sri Lanka's port capacity and competitiveness, following assessment and consultation with stakeholders.		X
(viii)	8	Assess organizational efficiency and capacity of SLPA with a focus on financial self-sustainability of each port, and operation and organization for each port. Identify measurements to improve the operation of the organization. Conduct a preliminary assessment on possible restructuring options of SLPA in the short and medium term, including separation of regulatory and operational functions, with consideration of solvency of the new organizations, efficiency of operation, and fair competition grounds for port operators, among others.	X	
(ix)	9	Propose measures to improve multimodal connectivity in terms of software and hardware improvement.		X
(x)	10	Draft the National Policy Directions report and finalize it by incorporating comments from stakeholders.	X	X

Appendix II Questionnaire Form

QUESTIONNAIRE FOR PORT STAKEHOLDERS

In relation to the Sri Lanka National Ports Masterplan, we would appreciate your feedback as stakeholder on important views, and experienced bottlenecks.

SRI LANKA NATIONAL PORTS MASTER PLAN

The primary objective of the Sri Lanka National Ports Master Plan is to develop an overarching and integral guidance document that can be employed by the Sri Lanka Port Authority (SLPA) to harmonize and strengthen the Sri Lankan port sector. It will comprise the following four main components:

- National Port Directions
- Detailed Port Development Plans (for Colombo and Trincomalee)
- A Shortlist of Connectivity Projects
- An Assessment of the Port Access Elevated Highway (PAEH)

RESPONDENT

Please indicate the organisation you are working for or the type of stakeholder / port user you are.

BOTTLENECKS

Please indicate main current bottlenecks for quality of port development & operations?

1. 2. 3.

BOTTLENECKS IN PORT OPERATIONS

Please mark to what extent the following services are experienced as bottleneck

Nr	Bottleneck	Severe					No bottleneck
1	Cargo inspection procedures	1	2	3	4	5	6
2	Cargo clearance	1	2	3	4	5	6
3	Administrative procedures	1	2	3	4	5	6
4	Document automation	1	2	3	4	5	6
5	Port road congestion	1	2	3	4	5	6
6	Hinterland connectivity	1	2	3	4	5	6
7	Lack of Free Zones	1	2	3	4	5	6
8	Cargo scanning and weighing	1	2	3	4	5	6
9	Tug / pilotage services	1	2	3	4	5	6
10	Cargo security	1	2	3	4	5	6
11	Cargo handling – Containers	1	2	3	4	5	6
12	Cargo handling – dry bulk	1	2	3	4	5	6
13	Cargo handling – Break bulk	1	2	3	4	5	6
14	Cargo handling – Liquid bulk	1	2	3	4	5	6
15	Main gate efficiency	1	2	3	4	5	6
16	Terminal gate efficiency	1	2	3	4	5	6
17	Cargo trucking	1	2	3	4	5	6
18	Ship time at berth	1	2	3	4	5	6
19	Tug / pilotage services	1	2	3	4	5	6

BOTTLENECKS IN PORT DEVELOPMENT

	Bottleneck	Severe					No bottleneck
20	Master planning capacity	1	2	3	4	5	6
21	Business case development capacity	1	2	3	4	5	6
22	Decision making process	1	2	3	4	5	6
23	Allocation of responsibilities	1	2	3	4	5	6
24	Stakeholder management	1	2	3	4	5	6
25	(PPP) Transaction preparation	1	2	3	4	5	6
26	(PPP) Transaction process	1	2	3	4	5	6
27	Managing signed contracts	1	2	3	4	5	6

CLARIFICATIONS

Appendix III Questionnaire Results

Table 13-23: Average Results Bottlenecks (1=severe, 6=None)

Item	Question	Average
1	Cargo inspection procedures	2.24
2	Cargo clearance	2.59
3	Administrative procedures	2.78
4	Document automation	2.94
5	Port road congestion	1.60
6	Hinterland connectivity	2.19
7	Lack of Free Zones	2.56
8	Cargo scanning and weighing	2.94
9	Tug / pilotage services	3.05
10	Cargo security	3.00
11	Cargo handling – Containers	3.35
12	Cargo handling – dry bulk	3.18
13	Cargo handling – Break bulk	3.06
14	Cargo handling – Liquid bulk	3.29
15	Main gate efficiency	2.75
16	Terminal gate efficiency	3.16
17	Cargo trucking	2.95
18	Ship time at berth	3.12
19	Tug / pilotage services	3.00
20	Master planning capacity	2.89
21	Business case development capacity	2.70
22	Decision making process	2.67
23	Allocation of responsibilities	2.76
24	Stakeholder management	2.78
25	(PPP) Transaction preparation	2.59
26	(PPP) Transaction process	2.53
27	Managing signed contracts	2.71

Table 13-24: Results Bottleneck Open Question

Stakeholder	Bottleneck 1	Bottleneck 2	Bottleneck 3	Bottleneck 4
1	Management with vested political interest	Trade union politically motivated active	Red tape along the process	
2	Provision of boom barrier at jetty to contain oil spillage and leakage	Net jetty at Trincomalee to handle bigger vessels		
3				
4	Consider telecom / it facilities for master plan			
5	No proper hinterland connectivity			
6	Integrate railway transport to masterplan	Short term improve SLPA operations		
7	Immediate infrastructure improvements needed in terms of road / rail	In 2003 Nuturajewele area was ear-marked as cargo operations area. This is not developed yet.	Decision making: after ECT was constructed purchasing cranes has not happened	The Dry port concept to be developed north of Colombo in the low-lying area so that crossing of roads will be minimised. This should start immediately as all the infrastructure is 50% available
8	Transport related to the port area	Land requirement for facilitation and development of port activities	Cargo handling issues / requirement or simplification	
9	Disjointed plans, strategies	Lack of funding	Stakeholder management - very poor	
10	Need to clear cargo within short time	Road needs to develop to reduce traffic		
11	Lack of integration			
12	How many advantages to the Sri Lanka via the Kra canal projects?			
13	CCTV	Lack of passengers facility		
14				
15	Transport linkages not enough to rest of country	Dry port facilities where value addition is taking place	Specialisation of ports	

16	Not enough work space for the plant quarantine duties	Lack of facilities for the offices	No interconnection with other organisations at the port including SLPA	
17	Considerations are not given for environmental components when implementing plans.	Megapolis plans have not mentioned Colombo - Trinco corridor and the two industrial zones identified		
18	Limitation of lands du to proximity to capital	No adequate policy changes and decision making process		
19	Cargo security, pilotage service			
20	Lack of funds in SLPA			
21	High Traffic congestion	Container handling capacity, handling time / teu	High fixed costs	
22	Development should focus on port infrastructure	Coordination needed between all stakeholders		
23	Negative attitudes towards PPP in port development	Lack of coordination among stakeholders		
24				
25	Lengthy procedures in logistics operations	Need to introduce best practices in areas	Port community system	
26	Aging equipment	Lengthy procedures	Road congestion	
27	Lack of planning	Consultation at very late stage	No technical leadership	
28	Vessel navigation delays	Delay congestion at gates	Simpler customs	Coordination among all authorities
29	To many agencies trying to lever influence on port sector	Por roads and port connectivity		
30	Immigration area needed			
31				
32	Please include petroleum infrastructure			

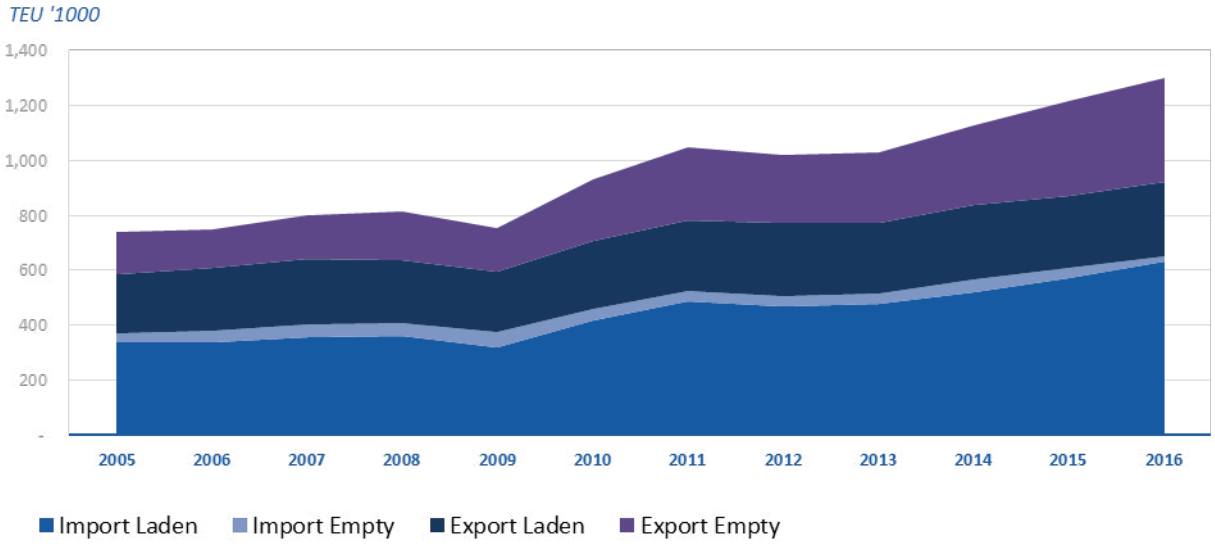
Appendix IV Commodity Assessment and Forecast Assumptions

Gateway Containers

Gateway containers are boxes destined to and originating from Sri Lanka totalling 1.3 M containers in 2016[25]. The nature of this traffic is that the inbound and outbound containers need to match (the empty container needs to be redelivered) and that is why we see an almost perfect 50-50 split of import and export containers through the years in Figure 13-3. In 2016 96% of import containers entered Sri Lanka were laden whereas on exports only 41% of containers left Sri Lanka laden, indicating a trade imbalance in laden volumes.

The export boxes are mainly filled with tea to Western Asian and Eastern European countries, garments and textiles destined for the US and rubber products to the North American market. As Sri Lanka transitions to a developing economy it is expected that trade will pick up and the laden export trade will increase supported by newly developed export oriented industries.

Figure 13-3: Throughput Gateway Containers Colombo



Source: SLPA

Demand Driver & Proxy

Gateway cargo is the import containers destined for the Sri Lankan market and export containers originating from the country. The working assumption is that as an island economy import laden containers outnumber the export laden containers. Import containers come in laden and either empty or laden with export products. The assumption is made that the imbalance will remain allowing most containers to be re-used for newly developed laden export trades. This will reduce the import of empty containers in the gateway trades. This analysis is supported by the current state of the gateway throughput:

- Import and export throughputs are split equally.
- Import containers enter the country 96% laden.
- Export containers exit the country 40% laden.

[25] This figure is the rounded-up total of all export and import containers excluding re-stowage in 2016.

The proxy for the forecast is the GDP per capita development of Sri Lanka as it captures most accurately wealth and population change. A standard method for forecast is the use of the GDP multiplier where the GDP growth is regressed with the historical container throughput growth to find a correlation. This method however depends on population growth as driving factor for correlation.

Gateway Forecast Analysis

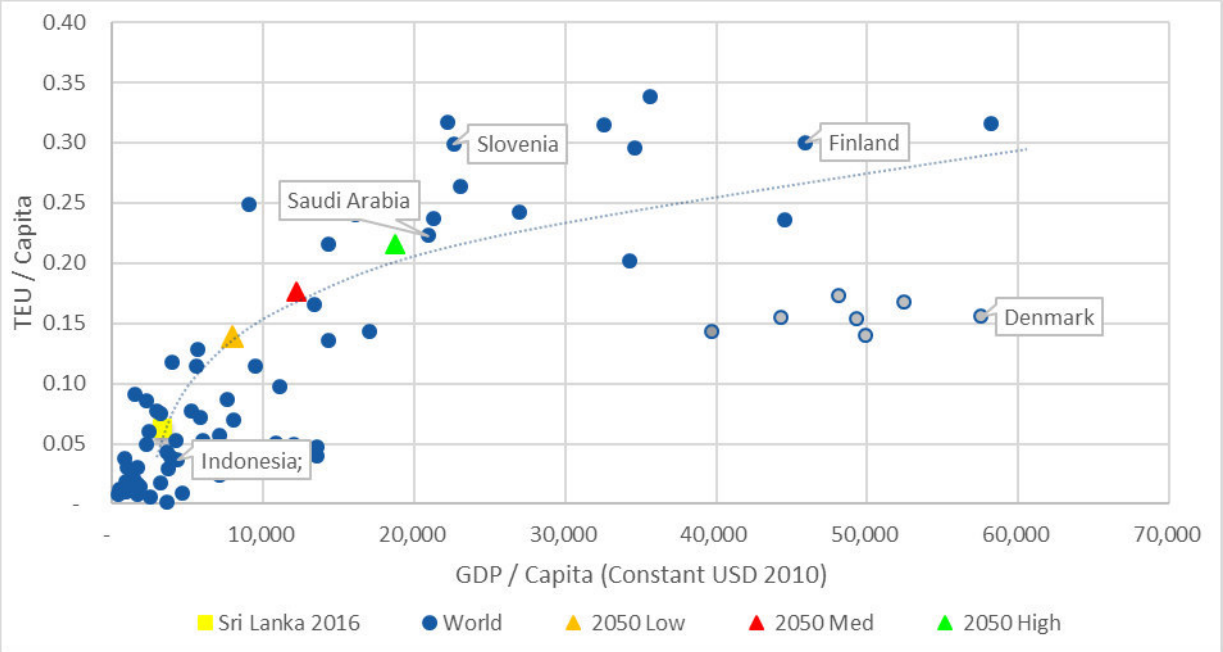
Figure 13-4 shows the analysis performed for this forecast: a set of 75 countries spread worldwide with population and throughput data was used to calculate the TEU per capita for the year 2013. This is the most recent year which yields a full data set for comparison.

Both the GDP and throughput data are derived from the World Bank. Several countries with large transhipment throughput like Singapore are left out in order to make a comparison on gateway containers. The mature economies are left out of the trend analysis because they skew the results for developing nations; however, they are still compared in the dataset.

The 2016 value for Sri Lanka and the three forecast scenarios are plotted in the figure for comparison. This graph shows three sets of countries:

1. Emerging economies like Indonesia, Brazil and Sri Lanka in the lower left corner.
2. Developed economies like Saudi Arabia, Slovenia and Finland above the trend line.
3. Mature economies like Italy, Denmark and Ireland below the trend line on the right.

Figure 13-4: TEU / Capita International 2013 Analysis



Key Assumptions of the Forecasts

- The TEU / Cap trendline formula is used to forecast total gateway throughput.
- The most likely population scenario is used to calculate total gateway throughput.
- The three GDP scenarios are inputs in the formula.
- Gateway throughput forecast are split 50-50 between exports and imports as no container imbalances can arise.
- Import containers are 97% laden for the entire forecast period.

- Export containers gradually increase from 42% laden in 2016 to 80% laden in 2040.

Coal

Coal is a vital commodity for the Lankan energy supply as most of the cargo flows to the power plant in Norochcholai which was built in 2011. Table 13-25 displays the increase of coal for energy in the past decade with the power plant now running at full steam. Despite the cancellation of the Indian Trincomalee power plant, the CEB still plans to partially fulfil the national energy demand through coal as presented in CEB Expansion plan 2015-2034. The reason being that coal power energy is cheaper that gas or oil based or renewable energy.

The existing coal power plant at Norochcholai is using an own jetty for coal imports by applying midstream transfer operations. At Trincomalee, the TTA facility and Ashroff Jetty are currently also used for imports of coal from Indonesia and Russia. However, most coal handled at Trincomalee is for the cement industry.

As a pilot experiment, coal in Trincomalee is nowadays sometimes containerized and transported by rail from China Bay rail station towards Puttalam cement industry. The cargo is still transported by truck to the railway station in Trincomalee due to absence of rail connectivity on the quay. The Puttalam facility has its own rail yard. Coal is sometimes also brought to the warehouse before further transport (by truck to warehouse; subsequently, by truck to Puttalam).

Table 13-25: Coal Consumption

Consumption Coal Tons '1000	2011	2012	2013	2014	2015
Industries	80	99	84	98	87
Energy	395	625	678	1,364	1,880
Consumption Total	**475**	**724**	**761**	**1,461**	**1,967**

Source: Sri Lanka Sustainable Energy Authority – Energy Balance 2015 & SLPA – Throughput Figures

Table 13-26: Coal Imports

Import Coal Tons '1000	2011	2012	2013	2014	2015
Private Facilities	655	873	1,032	1,494	1,789
SLPA	105	89	99	113	93
Imports All Facilities	**760**	**962**	**1,131**	**1,607**	**1,881**

Source: Sri Lanka Sustainable Energy Authority – Energy Balance 2015 & SLPA – Throughput Figures

Demand Driver & Proxy

The main driver for national coal demand is the energy industry in Sri Lanka. As a proxy the most accurate would be to use energy generation for which the figures are available. The Ceylon Electricity Board outlines energy generation forecasts with the relative share of coal in the energy mix. Still, the generation figures are not backed by actual capacity yet. As, for example, the coal plant in Sampur has been cancelled but another one is planned in the same region.

Because of the government shifting to LNG as a major supplier of energy, the official CEB forecast on coal generation is not followed as there is no indication for large investments in coal fired power plants.

Key Assumptions of Forecast

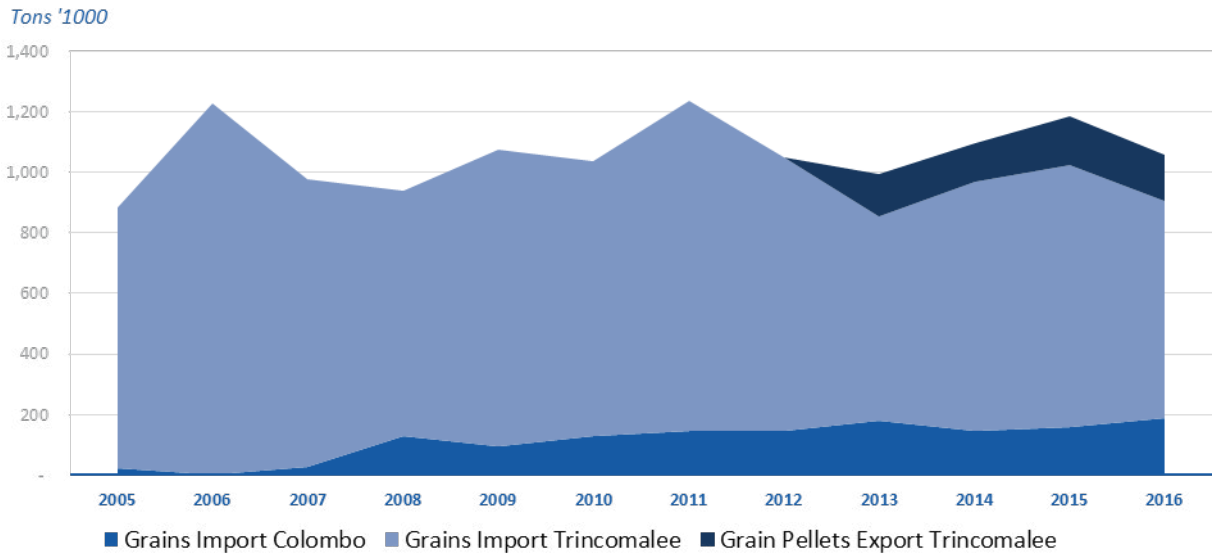
- Coal energy generation will be limited to the Norochcholai power plant in Puttalam.
- All coal needs to be imported as no coal reserves are present in Sri Lanka.
- The Norochcholai average efficiency over 2014 and 2015 are used as coal energy generation benchmark, which is 400 tons per GWh.
- Norochcholai coal energy (coal consumption 2,2 MTA max. capacity) will be the biggest source of Sri Lankan coal imports.
- Coal demand for cement industry is expected to remain stable at 120,000 tons a year.
- Because of the Ashroff jetty expansion 80,000 tons of coal for private industries will be added to the total.

Wheat / Maize / Corn

Wheat grain imports partly service the nations demand for cereals. Still the main source of cereals for the population is homegrown rice. Wheat imports originate mainly from the Canada and the US and are destined largely for the Prima Flour flour mill in Trincomalee and a smaller flour mill in Colombo. These mills service the total demand as no flour import takes place. Prima Flour has its dedicated jetty in Trincomalee and the imports in Colombo take place at the Prince Vijaya quay. Part of imports are used for animal feed. Import cattle feed is expected become popular with the modernisation of agricultural industry.

Figure 13-5 indicates that grain imports have been stagnant over the past years with most imports going to Trincomalee. The residuals of the flour mill in Trincomalee in the form of grain pellets flow to South-East Asian countries.

Figure 13-5: Wheat Grain Throughput Sri Lanka



Source: SLPA

Demand Driver & Proxy

Wheats, maize and corn are primarily used as a cereal food source for people, but it is also used in animal feed production. For the purpose of this discussion we will refer to these products as 'wheats'. The demand driver is consequently cereal consumption which is related to population. A proxy for this figure is the kilograms of wheat consumption per capita. Currently, consumption per capita is around 50 kg per person in 2016. According to the Food and Agriculture Organisation (FAO) a substitution of consumption towards wheat grains takes place as a country develops. Developing countries have a consumption of 70 kg per person per the FAO and industrial countries around 100 kg per person.

Additionally, grains trade is taken into consideration in the forecast. An example is that economies of scale can be reached for shipping lines when wheat is transported from the US and Ukraine/Russia for consumption regions in South East Asia in large panamax/mini cape vessels and redistributed in handysize vessels. Additional options are the soybean trade to produce bio-ethanol.

Key Assumptions of Forecast

- There is no domestic production of wheat, maize or corn, thus national demand equal national imports.
- In all cases consumption grows from 50 kg per capita in 2016 to 70 kg per capita in 2025.
- In the High Case consumption grows from 70 kg per capita in 2025 to 100 kg per capita 2040.
- In the Medium Case consumption grows from 70 kg per capita in 2025 to 90 kg per capita in 2040.
- In the Low Case consumption grows from 70 kg per capita in 2025 to 80 kg per capita in 2040.
- Additional grains trade is set at 5% in 2023 ramping up to 20% in 2027.

Cement / Clinker / Gypsum

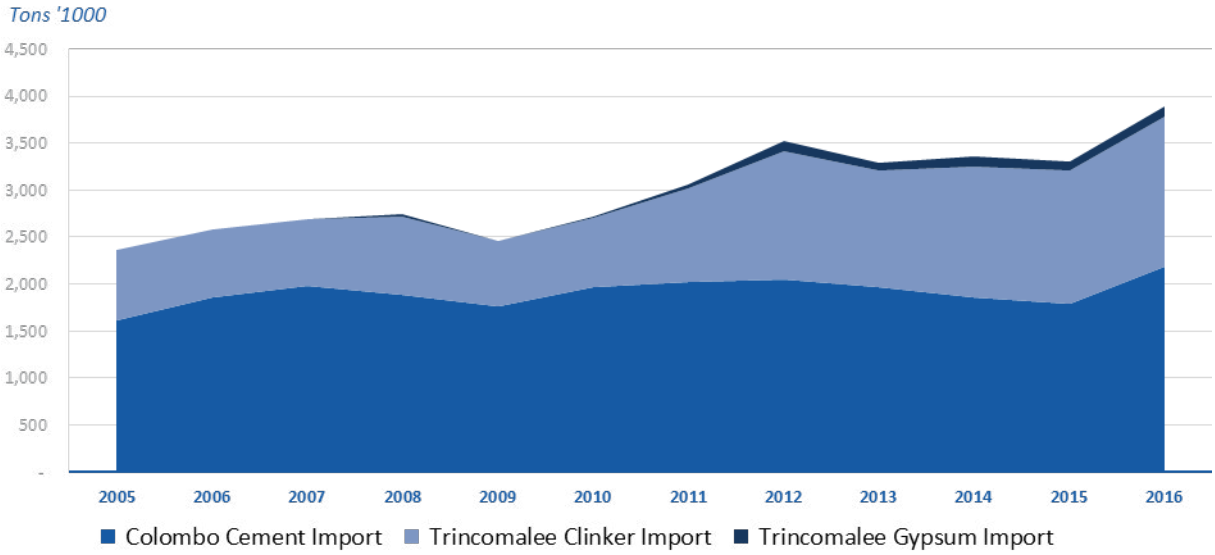
Cement as a finished product enters Sri Lanka through the ports of Colombo and Trincomalee. In Colombo, this is done at the Prince Vijaya quay whereas clinker and gypsum through the Tokyo cement facility and the Siam facility. Clinker and gypsum are grinded together to create cement in the grinding plants. The clinker destined for Galle is transhipped through Trincomalee port where the midstream vessel-to-vessel loading is replaced by transhipment at the Ashroff Jetty.

Domestic production is centred at the plants in Puttalam and Trincomalee; the facility in Puttalam comprises an integrated facility with a lime quarry near the plant, whereas the facility in Trincomalee processes imported clinker. Recently, Lafargeholcim PLC divested its stakes in the plant in Puttalam and the mill in Ruhunu to the Siam City Cement PLC.

Sri Lankan cement production facilities:

- Trincomalee Grinding Plant: 2.8 M tons per annum cement production capacity
- Puttalam Grinding and Clinker Production Plant: 0.66 MTA Clinker Capacity; 1.15 MTA Cement capacity
- Galle Grinding Plant: capacity unknown

Figure 13-6: Cement / Clinker / Gypsum Import



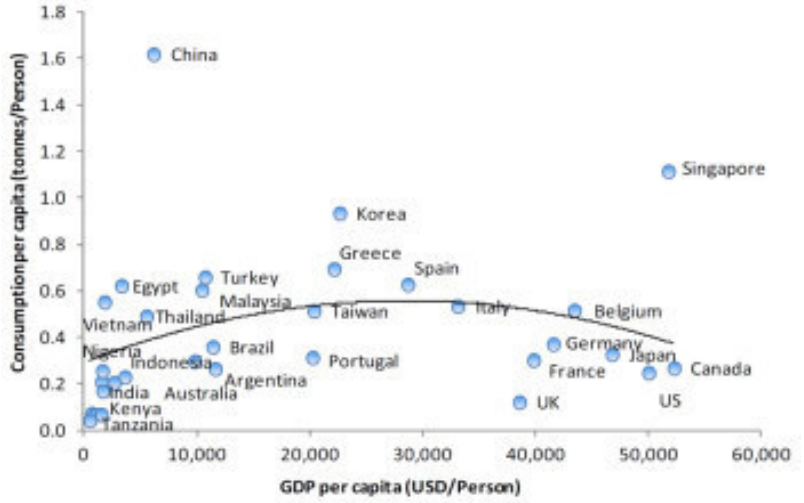
Source: SLPA

Demand Driver & Proxy

The demand for cement is directly derived from the demand of the construction industry. As a proxy for construction demand the GDP per capita because it incorporates wealth and population growth. Figure 13-7 shows a scatterplot of the relationship between GDP per capita and cement consumption for various countries. The relationship between GDP per capita is increasing in the development phase and slightly decreasing in mature economies. In 2016 Sri Lankan cement consumption is about 180 kg per capita.

Several government projects due to a construction boom are taken into account in the forecast to model the construction boom in the Western province. Projects include theMinistry Megapolis and Western Development construction works, ADB funding of highways and general city high-rise construction works.

Figure 13-7: Relationship GDP/Capita and Cement Consumption



Source: Global Cement 2012

Key Assumptions of Forecast

- Imports are considered to be cement, clinker or gypsum.

- Imports equal forecast cement demand minus clinker production capacity.
- Cement powder consists of 90% clinker and 10% gypsum.
- The Puttalam clinker plant produces 0.66 MTA.
- No clinker production capacity variations are incorporated.
- Cement consumption per capita is forecasted.
- In the High Case consumption grows from 0.18 tons per capita in 2016 to 0.5 tons per capita 2040.
- In the Medium Case consumption grows from 0.18 tons per capita in 2016 to 0.4 tons per capita in 2040.
- In the Low Case consumption grows from 0.18 tons per capita in 2016 to 0.3 tons per capita in 2040.
- Consumption per capita is multiplied with the 'most likely' population forecast scenario.
- Between 2018 and 2025 consumption is boosted because of Megapolis and Western Development construction projects.

Fertiliser

The mainly Chinese Fertiliser is imported to cultivate the 1.2 M ha of arable land in Sri Lanka. Fertiliser is discharged at the port of Colombo. The bulk imports are bagged at the quay with mobile bagging machines and the rest of the imports is imported already bagged. Table 13-27 presents an overview of the imports which appear not to have a clear trend. The high imports of 2015 might be a build-up of stock. Currently, Sri Lanka does not produce Fertiliser though it has large pockets of phosphate rock needed for production.

Table 13-27: Fertiliser Imports 2007-2016

Tons	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Fertiliser Bulk Imports	371,555	201,964	175,218	275,254	238,988	118,740	44,025	164,747	291,813	117,618
Fertiliser Bagged Imports	136,004	341,609	171,790	269,107	234,996	333,536	291,396	354,880	306,969	196,347
Total Imports	**507,559**	**543,573**	**347,008**	**544,361**	**473,984**	**452,276**	**335,421**	**519,627**	**598,782**	**313,965**

Source: SLPA

Demand Driver & Proxy

Sri Lanka has natural phosphate reserves. Private initiatives want to utilize this opportunity and set-up a SSP Fertiliser production facility in Trincomalee. This is a possible industrial development and is still subject to political and environmental approvals. The production facility may produce 1.8 M tons when fully operational and excess fertiliser shall be exported. The drivers for this product are domestic demand for which arable land is an accurate indicator and for foreign market demand no proximation can be made at time of writing, hence the facilities production capacity is regarded as proxy.

Key Assumptions of Forecast[26]

- Private development of a fertiliser plan with full capacity of 1.8 M tons reached in three years.
- Production of SSP is fixed at 80% of total available capacity.
- Phosphate is sourced entirely from Sri Lanka itself.
- Sulfuric acid is imported for the production process.
- For production of 1 ton SSP Fertiliser, 0.3 tons of sulfuric acid is needed.

[26] Based on private party initiatives

- Sri Lanka has 1.2 M ha of arable land for which it needs 0.3 tons of fertiliser per ha (World Bank, 10-year average).
- Sri Lankan maximum demand is stable at 336,000 tons of Fertiliser.
- The entire fertiliser imports will be replaced by domestic production.
- Excess production will be exported.

Crude & Refined Oil

Middle-Eastern crudes are pumped to the Sapugaskanda refinery and Orugodawatta tank farm through the SPBM 1 offshore jetty which is located approximately 12 kilometres off the coast of Colombo as described in Table 13-28. The crude imports described in Table 13-29 show that the imports have not seen significant changes due to the refinery capacity being unchanged for the past decade.

Table 13-28: Crude Supply Chain Overview

Facility	Capacity
SPBM 1 Jetty	• Pump capacity: minimum 1,406 tons/hr
Sapugaskanda Refinery	• 2.5 M tons / annum distilling capacity • 0.54 M tons' crude storage capacity
Orugodawatta Tank Farm	• 0.16 M tons' storage capacity

Source: Various

Table 13-29: Crude Imports 2007-2016

Tons '1000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Crude Imports	1,939	1,854	1,932	1,819	1,934	1,625	1,743	1,740	1,761	1,685

Source: SLPA

Refined oils are pumped to the storage terminals through the dolphin jetty in the Colombo port and the offshore SPBM 2 jetty. The Sapugaskanda refinery produces main auto diesel oil for the energy plants, jet fuel for the airports and blended oils as bunkering fuel. Sri Lanka is dependent on refined white oil imports for its national supply. These imports also include gasoline. The refinery in Sapugaskanda is old and needs an upgrade to supply the country towards the future.

Table 13-30: Refined Oils Supply Chain

Facility	Capacity
Dolphin Jetty	• Pump capacity: minimum 278 tons/hr
SPBM 2 Jetty	• Pump capacity: minimum 2500 tons/hr
Sapugaskanda Refinery	• 60,000 tons' storage capacity
Kollonnawa Tank Farm	• 248,000 tons' storage capacity
Muthurajawela Tank Farm	• 205,000 storage capacity

Source: Various

Table 13-31: Refined Oils Imports 2007-2016

Tons '1000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Refined Imports	2,064	2,025	1,945	2,224	2,431	3,111	2,253	2,483	2,330	2,778

Source: SLPA

Demand Driver & Proxy

Crudes and refined oils ultimately are driven by domestic consumption or foreign consumption in case of exports. For Sri Lanka, the focus lies on the former. As a proxy, an estimate of the CIA World Factbook for the refined oil consumption per capita is used to forecast national refined oil demand for Sri Lanka. Refinery capacity output is deducted from this demand as refinery capacity required crude imports.

Key Assumptions of Forecast

- The Sapugaskanda refinery has a crude input capacity of 2.0 MTA of crude operating capacity (historic maximum).
- The Sapugaskanda yields 97% of the weight of its crude input as refined output (based on refinery data).
- The Sapugaskanda refinery is assumed to be revamped at current maximum capacity until 2050 or a new refinery with same capacity is planned for.
- Additional refining capacity of 5.0 MTA is assumed to be operational in 2030 ramping up from 0.5 MTA in 2026.
- Current Sri Lanka refined oil consumption is 232 litres per capita in 2016 (based on throughput data).
- Refined oil consumption will increase to:
  - 772 litres per capita in 2050 in High Case – Czech Republic 2014 consumption based on BP Statistical Review.
  - 609 litres per capita in 2050 in Medium Case – Croatia 2014 consumption based on BP Statistical Review.
  - 446 litres per capita in 2050 in Low Case – South Africa 2014 consumption based on BP Statistical Review.
- Sapugaskanda refinery output is deducted from refined oil demand.

LNG

Demand Driver & Proxy

A clear demand driver for LNG is the energy sector in Sri Lanka. The CEB energy generation shares are not followed for this forecast for the same reason as explained the in assumption for coal imports:

- The Indian and Japanese proposals for a power plant in the Sampur area are cancelled.
- There are no other credible plans for coal generation backed by the government in Sri Lanka.
- The government expressed its vision to invest in LNG fired power plants.

The most immediate project would be turning the Kerawalapitya plant into LNG supplied gas power plant.

Key Assumptions of Forecast

- The three energy generation scenarios outlined in Appendix V are used as inputs for the forecasts.
- The share of LNG in total energy generation is (MTBS market assumption):
  - 0% in 2015
  - 14% in 2020
  - 50% in 2025

- 50% in 2035 and beyond.
- IGU benchmark gas plant output is used for generation efficiency:
  - Open cycle power generation plant yields 3,700 GWh with 1bcm gas.
  - 1 bcm gas equals 770,000 tons LNG

Ilmenite & Biomass

Demand Driver & Proxy

Sri Lanka has pockets of ilmenite which is used as a metal in titanium production. Biomass is being produced by a private company for which a bulk export location is needed. Trincomalee is opted due to the availability of land near the Ashroff quay. The demand driver for both products are the respective export markets. Regarding Biomass demand, international power facilities are interested to burn biomass at their coal-fired power stations to lower their carbon footprints. For the purpose of this report, the expect amounts given by the private parties are presented.

Key Assumptions of Forecast[27]

- Biomass exports are 150,000 tons in 2020 increasing to 500,000 tons in 2030.
- Ilmenite will be exported with 29 ships annually of 30,000 DWT filled at 80% capacity starting when bulk export capacity is available at Ashroff jetty (possibly 2023).

Non-containerised general cargo

Non-containerised general cargo includes all break bulk cargo reported by SLPA like the steel imports in Colombo and the break bulk imports and exports in Hambantota and the smaller ports. The containerisation rate in Sri Lanka is high compared to any other lower-middle income country due to availability of efficient container terminal in Colombo, making containerised trade relatively cheap. The containerisation rate for exports and imports in the past 3 years 95.0 % (Source: SLPA). Because of this high rate no significant change is to be expected in this rate.

Table 13-32: Non-Containerised General Cargo Imports / Exports 2007-2016

Tons	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GC – Imports	820,876	630,251	671,929	612,881	720,680	679,568	235,654	408,040	606,314	350,827
GC – Exports	215,496	205,533	132,844	21,009	34,375	10,979	175,346	234,117	249,851	299,667
Totals	**1,036,372**	**835,784**	**804,773**	**633,890**	**755,055**	**690,547**	**411,000**	**642,157**	**856,165**	**650,494**

Source: SLPA

Demand Driver & Proxy

Non-containerised general cargo is a category of potentially comprising of dozens of individual commodities and supply chains. Thus, a top-down forecast by extending the gateway cargo forecast will give the best results. Generally speaking the much of the general cargoes handled in the past are nowadays transported into containers. This effect is captured under the term containerisation rate.

Key Assumptions of Forecast

- General cargo comprises of containerised general cargo and non-containerised general cargo.

[27] Based on private party initiatives

- The containerisation rate in Sri Lanka (containerised cargo divided by weight total cargo) is stable and high in Sri Lanka at 95%.
- The containerisation rate will remain stable until 2050.
- A construction boom for the development of the Megapolis and Western developments especially, and Hambantota will increase GC imports in the period 2018-2025 followed by stabilisation.
- To arrive at total general cargo forecast, the gateway laden export and laden import forecasts are multiplied by 1/containerisation rate.
- The non-containerised general cargo then comprises of total general cargo weight minus containerised cargo weight including the weight of the container box.
- The high, medium and low scenarios are derived from the gateway container forecast, as total cargo demand minus containerised demand equals non-containerised general cargo.

RoRo Domestic

Vehicles for the Sri Lankan domestic market are handled at the ports of Colombo and Hambantota with a 50-50 split on the number of vehicles handled totalling around 63 thousand in 2016. In Colombo, the UCT berths and the Guide Pier are used for docking car carriers and RoRo vessels. The imports of 140 thousand vehicles in 2015 were an outlier due to fiscal measures taken by the government.

Table 13-33: Vehicles Imports & Transhipment 2007-2016

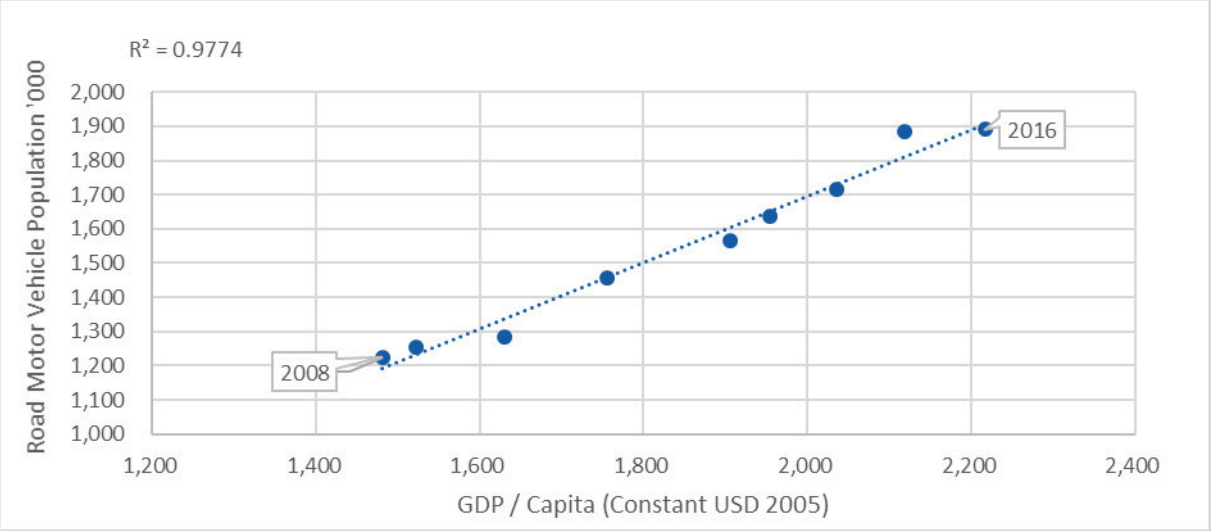
Vehicles	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic	30,047	21,875	6,732	45,779	90,824	45,297	33,109	59,219	140,933	63,407
Transhipment	10,065	2,154	4,973	2,455	993	4,521	38,530	160,502	116,270	150,921
Total	**40,112**	**24,029**	**11,705**	**48,234**	**91,817**	**49,818**	**71,639**	**219,721**	**257,203**	**214,328**

Source: SLPA

Demand Driver & Proxy

Wealth and population are the primary demand drivers for domestic car sales. GDP per capita combines these two drivers the most appropriately. This thesis is further supported by the regression analysis in Figure 13-8. There is a near perfect correlation of the road motor vehicle population derived from the Department of Motor Traffic and the GDP per capita for Sri Lanka. The road motor vehicle population is defined as all 4-wheeled vehicles which are allowed on the public road. Tractors, for example, are included whereas tricycles and motor bikes are naturally excluded.

Figure 13-8: Scatterplot Road Vehicle Population and GDP / Capita



Key Assumptions of Forecast

- The linear relationship described in Figure 13-8 used to forecast the total road vehicle population.
- RoRo imports equal domestic road vehicle demand minus domestic production of vehicles.
- Domestic production caters to 5% of demand in 2020 up to 10% in 2025.

RoRo Transhipment

The vehicle transhipment business picked up in 2012 as shown in Table 13-33 with the use of Hambantota as bundling point for Indian car exports and Japanese used car exports amongst others. The favourable location of the port along major shipping routes and its low storage tariffs for vehicles make it an attractive location for the major car carriers. The transhipment of vehicles in Colombo faced capacity constraints which is the reason of the shift of the business to Hambantota.

Demand Driver & Proxy

The transhipment for vehicles is a relatively difficult market to forecast as it is supply side driven where different dynamics take place. Currently, Sri Lanka is a collection hub for smaller Indian exports to various global markets and a distribution hub for Asian car exports. Hambantota's attractiveness lies in its proximity to the main shipping routes and its proximity to India combined with its low storage tariffs. The space and capacity constraints in Indian ports also play a role. The main proxy for this study will be the Indian vehicle exports thus no domestic economic scenarios will be used.

Key Assumptions of Forecast

- Indian vehicle exports are two-thirds of the total transhipment of vehicles.
- Hambantota has 25% market share in Indian vehicle exports in 2015 dropping to 17% in 2025.
- Market share drops due to capacity upgrades in India.
- The low, medium and high scenarios are based on domestic demand and economic growth. As such these scenarios do not fit this forecast.

Cruise Vessels

Demand Driver & Proxy

The approach for the vessel arrival forecast employs a bottom-up approach in contrast to the other forecasts, because the cruise market operates on a per port basis where a larger cruise port can serve as hub for smaller cruise ports in the country. For this reason, the cruise vessel demand for other ports is derived from the Colombo forecast.

Key Assumptions of Forecast

Colombo

Based on (i) historic vessel arrival growth figures; (ii) overall market trends; and (iii) stakeholder interviews, the following assumptions have been derived for the vessel forecast:

- Phase 1 of the cruise terminal development will be completed by the start of 2021.
- Vessel arrival growth:
  - 2018 – 2020: 4.4% (in line with historic CAGR)
  - 2021: 52 calls added (a year-round weekly service, with Colombo as the homeport, is introduced)
  - 2022 – 2024: 2.0% (decreased growth rate)
  - 2025: 35 calls added (addition of a year-round 10-day service)
  - 2026 – 2030: 2.0%
  - 2031 – 2050: 1.0% (further decreased growth rate)

Other Ports

- Vessels arrivals at Galle are 10 % of Colombo in 2018, increasing to 12% in 2030.
- Vessels arrivals at Hambantota are 7 % of Colombo in 2018, decreasing to 5% in 2030.
- Vessels arrivals at Trincomalee are 5 % of Colombo in 2018, increasing to 7% in 2030.

Appendix V General Forecasting Methodology

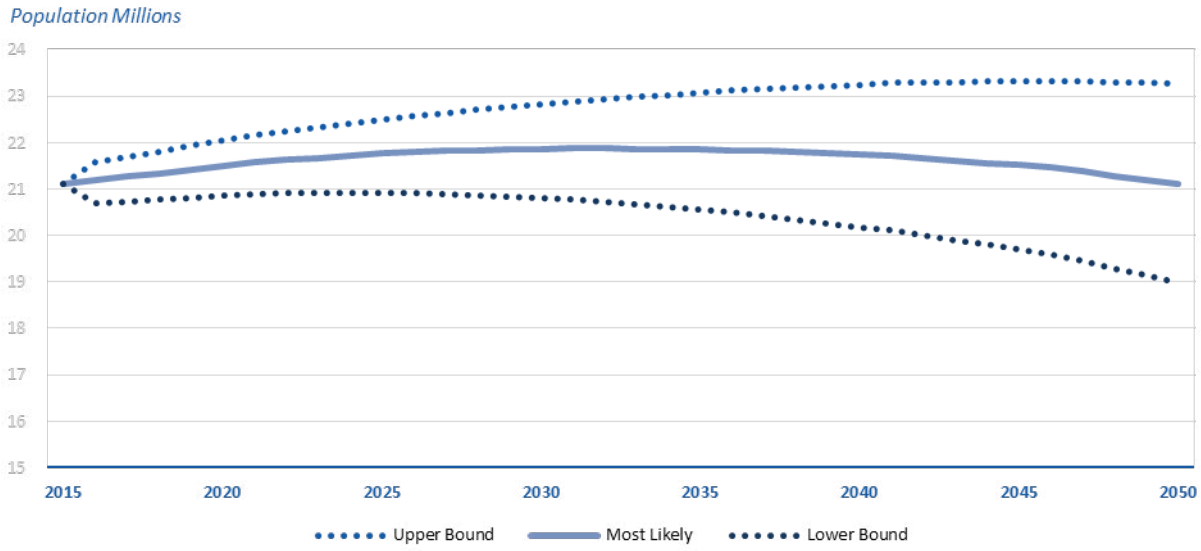
Population Forecasts

The population of Sri Lanka has been relatively stagnant over the past decade. The last census, which was carried out in 2011, revealed a population of approximately 20.5 M people, and forecasted a population of 22 M for 2021. Additionally, the population is aging: The country's working age population reached its peak in 2006, while the number of people aged 60+ is expected to double in 2041, as compared to the last census in 2011. (World Bank, 2016)

Population figures are used as input for the forecast when calculating the GDP per capita for example to forecast container imports. Also, several forecasts like cement demand are based on a per capita forecast. For this purpose, the population forecast of the Sri Lankan Institute for Health Policy is used (based on the 2001 census but updated in 2007).

Figure 13-9 displays the high, medium and low scenarios of the forecast. The medium scenario is used for all forecast as the most likely scenario.

Figure 13-9: Population Forecasts



Source: Institute for Health Policy 2007

GDP per Capita Developments

Sri Lanka's economy is transitioning and the country is facing financial challenges. The significant trade deficit causes an outflow of international monetary reserves, leading to lower exchange rates. Government finances are negatively impacted by this development; as external debt is in foreign currency. Government debt to GDP is currently at 75%, but several successful measures have been taken by the government.

For the purpose of the traffic forecast three scenarios for the Sri Lankan economy are identified by the consultant:

- "Accelerated growth" (High) - Sri Lanka develops fast and outpaces its regional competitors. In 2050 Sri Lanka is strong regional maritime and trading hub including new industrial complexes.

- "Developed Nation" (Medium) - Sri Lanka is a developed nation in 2050 with its entire population out of poverty. It has become a net exporter and a medium regional player.
- "Slow Growth" (Low) - Sri Lanka has a slow economic growth. In 2050 its export industry has not fully developed.

The most likely population forecast is used for each scenario to reduce complexity. The following assumptions underlie the three scenarios:

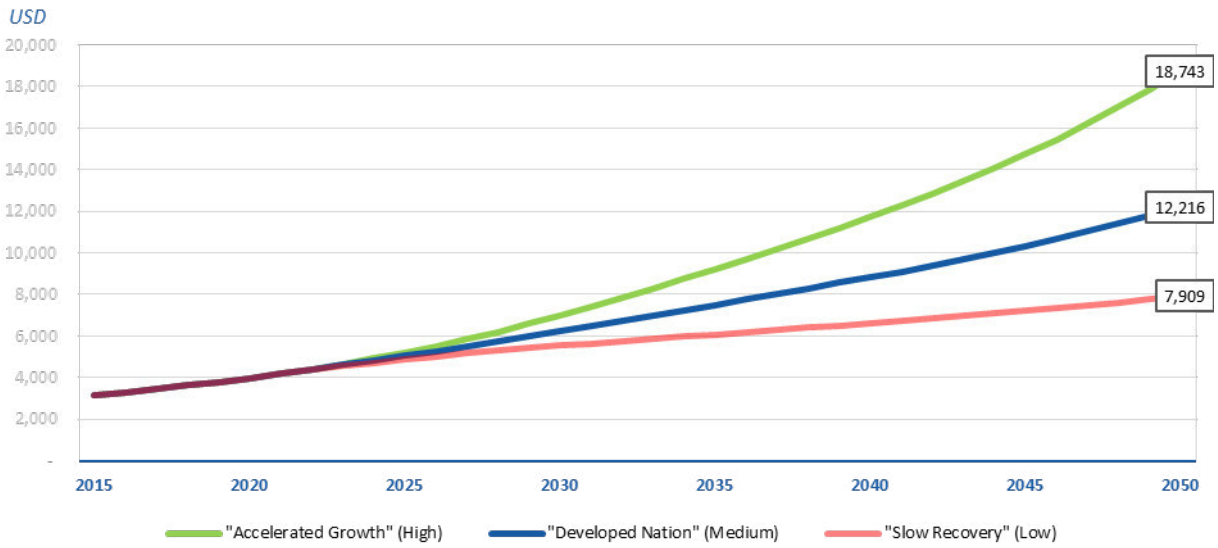
Table 13-34: GDP Growth Scenarios Overview

Scenario	GDP / Capita 2015 (USD Constant 2010)	Population Forecast	GDP Growth Rate 2010 – 2015 (IMF)	GDP Growth Rate 2015 – 2021 (IMF)	GDP Growth Rate 2021-2030	GDP Growth Rate 2031-2040	GDP Growth Rate 2041-2050	GDP / Capita 2050 (USD Constant 2010)	Economy Comparable to
"Accelerated growth"	3,156	Most Likely	6.4%	5.18%	5.92%	5.25%	4.50%	18,743	Czech Republic & Saudi Arabia 2015
"Developed Nation"	3,156	Most Likely	6.4%	5.18%	4.81%	3.50%	3.00%	12,216	Croatia & Russia 2015
"Slow Growth"	3,156	Most Likely	6.4%	5.18%	3.70%	1.75%	1.50%	7,909	Colombia 2015

Source: MTBS

Based on the medium population Figure 13-10 presents the GDP per capita forecast which will be used in the commodity forecasts.

Figure 13-10: GDP per Capita Forecasts



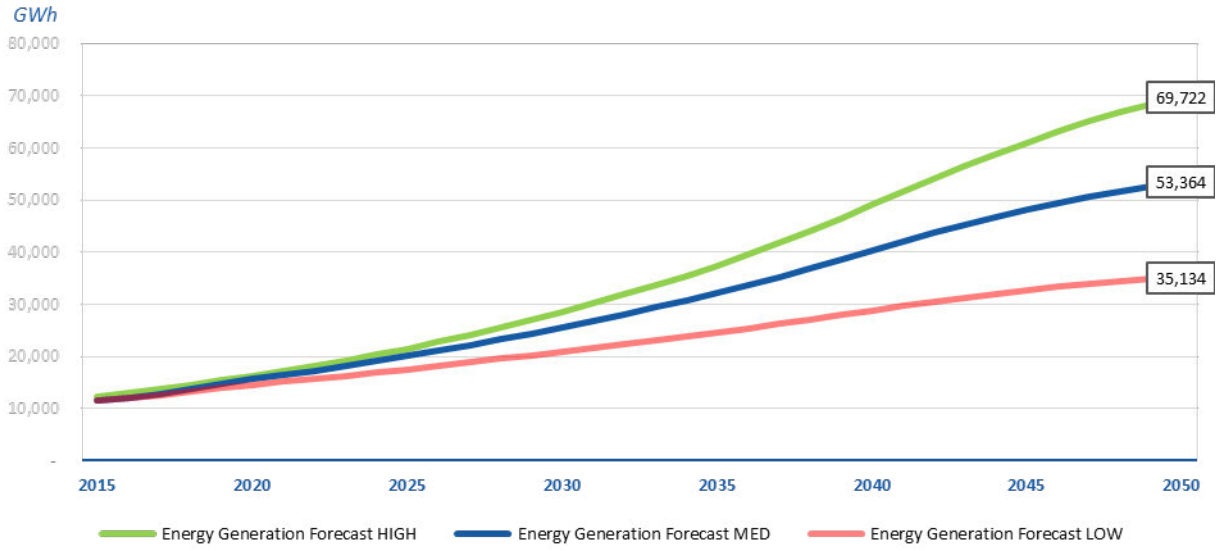
Source: MTBS

Energy Sector Developments

The energy mix of Sri Lanka is seeing a shift from a reliance on heavy fossil fuels to renewable energy and other forms of fossil fuels like LNG, but still for a large part: coal. Exploration of the eastern seabed and exploitation of the gas reserves in the western seabed will might impact the energy mix, as the country is looking for ways to power its economic endeavours. Next to potential energy demand from new industries, the energy demand per capita is expected to rise once the country further develops. This will have consequences for port development.

For the purpose of this study the forecasts and capacity predictions of the 2015 report of the Ceylon Electricity Board "Long Term Generation Expansion Plan 2015-2034" are used presented in Figure 13-11. The forecasts presented in the CEB report are matched to the economic scenarios in paragraph 0. An extrapolation by MTBS from the 2034 to 2050 has taken place to account for the entire period.

Figure 13-11: Energy Generation Forecasts

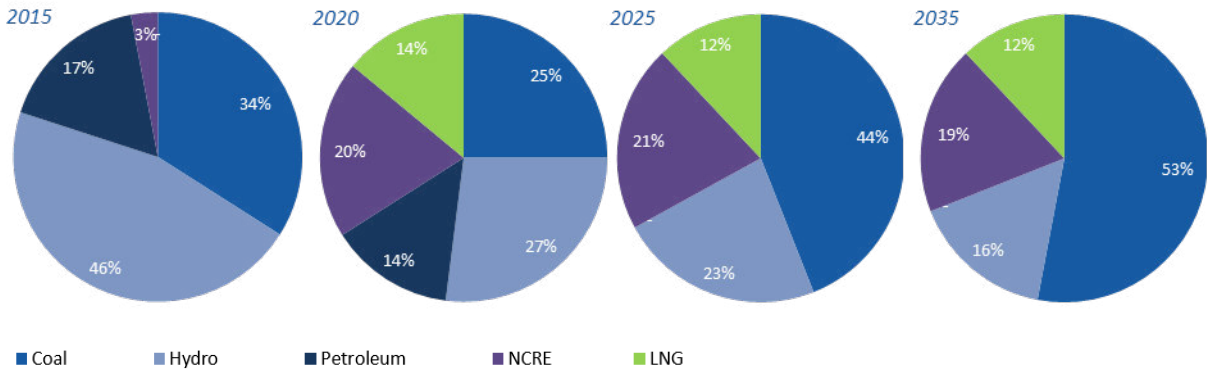


Source: CEB - Long Term Generation Expansion Plan 2015-2034

The sources of generation per scenario are assumed by CEB to be fixed per division provided by CEB displayed in Figure 13-12.

This report does not follow the CEB division and of sources, because as of November 2017 coal is highly unlikely to be the future of Sri Lankan energy. A substation for LNG is more likely as construction of an LNG plant in Colombo will be on its way.

Figure 13-13: Generation Shares



Source: CEB - Long Term Generation Expansion Plan 2015 - 2034

Appendix VI Container Transhipment Forecasting Methodology

Forecast Methodology & Process

Transhipment is an ever-growing business for the port Colombo and the main source of this container traffic in the port outperforming gateway cargo as can be seen in Figure 13-14. Colombo's strategic and timely expansion and geographically position for transhipment towards East-India, Bangladesh, Myanmar, Maldives and for relay to West India, Pakistan and East Africa contributes to this growth. Growth in the past year has picked up significantly to 12% in 2016 with total transhipment throughput of 4.4 M TEU in that year. This is mainly due to the capacity upgrades of the port Colombo lying conveniently near the main East-West maritime trade route.

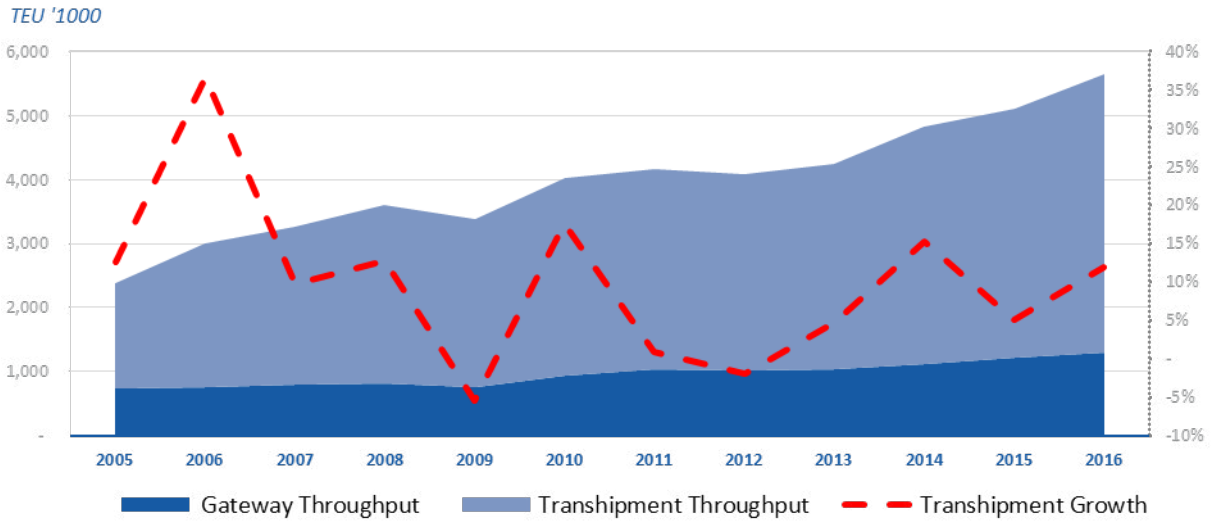
Colombo used to be dominant in transhipment to West India and the Middle East. The transhipment to west India has been reduced due to newly developed port facilities and the development of direct trades to this area. However, some relay transport has remained to these destinations. East India is still the traditional transhipment market contributing to most of the transhipment growth today.

Figure 13-14 also displays the volatile nature of the transhipment business though the trend has been positive with a CAGR of 4.9% in the past decade (2007 to 2016), the growth has fluctuated significantly with the global economy and trade. An important feature of the transhipment trade is the fact that it is "footloose". This means that shipping lines can easily redirect transhipment to other port along the transportation chain. Where they choose to perform their transhipment is driven by;

- suitability to handle Ultra Large Container Ships (ULCS);
- cost price of box handling;
- geographical location;
- quality of services rendered.

Competition is significant in this market with large transhipment ports like Singapore and Tanjung Pelepas along the same east-west corridors. The port of Colombo can maintain its position once cost price, and service levels (efficiency) remain competitive.

Figure 13-14: Throughput and Growth Transhipment Containers



Source: SLPA

Demand Driver & Proxy

Sri Lanka's transhipment trade mainly focuses on India, Bangladesh, the Maldives, and the Seychelles. Hence, the trade is mainly driven by (i) economic development and (ii) port development in these regions. Economic development of those regions drives the container consumption volumes, whereas (the lack of) port development drives the need for transhipment. Besides transhipment to feeder regions, transhipment at Colombo takes place because of Relay. The latter is the transhipment between two main vessels which connect at the transhipment hub to optimise the distribution to the end destinations.

Forecast Methodology & Process

Due to the importance of transhipment cargo for Sri Lanka's port volumes, the following detailed 8-step methodology has been applied for the forecast.

- Step 1 – Identification of relevant shipping loops: For each of Sri Lanka's transhipment areas, shipping loops are identified.
- Step 2 – Shipping loop data gathering and assessment: for each identified shipping loop, data regarding port rotation, weekly TEU capacity, number of loading and discharge ports, the type of loop, and the inclusion or exclusion of Colombo is gathered.
- Step 3 – Shipping loop volume estimation: based on the assessed data, each shipping loop's annual TEU volumes are estimated for the identified ports.
- Step 4 – Port throughput data gathering: actual 2015 TEU throughput data is obtained for ports in Sri Lanka's key transhipment regions.
- Step 5 – Shipping loop model calibration (country-level): there may be discrepancies between the estimated total shipping loop TEU volumes for a port (step 3) and the actual throughput at the port (step 4); such discrepancies may be caused by multiple factors, such as low utilization rates of some shipping loops. To control for such discrepancies, estimated TEU volumes of shipping loops are calibrated.
- Step 6 – Estimating Colombo market shares: given the adjusted shipping loop capacities (step 5), Colombo's volume share is estimated for each shipping loop.
- Step 7 – Shipping loop model calibration (overall): once Colombo's capacity share has been estimated for each of the identified transhipment regions (step 6), Colombo's total estimated capacity should equal Colombo's total actual transhipment volumes (2015: 3,888,321 TEU). If this is not the case, Colombo's forecast will be underestimated (if estimated volumes are lower than actual volumes) or overestimated (if estimated volumes are higher than actual volumes). As such, the total model is calibrated.

After step 7, Sri Lanka's current volumes for each of its transhipment markets can be derived. The table below provides an overview of the estimated 2015 volumes for each of the transhipment markets. Subsequently, assumptions concerning the transhipment markets are applied, in order to forecast Sri Lanka's future transhipment volumes towards these markets.

Table 13-35 Sri Lanka - Estimated Transhipment Volume Breakdown

Region	Port	Colombo Trade est. Volume (TEU)	Colombo est. Handlings (TEU)*
	Chennai	277,027	554,055
	Chidambaranar	411,576	823,153
East India	Visakhapatnam	119,940	239,880
	Paradip	-	-
	Haldia	52,850	105,700

Region	Port	Colombo Trade est. Volume (TEU)	Colombo est. Handlings (TEU)*
	Calcutta	76,536	153,073
	Total – East India	*937,930***	*1,875,860*
West India	Cochin	64,449	128,898
	Nhava Sheva (JNPT)	197,326	394,653
	Total – West India	*261,775***	*523,551*
Bangladesh	Chittagong	471,297	942,593
	Mongla	-	-
	Total - Bangladesh	*471,297*	*942,593*
Maldives	Male	*59,529*	*119,059*
Seychelles	Port Victoria	*1,966*	*3,932*
East & South Africa		*78,603*	*157,206*
Middle East, Mediterranean & U.S. East Coast		*113,087*	*226,175*
Total Estimated Colombo Transhipment			**3,848,375**
Total Actual Colombo Transhipment			3,888,321
Discrepancy (Allocated to "Other Markets")			39,946

Assumptions

In order to forecast Colombo's transhipment volumes, assumptions need to be made regarding economic development in Sri Lanka's transhipment markets, as well as regarding port development in Sri Lanka, its transhipment markets, and other regional hubs. The sections below provide an overview of the key assumptions applied to forecast transhipment container demand for each of the regions.

India

- Economic / Demographic Development Assumptions
  - World Bank population forecast up to 2050 has been employed.
  - IMF GDP forecast up to 2021 has been employed; MTBS has further projected GDP growth.
  - It is assumed that the Eastern regions of India will become increasingly important; as such, share of container consumption is assumed to partially shift towards East India over the forecast period.
- Transhipment Share Assumptions
  - East India: currently, a majority of containers handled at East Indian ports is transhipped. It is assumed that deep sea ports will be developed in East India, thus decreasing the need for transhipment. Specifically, it is assumed that the transhipment share will decrease to 25% of total East Indian container demand by 2050.
  - West India: currently, approximately 25% of containers handled at West Indian ports is transhipped. It is assumed that (new) deep sea ports will be developed in West India (e.g., Vizhinjam and Enayam / Colachel), thus decreasing the need for transhipment. Specifically, it is assumed that the transhipment share will decrease to 10% of total West Indian container demand by 2050.
- Sri Lanka Share of Transhipment Assumptions

- East India: currently, over 40% of East India's transhipment containers is handled by Colombo port. It is expected that this market share will initially grow to 50% by 2030, due to Sri Lanka's favourable geographic location for this market and the expected implementation of the East Terminal and Hambantota Container Terminal. Subsequently, Sri Lanka's market share is assumed to decline to 40% by 2050, due to substantial development projects of other major regional hubs (e.g., the new Tuas Terminal in Singapore).
- West India: currently, approximately 20% of West India's transhipment containers is handled by Colombo port. It is expected that this market share will not grow due to the implementation of the new terminals, as competition for transhipment to the West Indian market is more severe and Sri Lanka is less favourably positioned to serve the market. Subsequently, it is assumed that Sri Lanka's market share will decline from 2025 onwards, to a market share of 10% in 2050.

Bangladesh

- Economic / Demographic Development Assumptions
  - World Bank population forecast up to 2050 has been employed.
  - IMF GDP forecast up to 2021 has been employed; MTBS has further projected GDP growth.
- Transhipment Share Assumptions
  - Currently, more than 80% of container traffic towards/from Bangladesh is transhipped. This dependence on transhipment is assumed to decline from 2026 onwards, when several deep-sea port projects, such as Payra port and the less likely Sonadia port project, are expected to become operational. It is assumed that, by 2050, transhipped containers will comprise 40% of total container traffic.
- Sri Lanka Share of Transhipment Assumptions
  - Sri Lanka currently handles approximately 30% of transhipped containers to/from Bangladesh. This is expected to increase in the short term, due to the implementation of the East Terminal and Hambantota Container Terminal. Subsequently, Sri Lanka's market share is assumed to decrease due to development projects of other regional transhipment hubs. Specifically, Sri Lanka's transhipment market share is assumed to decrease to 25% by 2050.

Maldives

- Economic / Demographic Development Assumptions
  - World Bank population forecast up to 2050 has been employed.
  - IMF GDP forecast up to 2021 has been employed; MTBS has further projected GDP growth.
- Transhipment Share Assumptions
  - Currently, more than 70% of container traffic towards/from the Maldives is transhipped. This dependence on transhipment is assumed to remain over time, as no large port projects are planned. As such, it is assumed that, by 2050, transhipped containers will comprise 74% of total container traffic.
- Sri Lanka Share of Transhipment Assumptions
  - Sri Lanka currently handles all of the transhipped containers to/from the Maldives. Sri Lanka's market share is assumed to remain constant over the forecasting period, due to its proximity to the Maldives.

Seychelles

- Economic / Demographic Development Assumptions
  - World Bank population forecast up to 2050 has been employed.
  - IMF GDP forecast up to 2021 has been employed; MTBS has further projected GDP growth.

- Transhipment Share Assumptions
  - Currently, approximately 65% of container traffic towards/from the Seychelles is transhipped. This dependence on transhipment is assumed to remain over time, as no large port projects are planned. As such, it is assumed that, by 2050, transhipped containers will comprise 64% of total container traffic.
- Sri Lanka Share of Transhipment Assumptions
  - Sri Lanka currently handles 6% of the transhipped containers to/from the Seychelles. Sri Lanka's market share is assumed to remain constant over the forecasting period.

Other Markets – Relay Services

- Demand Growth
  - Relay transhipment activities are carried out by shipping lines to shift cargo from one main service to another main service. As this trade exists purely due to the strategic considerations of the shipping lines, it does not fully follow the economic development of cargo destinations. Additionally, as it is expected that shipping lines will aim to minimize the amount of handlings in the shipping chain, it is assumed that the volumes of the relay services will grow slowly. Specifically, it is assumed that the relay to non-key markets of Sri Lanka will grow at a rate of 2% p.a.

Due to the importance of transhipment cargo for Sri Lanka's port volumes, the following detailed 8-step methodology has been applied for the forecast:

Step 1 – Identification of Relevant Shipping Loops

For each of Sri Lanka's transhipment areas, shipping loops are identified. Specifically, the following shipping loops are identified:

- East India – All shipping loops to major ports (Calcutta, Haldia, Paradip, Visakhapatnam, Chennai, and Chidambaranar (Tuticorin)).
- West India – All shipping loops to Nhava Sheva and Cochin, which accounted for >97% of West India port throughput in 2015.
- Bangladesh – All shipping loops to Chittagong port and Mongla port.
- Maldives – All shipping loops to Male port.
- Seychelles – All shipping loops to Port Victoria.
- East & South Africa – Shipping loops that call Colombo and either Mombasa (Kenya), Dar es Salaam (Tanzania), Djibouti (Djibouti) or Durban (South Africa).
- Middle East, Mediterranean & U.S. East Coast – Shipping loops that call Colombo, pass either Jebel Ali or Salalah, and move on to the Mediterranean or U.S. East Coast.

Example

Chidambaranar port (or Tuticorin) is called by the following 9 loops:

1) South India Feeder
2) Colombo-Goa-Mangalore shuttle (X-Press: GMX)
3) Colombo-Tuticorin shuttle (TUX) (KL: Swaco-P)
4) SCI Middle East India Liner Express service (SMILE)
5) Pan-India Express 1 (PIX 2)
6) Pan-India Express 1 (PIX 1)
7) Colombo-Cochin service (CCX) (KL: Swaco-H)
8) Colombo-Tuticorin service
9) Tuticorin Feeder

Step 2 – Shipping Loop Data Gathering and Assessment

For each of the identified shipping loops, the following data is assessed:

- Port rotation
- Weekly TEU capacity
- Number of loading ports / hub ports
- Number of discharge ports
- Focal port is a hub port or discharge port in the loop
- One-way or two-way cargo
- Colombo called in the loop or not
- Direct service or feeder loop

Example

The table below provides an overview of relevant data regarding the 9 identified loops that call Chidambaranar port.

Loop	Port Rotation	Weekly TEU Capacity	# Hub Ports	# Discharge Ports	Hub Port / Discharge Port	One-way / Two-way	Colombo called	Direct Service / Feeder Loop
1	Colombo, Cochin, Colombo, Tuticorin (DBGT), Colombo	1,145	2	2	Discharge Port	Two-Way	Yes	Feeder Loop
2	Colombo, Tuticorin, Goa (~Mormugao) (BTL only), Mangalore, Colombo	1,680	1	3	Discharge Port	Two-Way	Yes	Feeder Loop
3	Colombo, Tuticorin, Colombo	3,400	1	1	Discharge Port	Two-Way	Yes	Feeder Loop
4	Mundra, Jebel Ali, Mundra, Pipapav, Cochin, Tuticorin, Chennai, Kattupalli, Krishnapatnam, Mundra	1,401	4	5	Discharge Port	Two-Way	No	Feeder Loop
5	Mundra, Kattupalli, Visakhapatnam, Kakinada, Tuticorin, Cochin, Jebel Ali, Mundra	1,977	4	3	Discharge Port	Two-Way	No	Feeder Loop
6	Mundra, Hazira, Cochin, Tuticorin, Cochin, Mangalore, Mundra	1,669	5	1	Discharge Port	Two-Way	No	Feeder Loop
7	Colombo, Cochin, Colombo, Tuticorin, Colombo	1,000	2	2	Discharge Port	Two-Way	Yes	Feeder Loop
8	Colombo, Tuticorin, Colombo	1,000	1	1	Discharge Port	Two-Way	Yes	Feeder Loop

9	Colombo, Tuticorin, Colombo	1,200	1	1	Discharge Port	Two-Way	Yes	Feeder Loop

Step 3 – Shipping Loop Volume Estimation

Based on the assessed data, each shipping loop's annual TEU volumes are estimated for the identified ports.

Example

The Chidambaranar feeder loop (shipping loop 9 in the previous table) is a simple feeder loop that shuttles between Colombo (the only hub port in the loop) and Chidambaranar (the only discharge port in the loop). As Chidambaranar is the only discharge port, it is assumed to absorb the full weekly capacity of 1,200 TEU (correction for the loading factor is done later). As it is assumed that the feeder vessels will also take empty containers, the weekly TEU capacity is doubled to 2,400 (two-way cargo flow). Hence, given a 52-week year, estimated annual capacity to Chidambaranar amounts to 124,800 TEU for this shipping loop.

In a similar fashion, the following estimated annual capacities have been determined for the 9 shipping loops that call Chidambaranar:

Loop	Port Rotation	Annual TEU
1	Colombo, Cochin, Colombo, Tuticorin (DBGT), Colombo	59,540
2	Colombo, Tuticorin, Goa (~Mormugao) (BTL only), Mangalore, Colombo	58,240
3	Colombo, Tuticorin, Colombo	353,600
4	Mundra, Jebel Ali, Mundra, Pipapav, Cochin, Tuticorin, Chennai, Kattupalli,	29,141
5	Mundra, Kattupalli, Visakhapatnam, Kakinada, Tuticorin, Cochin, Jebel Ali, Mundra	68,536
6	Mundra, Hazira, Cochin, Tuticorin, Cochin, Mangalore, Mundra	173,576
7	Colombo, Cochin, Colombo, Tuticorin, Colombo	52,000
8	Colombo, Tuticorin, Colombo	104,000
9	Colombo, Tuticorin, Colombo	124,800
Total		**1,023,433**

**Note that these capacities only comprise the estimated annual capacity towards Chidambaranar, not the total capacity of the shipping loops.*

Step 4 – Port Throughput Data Gathering

Actual 2015 TEU throughput data is obtained for Sri Lanka's key transhipment regions. This data is shown in the table below.

Region	Port	2015 Throughput (x1,000 TEU)
East India	Calcutta	528
	Haldia	102
	Paradip	4
	Visakhapatnam	248
	Chennai	1,552
	Chidambaranar	560
West India	Cochin	366
	Nhava Sheva (JNPT)	4,467

	Other West India Ports	133
Bangladesh	Chittagong	1,867
	Mongla	42
Maldives	Male	80
Seychelles	Port Victoria	49

Step 5 – Shipping Loop Model Calibration (Country-Level)

There may be discrepancies between the estimated total shipping loop TEU volumes for a port (step 3) and the actual throughput at the port (step 4); such discrepancies may be caused by multiple factors, such as low utilization rates of some shipping loops. In order to control for such discrepancies, estimated TEU volumes of shipping loops are calibrated through applying the following restriction:

$$\sum_{j=1}^{n} Estimated\ Volume_{jk} = Actual\ Volume_{k}$$

Item	Description
Estimated Volume$_{jk}$	Estimated TEU volume from shipping loop *j* to port *k*
∑Estimated Volume$_{jk}$	The sum of estimated TEU volumes from all shipping loops to port *k*
Actual Volume$_{k}$	2015 Throughput for port *k*

This restriction is intuitive, as total TEU volumes transported by shipping loops to a certain port have to be equal to that port's total throughput.

Example

As can be observed from the step 3 example, the annual TEU capacity provided by shipping loops to Chidambaranar port amounts to 1,023,433 TEU. However, the table above shows that actual 2015 throughput at Chidambaranar port only amounted to 560,000 TEU. Consequently, the estimated TEU capacity needs to be adjusted downwards to more accurately reflect reality and to be in line with the restriction posed in step 5 (the sum of estimated shipping line volumes must equal actual throughput).

As Chidambaranar's actual throughput was 54.72% of the estimated throughput (560,000 / 1,023,433), a loading factor of 54.72% is applied to all shipping loop volumes for Chidambaranar port. Accordingly, the table on the next page shows the adjusted annual shipping loop capacities for Chidambaranar port.

Loop	Port Rotation	Annual TEU
1	Colombo, Cochin, Colombo, Tuticorin (DBGT), Colombo	32,579
2	Colombo, Tuticorin, Goa (~Mormugao) (BTL only), Mangalore, Colombo	31,868
3	Colombo, Tuticorin, Colombo	193,482
4	Mundra, Jebel Ali, Mundra, Pipapav, Cochin, Tuticorin, Chennai, Kattupalli,	15,945
5	Mundra, Kattupalli, Visakhapatnam, Kakinada, Tuticorin, Cochin, Jebel Ali, Mundra	37,501
6	Mundra, Hazira, Cochin, Tuticorin, Cochin, Mangalore, Mundra	94,977
7	Colombo, Cochin, Colombo, Tuticorin, Colombo	28,453
8	Colombo, Tuticorin, Colombo	56,907
9	Colombo, Tuticorin, Colombo	68,288

Total	**560,000**

With these adjusted capacities, the sum of shipping loop volumes is equal to the port's actual throughput.

Step 6 – Estimating Colombo Market Shares

Given the adjusted shipping loop capacities (step 5), Colombo's volume share is estimated for each shipping loop. The share is impacted by the following 3 factors:

- Whether or not Colombo is called in the loop.
- Number of hub ports in the loop (higher number of hub ports results in a lower average share per hub port).
- Whether or not the loop is a direct service (in a direct service loop, Colombo and other hub ports may act as wayports; in this scenario, smaller shares of the capacity should be attributed to the way ports and higher shares should be attributed to the origin ports (e.g., ports in the Far East)).

Example

When looking at the 9th loop calling Chidambaranar port, the adjusted total capacity of 68,288 TEU is taken as the starting point. From the step 2 example, it can furthermore be observed that (i) Colombo is called in the loop; (ii) the loop has only 1 hub port (Colombo) and (iii) that the loop is classified as a feeder loop. As such, the following computations are carried out:

- The full capacity of 68,288 is attributed to Colombo, as Colombo is the only hub port in the feeder loop (68,288 / 1).
- As the loop is a feeder loop, Colombo is not seen as a wayport; as such, Colombo's share is not adjusted downwards.

Hence, Colombo's estimated share of the shipping loop volume to Chidambaranar port is 68,288 TEU. In a similar fashion, the following volumes are derived for Colombo's contribution to each of the shipping loops to Chidambaranar:

Loop	Adjusted Annual TEU Capacity	# Hub Calls	Colombo calls	Direct Service / Feeder Loop	Colombo TEU Capacity
1	32,579	2	2	Feeder Loop	32,579
2	31,868	1	1	Feeder Loop	31,868
3	193,482	1	1	Feeder Loop	193,482
4	15,945	4	-	Feeder Loop	-
5	37,501	4	-	Feeder Loop	-
6	94,977	5	-	Feeder Loop	-
7	28,453	2	2	Feeder Loop	28,453
8	56,907	1	1	Feeder Loop	56,907
9	68,288	1	1	Feeder Loop	68,288
Total Colombo Capacity					**411,576**
Colombo Share					*73.50%*

Step 7 – Shipping Loop Model Calibration (Overall)

Once Colombo's capacity share has been estimated for each of the identified transhipment regions (step 6), Colombo's total estimated capacity should equal Colombo's total actual transhipment volumes (2015: 3,888,321 TEU). If this is not the case, Colombo's forecast will be underestimated (if estimated volumes are lower than actual volumes) or overestimated (if estimated volumes are higher than actual volumes). As such, the following restriction is applied:

$$\sum_{j=1}^{n} Estimated\ Volume_j = Actual\ Volume_{Colombo}$$

Item	Description
Estimated Volume$_j$	Colombo's estimated TEU volume for transhipment region *j*
∑Estimated Volume$_j$	The sum of Colombo's estimated TEU volumes for all transhipment regions
Actual Volume$_{Colombo}$	Actual total 2015 transhipment volumes for Colombo port

Example

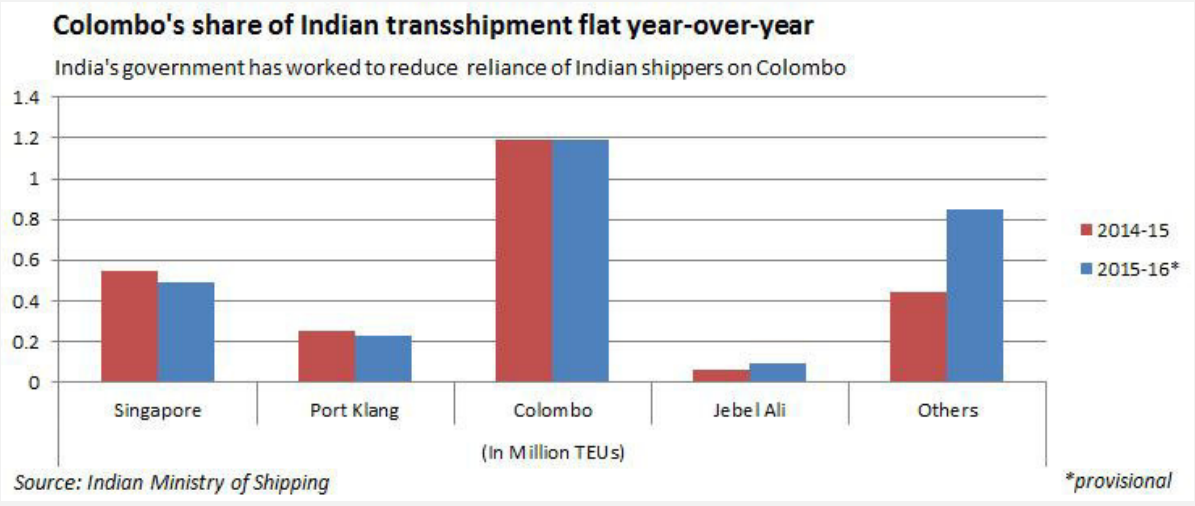
Following the assessment of all of Colombo's identified transhipment services (comprising both end-feeder loops and relay services), the following volumes are estimated for the transhipment regions:

Region	Port	Colombo Trade est. Volume (TEU)	Colombo est. Handlings (TEU)*
East India	Chennai	277,027	554,055
	Chidambaranar	411,576	823,153
	Visakhapatnam	119,940	239,880
	Paradip	-	-
	Haldia	52,850	105,700
	Calcutta	76,536	153,073
	Total – East India	*937,930***	*1,875,860*
West India	Cochin	64,449	128,898
	Nhava Sheva (JNPT)	197,326	394,653
	Total – West India	*261,775***	*523,551*
Bangladesh	Chittagong	471,297	942,593
	Mongla	-	-
	Total - Bangladesh	*471,297*	*942,593*
Maldives	Male	*59,529*	*119,059*
Seychelles	Port Victoria	*1,966*	*3,932*
East & South Africa		*78,603*	*157,206*
Middle East, Mediterranean & U.S. East Coast		*113,087*	*226,175*
Total Estimated Colombo Transhipment			**3,848,375**
Total Actual Colombo Transhipment			3,888,321
Discrepancy			39,946

As each transhipped container to/from a transhipment market results in 2 handlings at the transhipment port (e.g., discharged from mother vessel and loaded onto feeder vessel), the estimated transhipment trade volumes need to be multiplier by 2 in order to arrive at the TEUs handled at Colombo.

***Colombo's total estimated transhipment trade to India amounts to 1,199,705 TEU. This is in line with figures made available by the Indian Ministry of Shipping (see figure on the next page).*

In order to account for the 39,946 TEU discrepancy, a transhipment category "other regions" has been added. The 39,946 TEUs have been allocated to this category.



Step 8 – Assumptions and Forecasting

In order to forecast Colombo's transhipment volumes, assumptions need to be made regarding economic development in Sri Lanka's transhipment markets, as well as regarding port development in Sri Lanka, its transhipment markets, and other regional hubs. The sections below provide an overview of the key assumptions used to forecast transhipment container demand for each of the regions. Subsequently, summarized forecast volumes are provided.

8a TEU Demand Growth in Transhipment Markets

First, the overall TEU demand growth of the transhipment markets is assessed, based on projected economic development of the markets. For the economic development projections, IMF World Economic Outlook (2017) growth projections have been applied for the period from 2017 to 2021. After 2021, MTBS has further projected economic development until 2050. The table below summarizes the estimated Base Case GDP growth figures for Sri Lanka's main feeder transhipment markets.

Item	Unit	2017	2018	2019	2020	2025	2030	2040	2050
India GDP Growth	% (constant prices)	6.72	7.37	7.80	7.93	7.50	5.50	4.67	3.00
Bangladesh GDP Growth	% (constant prices)	6.90	7.00	7.00	6.74	5.50	4.75	3.00	2.00
Maldives	% (constant prices)	4.06	4.72	4.72	4.78	4.40	4.00	3.00	3.00
Seychelles	% (constant prices)	3.50	3.41	3.31	3.33	3.41	3.50	3.00	3.00

Additionally, TEU-GDP growth multipliers have been projected for each of the feeder transhipment markets. The table below summarizes the projected multipliers.

Item	Unit	Actual	2017	2018	2019	2020	2030	2040	2050
India TEU-GDP Growth Multiplier	Factor	1.25*	1.20	1.20	1.20	1.20	1.10	1.00	1.00
Bangladesh TEU-GDP Growth Multiplier	Factor	1.03**	1.46	1.43	1.39	1.35	1.15	1.05	1.00
Maldives TEU-GDP Growth Multiplier	Factor	1.99***	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Seychelles TEU-GDP Growth Multiplier	Factor	-1.46****	1.00	1.00	1.00	1.00	1.00	1.00	1.00

*Average calculated over the period from 2006 to 2015. **Average calculated over the period from 2012 to 2015. ***Average calculated over the period from 2004 to 2015. However, due to substantial volatility in the period, a multiplier of 1.0 has been applied for the projection. ****Average calculated over the period from 2008 to 2015. However, due to substantial volatility in the period, a multiplier of 1.0 has been applied for the projection.

The table below summarizes the TEU trade demand forecasts for the feeder transhipment markets, which result from the historic demand and economic development projections.

Item	Unit	2015	2017	2018	2019	2020	2030	2040	2050
India TEU Demand	'000 TEU	12,392*	14,838	15,939	17,048	18,156	31,529	46,216	58,871
West India Share	*%*	*75.00*	*74.00*	*73.50*	*73.00*	*72.50*	*70.00*	*60.00*	*60.00*
East India Share	*%*	*25.00*	*26.00*	*26.50*	*27.00*	*27.50*	*30.00*	*40.00*	*40.00*
West India TEU Demand	*'000 TEU*	*9,294*	*10,980*	*11,715*	*12,445*	*13,163*	*20,494*	*27,730*	*35,332*
East India TEU Demand	*'000 TEU*	*3,098*	*3,858*	*4,224*	*4,603*	*4,993*	*11,035*	*18,487*	*23,548*
Bangladesh TEU Demand	'000 TEU	1,909	2,320	2,551	2,799	3,054	5,862	8,870	11,054
Maldives TEU Demand	'000 TEU	80	86	90	94	99	152	213	286
Seychelles TEU Demand	'000 TEU	49	54	55	57	59	83	114	153

*Including throughput at minor ports.

As relay transhipment is driven by other factors than economic development of the market, the relay market forecast is not based on economic development. Rather, a 2% annual growth rate is applied for the relay markets. The table below summarizes the resulting development of relay demand, in terms of TEU handlings at Sri Lanka's ports.

Item	Unit	2015	2017	2018	2019	2020	2030	2040	2050
East & South Africa Relay	'000 TEU	157	164	167	170	174	212	258	314
ME, MED & USEC Relay	'000 TEU	226	235	240	245	250	304	371	452
Other Markets Relay	'000 TEU	40	42	42	43	44	54	66	80
Total Relay	**'000 TEU**	**423**	**440**	**449**	**458**	**467**	**570**	**695**	**847**

8b Direct Trade vs Transhipment in Feeder Markets

In a second step, the development of direct trades in Sri Lanka's feeder markets is projected, based on expected port developments in these markets. The table below summarizes identified deep sea port capacity development plans in the key feeder markets that are foreseen to accommodate increasing direct trade volumes in the future – East India, West India, and Bangladesh.

Port	Initial Capacity		Expansion Capacity	
	TEU	Year	TEU	Year
East India				
Ennore	800,000	2017	600,000	2025
Visakhapatnam	360,000	2015	1,640,000	2020
Krishnakapatnam	1,200,000	2015	3,000,000	2025
Chennai	2,500,000	2015	4,000,000	2035
Kattupalli	1,200,000	2015	1,200,000	2020
Vizhinjam*	225,000	2019	193,750	2030
Colachel*	400,000	2020	1,600,000	2030
West India				
Mundra	3,300,000	2015	3,300,000	2018
JNPT	5,000,000	2015	4,800,000	2020
Cochin	1,000,000	2015	3,000,000	2025
Pipapav	850,000	2015	500,000	2016
Vizhinjam**	225,000	2019	193,750	2030
Colachel**	400,000	2020	1,600,000	2030
Bangladesh				
Chittagong	2,000,000	2015	3,570,000	2025
Payra	6,000,000	2023	-	-

*Assumed share of capacity that will be used for gateway cargo for East India; **Assumed share of capacity that will be used for gateway cargo for West India

Additionally, it is expected that deep-sea capacity in these regions will continue to expand after completion of the currently identified projects. As such, capacity growth beyond 2030 is estimated based on the identified capacity development plans between 2021 and 2030. The table below summarizes total expected capacity development for each of the regions.

Item	Unit	Value
East India		
Deep Sea Capacity Development Growth 2021 – 2030*	%	64.79
Estimated Deep Sea Capacity Development Growth 2031 – 2040**	%	50.00
Estimated Deep Sea Capacity Development Growth 2041 – 2050***	%	30.00
2015 Deep Sea Capacity	M TEU	5.3
2050 Deep Sea Capacity	M TEU	33.2
West India		
Deep Sea Capacity Development Growth 2021 – 2030*	%	24.74
Estimated Deep Sea Capacity Development Growth 2031 – 2040**	%	25.00
Estimated Deep Sea Capacity Development Growth 2041 – 2050***	%	25.00

2015 Deep Sea Capacity	M TEU	10.2
2050 Deep Sea Capacity	M TEU	37.8
Bangladesh		
Deep Sea Capacity Development Growth 2021 – 2030*	%	479.00
Estimated Deep Sea Capacity Development Growth 2031 – 2040**	%	0.00
Estimated Deep Sea Capacity Development Growth 2041 – 2050***	%	0.00
2015 Deep Sea Capacity	M TEU	2.0
2050 Deep Sea Capacity	M TEU	11.6

*Vis-à-vis 2020 capacity, fully based on identified projects; **Vis-à-vis 2030 capacity, based on identified projects and expected new projects; ***Vis-à-vis 2040 capacity, based on expected new projects.

It is noted that it is not expected that the full deep sea port capacity will be used for direct trade. The table below presents the expected share of deep sea capacity that will be used for direct trade over time, based on calculated 2015 base figures and an expected gradual increase in direct trades. Note that these figures concern the share of deep sea capacity that is used for direct trades, not the share of total demand that is served through direct trades.

Item	Unit	2015*	2050
East India (% of Deep Sea Capacity used for Direct Trade)	%	17.11	40.00
West India (% of Deep Sea Capacity used for Direct Trade)	%	78.81	85.00
Bangladesh (% of Deep Sea Capacity used for Direct Trade)	%	16.63	30.00

*Calculated based on shipping line analysis in steps 1 – 7 and identified current deep sea capacity.

The assumptions posited above result in the following development of direct trade and feeder transhipment demand in the regions over time.

Item	Unit	2015	2017	2018	2019	2020	2030	2040	2050
East India									
Direct Trade	'000 TEU	890	1,116	1,156	1,240	1,478	4,016	8,625	13,261
Transhipment Trade	'000 TEU	2,198	2,742	3,068	3,363	3,515	7,019	9,861	10,288
Direct Trade Share of Total Trade	%	29.05%	28.93%	27.36%	26.93%	29.60%	36.39%	46.66%	56.31%
Transhipment Handlings*	'000 TEU	4,396	5,484	6,136	6,726	7,030	14,038	19,723	20,575
West India									
Direct Trade	'000 TEU	7,999	8,193	8,814	9,617	11,328	19,688	25,145	32,099
Transhipment Trade	'000 TEU	1,295	2,787	2,901	2,828	1,835	806	2,585	3,223
Direct Trade Share of Total Trade	%	86.06%	74.62%	75.24%	77.28%	86.06%	96.07%	90.68%	90.87%

Transhipment Handlings*	'000 TEU	2,590	5,575	5,801	5,655	3,670	1,611	5,170	6,446
Bangladesh									
Direct Trade	'000 TEU	333	348	355	363	371	2,587	3,029	3,471
Transhipment Trade	'000 TEU	1,576	1,972	2,196	2,436	2,683	3,276	5,841	7,583
Direct Trade Share of Total Trade	%	17.42%	14.99%	13.93%	12.97%	12.14%	44.13%	34.15%	31.40%
Transhipment Handlings*	'000 TEU	3,153	3,944	4,392	4,872	5,366	6,551	11,683	15,167

*For transhipment hubs, each import/export container to/from the feeder port is handled twice.

8c Inter Hub Group Competition

The next step comprises an assessment of the competitive positions of the major transhipment hub groups. The following hub groups have been identified:

- South Asia Hub – Colombo, Hambantota, Vizhinjam, and Colachel
- South East Asia Hub – Singapore, Tanjung Pelepas, and Port Klang
- Middle East Hub – Jebel Ali, Khalifa, and Salalah

Given the locations of the hub groups, each hub group has its own focus market. The table below presents the assumed Base Case hub group market shares for each of the key feeder regions.

Item	Unit	East India		West India		Bangladesh	
		2015	2050	2015	2050	2015	2050
South Asia Market Share	%	42.67%*	42.67%	20.21%*	20.21%	29.90%*	29.90%
South East Asia Market Share	%	47.33%	47.33%	49.79%	49.79%	-	-
Middle East Market Share	%	10.00%	10.00%	30.00%	30.00%	70.10%	70.10%

*Based on shipping line analysis in steps 1 - 7

8d Intra Hub Group Competition

In a final step, the market share of Sri Lankan ports within the South Asia Hub needs to be determined. Thereto, the following Base Case assumptions have been applied:

- No transhipment cargo is allocated to Hambantota as Colombo remains the dominant port in Sri Lanka.
- Transhipment capacity at Vizhinjam and Colachel is calculated by subtracting the direct trade capacity (as presented in step 8b) from total capacity. Due to a dominant competitive position of Colombo vis-à-vis these ports, it is assumed that transhipment demand will be restricted at Vizhinjam and Colachel. The following restrictions are assumed to reflect the dominance of Colombo:
  - For East India transhipment cargo, utilization of the combined East India transhipment capacity at Vizhinjam and Colachel will not exceed 50%.
  - For East India transhipment cargo, combined throughput at Vizhinjam and Colachel will not exceed 50% of total East India South Asia Hub transhipment demand.
  - For West India transhipment cargo, utilization of the combined West India transhipment capacity at Vizhinjam and Colachel will not exceed 60%.

- For West India transhipment cargo, combined throughput at Vizhinjam and Colachel will not exceed 60% of total West India South Asia Hub transhipment demand.
- For Bangladesh transhipment cargo, utilization of the combined Bangladesh transhipment capacity at Vizhinjam and Colachel will not exceed 50%.
- For Bangladesh transhipment cargo, combined throughput at Vizhinjam and Colachel will not exceed 50% of total Bangladesh South Asia Hub transhipment demand.

Appendix VII Summary of Sri Lanka Ports Authority Act

Sri Lanka ports Authority Act, No 51 of 1979

2. Ports to which this Act applies

(1) this Act shall apply, in, to, and in relation to, the ports of Colombo, Galle, Trincomalee, and other Port, as may be declared hereafter by the minister by Order published in the Gazette to be a Port to which this Act shall apply.

(2) the ports to, and in relation to which this act shall apply are hereafter in this act referred to as "specified Ports".

(3) The Minister may by Order published in the Gazette, from time to time, define the limits of any specified port.

(4) Until an Order is made under subsection (3) in relation to any specified port, the limits of the specified ports on the day immediately preceding the appointed date shall be the limits of the specified ports with the exclusion of

(a) the areas within limits defined for ports declared as Naval Ports under the Navy Act; and

(b) land, buildings and other properties of the Sri Lanka Customs within the limits of the specified ports.

5. Membership of the Ports Authority

~~(1) The Ports Authority shall consist of the following members :-~~

~~(a) the Chairman and five other members all of whom shall be appointed by the Minister from among persons who appear to the Minister to have wide experience in, and to have shown capacity in, port development or port operations or legal or financial matters, or shipping, commercial or engineering activities or administration or labour relations;~~

~~(b) a representative of the General Treasury nominated by the Minister in charge of the subject of Finance;~~

~~(c) the Principal Collector of Customs; and~~

~~(d) a representative of the Ministry in charge of the Minister to whom the subject of Fisheries has been assigned, nominated by such Minister.~~

~~(2) The Minister may appoint one of the members appointed under subsection (1) (a), other than the Chairman to be the Vice-chairman of the Porto Authority.~~

~~(3) The provisions of Schedule I to this Act shall have effect in relation to the Ports Authority.~~

2. Section 5 of the Sri Lanka Ports Authority Act (hereinafter referred to as the "principal enactment") is hereby repealed and the following section substituted therefor: -

5.

(1) The Ports Authority shall have a Board of Directors consisting of

(a) the Chairman and four other Directors all of whom shall be appointed by the Minister from among persons who appear to the Minister to have wide experience in, and to have shown capacity in, port development or port operations or legal or financial matters, or shipping, commercial or engineering activities or administration or labour relations;

(b) a representative of the General Treasury nominated by the Minister in charge of the subject of Finance;

(c) the Managing Director appointed under section 13;

(d) the Principal Collector of Customs: and

(e) a representative of the Ministry charged with the subject of Fisheries nominated by the Minister in charge of that subject.

(2) The Minister may appoint one of the Directors appointed under subsection (1) (a) or subsection (1) (c), other than the Chairman, to be the Vice-Chairman of the Ports Authority.

(3) The provisions of Schedule I to this Act shall have effect in relation to the Ports Authority. ",

6. Objects and duties of Ports Authority

(1) Subject to the provisions of this Act it shall be the duty of the Ports Authority

(a) to provide in any specified port, efficient and regular services for stevedoring, lighterage, shipping and transhipping, landing and warehousing of dry and wet cargo and cargo in bulk; for wharfage, the supply of water, fuel and electricity to vessels, for handling petroleum, petroleum products and lubricating oils to and from vessels and between bunkers and depots ; for pilotage and the mooring of vessels ; for diving and under-water ship repairs and for other services incidental thereto;

(b) to provide in any specified port, efficient and regular tally and protective services;

(c) to regulate and control navigation within the limits of, and the approaches to, the specified ports;

(d) to maintain port installations and to promote the use, improvement and development of the specified ports;

(e) to co-ordinate and regulate all activities within any specified port excluding the functions of the Customs;

(f) to establish and maintain on and off the coast of Sri Lanka such lights and other means for the guidance and protection of vessels as are necessary for navigation in and out of the specified ports;

(g) to perform such other duties as are imposed on the Ports Authority by this Act;

(h) to conduct the business of the Ports Authority in such manner and to make in accordance with this Act such charges for services rendered by the Authority as will secure that the revenue of the Authority Is not less than sufficient for meeting the charges which are proper to be made to the revenue of the Authority, to replace assets, make new investments and to establish and maintain an adequate general reserve; and

(i) to endeavour to manage the specified ports and each of them as a self supporting enterprise in accordance with the provisions of this Act.

(2) The services provided under paragraphs (a) and (b) of subsection (1) are hereafter in this Act referred to as " Port Services ".

(3) Subsection (1) shall not be construed as imposing on the Ports Authority, either directly or indirect, any form of duty or liability enforceable by proceedings before any court or tribunal to which the Authority would not otherwise be subject.

7. Powers of the Ports Authority

(1) Subject to this Act, the Ports Authority may exercise all or any of the following powers:-

(a) to acquire, hold, take on lease to give on lease, hire, pledge and sell or otherwise dispose of any movable or Immovable property;

(b) to employ such officers and servants as may be necessary for carrying out the work of the Authority;

(c) to do anything for the purpose of improving the efficiency of port operations and advancing the skill of persons employed by the Authority or the efficiency of the equipment of the Authority or the manner in which the equipment Is operated, including the provision by the Authority and the assistance of the provision by others, of facilities for training persons required to carry out the work of the Authority;

(d) to establish an insurance scheme, a provident fund, a welfare fund and a lines fund and to provide welfare, health and recreational facilities, houses, hostels and other like accommodation for persons employed by the Authority;

(e) to make rules in relation to the officers and servants of the Authority including their appointment, promotion, remuneration, discipline, conduct, leave, working times, holidays and the grant of loans and.

(f) to make rules and prescribe procedures in respect of the administration of the affairs of the Authority;

(g) to delegate to the Chairman or to any Director or officer of the Authority any such functions as the Authority may consider necessary to delegate for the efficient transaction of business:
(h) to establish, maintain and operate within the limits of any specified port, a security service for protecting port installations, equipment, cargo and vessels within such port and for enforcing the provisions of this Act;
(i) to acquire any undertaking affording facilities for the loading and discharging or warehousing of goods in any specified port or the bunkering of vessels in such port;
(j) to carry on the functions of builders and repairers of vessels and machinery, removers or salvagers of wrecks, ship breakers, carriers of passengers, vehicles and goods by land or sea, stevedores, wharfingers, warehousemen, lightermen, dealers in coal and other kinds of fuel, suppliers of water and stores to shipping and dealers in stores and equipment connected with, or required for, any of the aforesaid activities;
(k) to operate and maintain a rail transport system within the limits of any specified port;
(l) to control the berthing and movement of all vessels whether in the harbour or in the approaches to or alongside any quay, wharf, pier or landing place within the limits of any specified port and to divert vessels to any specified port;
(m) to enter into, and perform, directly or through any officer or agent authorised in that behalf by the Authority, all such contracts as may be necessary for the performance of the functions and the exercise of the powers of the Authority ;
(n) subject to this Act, to levy such port dues, fees and other charges upon vessels, goods, vehicles and in respect of services within the limits of any specified port and upon cargo loaded, discharged or kept in such port as it may deem necessary ;
(o) to construct, maintain and operate all means and appliances for berthing, loading and dismooring within any specified port;
(p) to provide and use, within the territorial waters of Sri Lanka or otherwise, vessels and appliances for the purpose of protecting, guiding and communicating with vessels or towing and rendering assistance to any vessel or for recovering any property lost, sunk or stranded ;
(q) to provide such fire services both within any specified port and on the high seas, as may be deemed necessary by the Authority for the purpose of extinguishing fires on land, on sea or afloat and of preserving life and property;
(r) to appoint, license and regulate weighters and measurers and surveyors of goods within any specified port;
(s) to arrange for insurance of goods in the premises of the Authority;
(t) subject to this Act, to borrow money (whether by way of overdraft or in any other manner) from any person, organisation or institution within or outside Sri Lanka or from the Government;
" (tt) to guarantee, with the consent of the Minister given with the concurrence of the Minister in charge of the subject of Finance, the repayment of any loan given by any person, firm, corporate body, organization or institution within or outside Sri Lanka, to any person, firm, corporate body, organization or institution in which the Ports Authority has an interest, or the performance of the obligations of any person, firm, corporate body, organization or institution in which the Ports Authority has an interest; ".
(u) to control the use of, and to issue licences in respect of all craft, equipment, vehicles and services that are operated within the limits of any specified port;
(v) to survey, plan and execrate maritime engineering works for Government departments, public corporations and for other bodies approved by the Minister;
(w) to clean, deepen or improve any portion of any specified port and, for any of such purposes to construct, maintain and operate dredgers and other appliances and to make hydrographic surveys;
(x) to reclaim, enclose, raise, drain and excavate any area falling within the limits of any specified port or belonging to the Authority;

(y) to maintain, repair, erect, cause to be erected and to control the erection and use of piers, breakwaters, bridges, wharfs, docks, warehouses, stores, offices, shops, dwellings and any other buildings or works within the limits of, or the approaches to, any specified port and to install and maintain coast lights and other means of protecting and guiding vessels;
(z) to provide or cause to be provided, the following services within the limits of, and the approaches to, any specified port:
(i) the berthing, towing, mooring, moving, slipping or docking of any vessel including pilotage;
(ii) the loading or discharging of any vessel including all ancillary services;
(iii) the sorting, weighing, measuring, storing, were housing or otherwise handling of any goods;
(iv) radio communication between the specified ports and between ships and such ports;
(v) transport services and other facilities for port users and for employees of the Authority;
(vi) the handling of petroleum, petroleum products and lubricating oil to and from vessels and between all depots and bunkers.;
(vii) the supply of electricity and telephone services to vessels;
(viii) the disposal of garbage from ships; and
(ix) tally and protective services;
(aa) to construct, manufacture, purchase, operate, maintain and repair anything required for the purposes of the business of the Authority.-;
(ab) to co-ordinate and execute any Government project relating to the establishment of a free trade zone in any specified port and to enter into any agreement with port users for the utilization of such facilities;
(ac) to control the entry of vehicles, persons, goods and animals within the limits of any specified port and to regulate their movements within such limits;
(ad) to engage in such other activities, and do such other things as appear to the Authority to be beneficial, necessary or convenient for it to carry on, for or In connection with the exercise, performance and discharge of its powers, functions and duties under this Act; and
(ae) to do all other things which, in the opinion of the Authority, are necessary for carrying on its business.
(2) The provisions of subsection (1) shall not be construed as authorising the disregard by the Ports Authority of any law for the time being in force.

8. Powers of the Minister in relation to the Ports Authority
(1) The Minister may give the Ports Authority general or special directions in writing as to the performance of its duties and the exercise of its powers under this Act on matters which appear to him. to affect the national interest and the Authority shall give effect to such directions.
(2) The Minister may, from time to time, direct the Ports Authority in writing to furnish to him, in such form as he may require, returns, accounts and other information with respect to its property and business, and the Authority shall carry out every such direction
(3) The Minister may, from time to time, order all or any of the activities of the Ports Authority to be investigated and reported upon by such person or persons as he may specify, and upon such order being made, the Authority shall afford all such facilities and furnish all such information, as may be necessary to carry out the order.

10. delegation of power by Chairman to employees
(1) The Ports Authority may delegate in writing to the Chairman any of its powers, duties or functions under this Act or any other written law.
(2) The Chairman may, with the written approval of the Ports Authority delegate in writing to any employee of the Ports Authority any of his powers, duties or functions.

Insertion of new section 14A in the principal enactment. [8,7 of 1984]

8. The following new section is hereby inserted immediately after section 14 of the principal enactment, and shall have effect as section 14A of that enactment:

14A.

(1) The Ports Authority shall appoint a Harbour Master and such number of Deputy Harbour Masters as are necessary for the purpose of giving effect to the principles and provisions of this Act.

(2) In any written law any reference made to the Master Attendant shall be deemed to be a reference to the Harbour Master. ".

22. Service to the Ports Authority to be regarded as service to the Government for the purpose of contracts to serve the Government

Where any person has entered into a contract with the Government by which he has agreed to serve the Government for a specified period, any period of service to the Ports Authority by that person, shall be regarded as service to the Government for the purpose of discharging the obligations of such contract.

Insertion of new section 22A in the principal enactment. [13, 7 of 1984]

13. The following new section is hereby inserted immediately after section 22 of the principal enactment, and shall have effect as section 22A of that enactment:-

22A. Where the services of any employee of the Ports Authority are to be terminated on any ground other than that of misconduct, notice of such termination shall be given by the Ports Authority to such employee at least one month before the date of such termination or one month's salary or wages shall be paid to him by such Authority in lieu of such notice. ".

23. Transfer of property held by the Colombo Port Commission and of the Port (Cargo) Corporation and the Port Tally and Protective Services Corporation to the Ports Authority

(1) With effect from the appointed date, all property movable and immovable (including money) held by the Colombo Port Commission and all property, movable and immovable (including money in the funds) of the Port (Cargo) Corporation and the Port Tally and Protective Services Corporation, including all assets, powers, rights. interests and privileges of the Colombo Port Commission, the Port (Cargo) Corporation, and the Port Tally and Protective Services Corporation, subsisting on the day immediately preceding the appointed date shall be transferred to and shall vest in the Ports Authority.

(2) Upon such transfer, all debts, liabilities and obligations in connection with or appertaining the property referred to in subsection (1) of the Colombo Port Commission, the Port (Cargo) Corporation and the port Tally and Protective Services Corporation shall also be transferred to, and deemed to have been incurred the Ports Authority.

Replacement of section 23 of the principal enactment. [14, 7 of 1984]

14. Section 23 of the principal enactment is hereby repealed and the following section substituted therefor:

23.

(1) With effect from the appointed date, all State land within the Ports of and of the Port Colombo, Galle and Trincomalee, all State land at any other place held or administered by the Port Commissioner, all movable property (including money) held or possessed by the Port Commissioner and all property movable and immovable (including money in the funds) of the Port (Cargo) Corporation, and the Port Tally and Protective Services Corporation including all assets, powers, rights, interests and privileges of the Port Commissioner, the Port (Cargo) Corporation and the Port Tally and Protective Services Corporation, subsisting on the day immediately preceding the appointed date, shall be transferred to and vest in the Ports Authority.

(2) Upon such transfer, all debts, liabilities and obligations in connexion with or appertaining to the property of the State, of the Port Commissioner, the Port (Cargo) Corporation and the Port Tally and Protective

Services Corporation referred to in subsection (1) shall also be transferred to, and deemed to have been incurred by, the Ports Authority. ".

24. Power of the Minister to vest Land of the Republic in the Ports Authority

(1) Notwithstanding anything in the Crown Lands Ordinance or any other written law, where the Minister considers that any land of the Republic is required by the Ports Authority for the purposes of its functions the Minister may, with the concurrence of the Minister in charge of the subject of Lands, by Order (hereafter in this Act referred to as a. "Vesting Order") Published in the Gazette, vest such land in the Authority with effect from such date as shall be specified in the Order, subject to such restrictions or conditions, if any, as may be so specified.

(2) A Vesting Order shall, subject to such restriction and conditions as may be specified in the Vesting Order, have the effect of giving the Ports Authority absolute title to any land specified therein free from all encumbrances.

25. Acquisition of private lands under the Land Acquisition Act for the Ports Authority

(1) Where any immovable property, other than the property of the Republic, is required for the purpose of the business of the Ports Authority and the authority is unable, by agreement to purchase such property, that property may, if the Minister by Order published in the Gazette approves its acquisition, be deemed to be needed for a public purpose and be acquired under the Land Acquisition Act and be transferred to the Ports Authority under that Act

(2) Any sum payable for the acquisition of any immovable property under the Land Acquisition Act by the Ports Authority shall be payable by the Authority

27. Exemption from taxes

The Minister, with the concurrence of the Minister in charge of the subject of Finance, may provide for the exemption from any licence fees or taxes, of any equipment belonging to the Authority, that is used exclusively within the limits of any specified port.

29. The Fund of the Ports Authority

(1) The Ports Authority shall have its own Fund. All receipts of the Ports Authority shall be paid into that Fund and all payments made by the Ports Authority shall be paid out of the Fund.

(2) Subsection (1) shall not restrict in any way the Ports Authority from maintaining separate accounts for its different activities and enterprises.

30. Transfer of certain moneys and other assets to the Ports Authority and grants by the Government to the Ports Authority

(1) Notwithstanding anything to the contrary in any other written law-

(a) the balance lying to the credit of the Colombo Port Commission on the day preceding the appointed date out of the sums voted by Parliament for the expenditure of that Commission under the Appropriation Act, No. 18 of 1978;

(b) the value of all warehouses, transit sheds, oil installations, port railways, residential buildings, equipment and movable property, held by the Colombo Port Commission on the day immediately preceding the appointed date, as agreed between the Ports Authority and the Deputy Secretary to the Treasury; and

(c) the balance outstanding out of all loans granted by the Government to the Port (Cargo) Corporation and the Port Tally and Protective Services Corporation out of voted expenditure together with the amount of interest due on the day immediately preceding the appointed date,

(2) There may be granted from time to time to the Ports Authority, by resolution of Parliament from the Consolidated Fund, such sums of money and on such terms as may be determined by the Minister in charge of the subject of Finance in consultation with the Minister.

31. Ports Authority Stock

(1) The Ports Authority may create and issue any stock required for the purpose of exercising the borrowing powers of the Authority and the stock so created and issued shall be referred to as " Ports Authority Stock."

(2) Ports Authority Stock shall be issued, transferred, dealt with, redeemed and cancelled in accordance with such terms as may be determined by the Ports Authority with the approval of the Minister, given with the concurrence of the Minister in charge of the subject of Finance.

32. Government guarantee

(1) The Minister in charge of the subject of Finance may with the concurrence of the Minister guarantee the repayment of the principal of, and the payment of the interest on, any Ports Authority Stock created and issued under sector 31 (1) or any other loan from any person, organisation or institution in or outside Sri Lanka.

(2) Any sum required for the fulfilment of a guarantee provided under subsection (1) may with the prior approval of Parliament, be paid out of the Consolidated Fund.

(3) Any sum paid out of the Consolidated Fund in fulfilment of a guarantee provided under subsection (1) shall be repaid, together with interest thereon, at such rate as the Minister in charge of the subject of Finance may determine with the concurrence of the Minister, by the Ports Authority in such manner and over such period as the Minister in charge of the subject of Finance may with such concurrence determine.

(4) Immediately after any guarantee is given under subsection (1) the Minister in charge of the subject of Finance shall lay or cause to be laid, a statement of the guarantee before Parliament.

(5) Where any sum is paid out of the Consolidated Fund in fulfilment of a guarantee provided under subsection (2), the Minister in charge of the subject of Finance shall forthwith lay or cause to be laid a statement of the guarantee before Parliament.

33. Application of the provisions of the Finance Act No. 38 of 1971

Unless otherwise specially provided for by this Act, the provisions of Part II of the Finance Act, No. 38 of 1971, shall, 'mutatis mutandis, apply to and in relation to the financial control of the Ports Authority.

34. Financial year

The financial year of the Posts Authority shall be the calendar year.

35. Exemption from Customs duty

Notwithstanding anything to the contrary in any other written law, the Principal Collector of Customs, if he is satisfied that it should be in the interests of the national economy, may, with the sanction of the Minister in charge of the subject of Finance, waive the Customs duty on any plant, machinery and other equipment imported by the Ports Authority for any of its purposes.

36. Port services in specified ports

With effect from the appointed date all port services in any specified port shall be provided exclusively by the Ports Authority or, in exceptional circumstances, on a direction by the Minister, by any person authorised by the Ports Authority.

37. Charges for services

(1) The charges that may be levied by the Ports Authority for the services provided by the Authority shall be fixed, and may be revised from time to time, by the Authority with the approval of the Minister who shall, before giving his approval, consult the Minister in charge of the subject of Finance.
(2) Until the charges are fixed under subsection (1) the charges leviable for services by the Principal Collector of Customs, the Port Commissioner, the Master Attendant of any specified port, the Port (Cargo) Corporation and the Port Tally and Protective Services Corporation on the day immediately preceding the appointed date shall be the charges for the respective services rendered by the ports Authority.
(3) The Ports Authority may, in the interests of the national economy, by resolution, and with the approval of the Minister, remit the whole or any portion of the charges leviable under this section.

38. Recovery of charges in arrears
(1)
(a) The Ports Authority shall, in respect of charges which have not been paid on any goods, have a lien on such goods and shall be entitled to seize and detain such goods until the charges are fully paid, provided that the Principal Collector of Customs has no claim on such goods as goods seized or forfeited or goods liable to such seizure or forfeiture under the Customs Ordinance.
(b) Where the Principal Collector of Customs has a claim on goods seized and detained by the Ports Authority for non-payment of Ports Authority charges, the Principal Collector of Customs shall take charge and dispose of such goods or transfer such goods to a Customs warehouse within thirty days of such goods being landed in the transit warehouse:
(2) The lien referred to in subsection (1) shall have priority over all other claims and lien except claims for money payable to the Government.
"(3) Charges in respect of goods to be landed, shall become payable immediately on the landing of the goods, or within such time whether before or after the landing of the goods as may be determined by the Ports Authority.
(4) Charges in respect of goods to be shipped, shall be payable before the goods are shipped or within such time after the goods are shipped as may be determined by the Ports Authority.
(5) Charges in respect of goods to be removed from the premises of the Ports Authority shall be payable on demand before the goods are removed from the premises or within such time after the goods are removed from the premises as may be determined by the Ports Authority."

43. Arrangements between the Ports Authority and the Principal Collector of Customs
(1) The Ports Authority shall not deliver any cargo to the consignee or his agent or ship any cargo until Customs clearance documents in respect of such cargo are produced.
(2) The Ports Authority and the Principal Collector of Customs may enter into any such agreement or arrangement as they think fit to provide for, or to facilitate, the assessment, collection and recovery of charges and for the speedy loading and unloading of vessels in the specified ports.

45. Limitation of the Ports Authority's liability for loss, damage or injury
The Ports Authority shall not be liable for any loss, damage or injury caused to any property or person within the limits of any specified port unless such loss, damage or injury is caused by the negligence or wrongful or unlawful act of that Authority or any of its employees or agents acting within the scope of his employment.

47. Maximum liability
Notwithstanding anything in this Act or in any other written law, the Ports Authority shall not be liable to pay In respect of any loss or damage referred to in section 46, an amount in excess of five hundred rupees per package or unit unless the nature and value of the goods contained therein have, prior to the delivery to the Authority been declared in writing by the person delivering or causing the same to be delivered ;

Provided, however, that the Authority shall not be liable therefor where the value of any such goods has been misstated.

48. Limitation of liability in respect of one occasion

The limitation of liability under this Part shall relate to the whole of any losses and damages which may arise upon any one distinct occasion, although such losses or damages may be sustained by more than one person, and shall apply whether the liability arises at common law or under written law and notwithstanding anything contained in such written law.

49. Power of Courts to consolidate claims Where any liability is alleged to have been Incurred by the Ports Authority in respect of loss of life, personal injury, or loss of, or damage to vessels, trains, vehicles or other goods whatsoever and several claims are made or apprehended in respect of that liability, the Authority may apply to the District Court of Colombo which, notwithstanding anything to the contrary in any other law, is hereby vested with jurisdiction to hear and determine that application and that Court may determine the amount of the liability of the Authority and may distribute that amount rateably among the several claimants and may stay any proceedings pending in any other court relating to the same matter and may proceed in such manner and subject to such directions, as to making persons interested parties to the proceedings, and as to the exclusion of any claimants who had not come in within a prescribed time, and as to requiring security from the Authority and as to payment of any costs, as such Court thinks fit.

50. Ports Authority not liable for loss or damage for dredging within prescribed limits

(1) The Ports Authority may with the approval of the Minister, by notification published in the Gazette prescribe the limits within which and the levels to which dredging may be carried out by the Authority within any specified port and the approaches thereto.

(2) The Ports Authority shall not be liable for any loss or damage whatsoever to any sea or river -wall, wharf, dock or other property arising out of any dredging by the Authority within the limits and the levels so specified.

51. Ports Authority may accept goods as well as liability for loss, destruction or damage in certain circumstances

This Part shall not preclude the Ports Authority from accepting goods for storage as well as liability for any loss, destruction or damage to, goods so accepted for storage.

57. Evasion of dues, rates and charges

(1) Any master, owner or agent of any vessel or any owner of any goods who, by any means whatsoever, evades or attempts to evade any dues, rates or charges leviable under this Act, shall be guilty of an offence and shall be liable on conviction by a Magistrate to a fine not exceeding two thousand rupees, or to imprisonment for a term not exceeding six months or to both such fine and imprisonment, and shall in addition be liable to pay to the Ports Authority as penalty an amount which is double the amount of the dues, rates or charges he evaded or attempted to evade.

(2) The tender to, or the acceptance by, the Ports Authority or any of its officers of any dues, rates or charges which have been previously evaded or left unpaid, shall not release or discharge any person from any liability for any damages or penalty consequent upon such evasion or non- payment.

63. Liability of the directors and certain officers of a body of persons for offences committed by that body

Where an offence under this Act is committed by a body of persons then

(a) if that body of persons is a body corporate, every person who at the time of the commission of the offence was a director, general manager, secretary or other similar officer of that body; or
(b) if that body Is not a body corporate, every person at the time of the commission of the offence was a member of that body.
shall be deemed to be guilty of that offence, unless he proves that the offence was committed without his consent or connivance and that he exercised all such diligence to prevent the commission of that offence as he ought to have exercised having regard to the nature of his functions and in all the circumstances. C

64. Fines when recovered to be paid to the fines fund
All fines imposed for any offence under this Act or any regulation or rule made thereunder shall when recovered, notwithstanding the provisions of any written law to the contrary, be paid into the fines fund of the Ports Authority.

67. Regulations
(1) The Minister may make regulations in respect of matters required by this Act to be prescribed or in respect of which regulations are authorized to be made and in particular in respect of all or any of the following matters:-
(a) the allocation of the berths and stations to be occupied by vessels, and the removal of vessels from any berth, station or anchorage, and the time within which such removal shall be effected;
(b) the manner in which, and the conditions subject to which, the loading and discharging of vessels shall be carried out, and the changing of the position of vessels loading or discharging;
(c) the keeping of free passages of such width as is deemed necessary within the limits of any specified port and along or near, the wharfs, docks, moorings and other similar works in or adjoining the same and the marking out of the places to be kept free;
(d) the anchoring, fastening, mooring, unmooring and warping of all vessels, and the use of their motive power, warps, moorings, buoys, chains and other equipment and the granting of permission on such conditions as the Ports Authority may deem fit, for the keeping or placing of, private moorings or buoys;
(e) the regulation of traffic ashore, afloat and in the air, the prevention of obstruction and the keeping of order on wharfs and in the harbour and the ensuring of the safety in the port premises of any cargo thereon, port works and equipment;
(f) the regulation of the use of fires and light and illuminations and the signals to be used or measures to be taken in case of fire ;
(g) the enforcement and regulation of the use of navigation lights, signals and signal lights by vessels and the steps to be taken for avoiding collision by vessels navigating in the waters of any specified port or the approaches thereto ;
(h) the information to be supplied by the masters, owners or other persons in charge of vessels in respect of the arrival and departure of vessels, and of goods loaded or discharged at the wharfs and premises of the Ports Authority, and the time and manner in which such information shall be supplied;
(i) the regulation of the use by vessels of whistles, sirens and other like instruments;
(j) the prohibition of chipping, scaling, noisy work or underwater repairs on vessels or the breaking up of vessels except at such places and at such times and by such persons as may be specified;
(k) the safe and convenient use of the wharfs, docks and premises vested in the Ports Authority or under its control, and of any ferry services maintained or controlled by the Authority;
(l) the arrangements and the conditions relating to the reception, storage and removal of goods within and from the premises of the Ports Authority and the prescribing of the procedure to be followed in respect of the taking charge of goods which have been damaged before landing or alleged to have been so damaged;
(m) the loading, discharging and storage of dangerous goods within the limits of any specified ports, the classification of goods as dangerous goods and the regulation of navigation and the place of berthing of vessels carrying dangerous goods;

(n) the regulation of the mode of stowing and keeping dangerous goods on board vessels carrying dangerous goods within any specified port;
(o) the prohibition or the restriction of the conveyance of any kind of dangerous goods with any other kind of goods or articles on vessels within any specified port;
(p) the handling of petroleum, petroleum products and lubricating oil to and from vessels and between depots and bunkers in or around any specified port;
(q) the regulation and issue of licences to organisations or individuals who provide engineering, surveying, ship candling, ship repairing, clearing, forwarding and similar services in any specified port;
(r) the establishment and administration of a provident fund with the concurrence of the Minister in charge of the subject of Labour, a reward fund and a fines fund;
(s) the prevention of theft of, pilferage of or damage to, or the commission of nuisance on, any property owned, used or being handled by the Ports Authority;
(t) the safety of employees of the Ports Authority and of port users in any specified port;
(u) the prevention of damage to or pollution of premises of the Ports Authority and the pollution of the water in the harbours of any specified port:
(v) the establishment and operation of ports security service to protect cargo, equipment and property of the Ports Authority to assist in. maintaining law and order within the premises of specified ports and to enforce the provisions of this Act;
(w) the loading, unloading and transhipment of cargo, including tallying;
(x) the regulation of the entry of persons and vehicles, and goods to and the regulation of their movement within specified ports.
(2) Every regulation made by the Minister shall be published in the Gazette and shall come into operation on the date of such publication or on such later date as may be specified in the regulation.
(3) Every regulation made by the Minister shall, as soon as convenient after its publication in the Gazette, be brought before Parliament for approval
(4) Any regulation which is not so approved, shall be deemed to be rescinded as from the date of disapproval but without prejudice to anything previously done thereunder.
(5) The date on which any regulation shall be deemed to be rescinded shall be published in the Gazette.

68. Rules made by the Ports Authority
(1) The Ports Authority may make rules in respect of till or any matters for which rules are authorised or required by this Act to be made.

71. Ports Authority may create and maintain a ports security service
The Ports Authority may establish and maintain a ports security service within the limits of any specified Port,

27. The following new sections are hereby inserted immediately after section 71 of the principal enactment, and shall and have effect as sections 71 A, 71B, 71C and 71D, of that enactment:

71A.
(1) It shall be lawful for any member of the ports security service to detain within the area of the Ports Authority
(a) any person who commits an offence under this Act or any regulation or rule made thereunder;
(b) any person against whom reasonable suspicion exists that he is about to commit or is guilty of an offence;
(c) any person against whom reasonable suspicion exists that he has aided or abetted the commission of any offence under this Act or any regulation or rule made thereunder;
(d) any person having in his custody or possession without lawful excuse any instrument for housebreaking or being armed with any dangerous or offensive weapon or any document that could be used for the unauthorized removal of any cargo which is in the custody or possession of the Ports Authority;

(e) any person in possession of goods reasonably suspected to be the property stolen or fraudulently obtained and who may reasonably be suspected to have committed an offence under this Act or any regulation or rule made thereunder:
(f) any person who is committing an offence within the premises or area of the Ports Authority or being an offence in respect of which a person may be arrested without a warrant, within the meaning of section 32 of the Code of Criminal Procedure Act;
(g) any person who is committing theft of, or damage to, any property belonging to or in the possession of the Ports Authority;
(h) any person who is found within the premises or area of the Ports Authority in circumstances which provide reason to believe that such person has committed or is about to commit theft of, or damage to. any property belonging to or in the possession of the Ports Authority; or
(i) any person found taking precaution to conceal his presence.
(2) Any person detained under subsection (1) shall, unless released, be forthwith handed over to the nearest police station to be dealt with according to law.
(3) It shall be lawful for any officer of the ports security service to search any person or his belongings or any conveyance within the premises of the Ports Authority whom he has reason to believe to be the person who has committed an offence or is about to commit an offence:
71B. It shall be the duty of every member of the ports security service -
(a) to protect and safeguard the property of the Ports Authority and ensure the safety of navigation in any specified port;
(b) to use his best endeavours and ability to prevent all crime, offences, breaches of law and nuisance affecting the property of the Ports Authority;
(c) to apprehend disorderly and suspicious persons within the premises or area of the Ports Authority;
(d) to do any other thing which is necessary or which is required or ordered to protect and safeguard the property of the Ports Authority.
71C. In all cases of fire or any other calamity occurring within the Ports Authority, every member of the ports security service on duty within such premises, shall take steps to protect the persons and property endangered thereby.
71D. It shall not be lawful for any member of the ports security service to resort to strike action

73. Bonded warehouse
(1) Where any warehouse of the Ports Authority is approved, and appointed as a bonded warehouse under any written law for the time being in force, the Authority shall give such security as is required, in that written law for the payment of such import duty as is payable in respect of the goods stored in such bonded warehouse or for the due exportation of such goods.
(2) Where such security has been given by the Ports Authority further security shall not be required by the Government or any other person to the same effect.
(3) Any person being or having the powers of, a revenue officer under any written law fur the time being in force shall, for the performance of his duties at all times be admitted to all parts of any specified port including those parts of the premises approved and appointed as a bonded warehouse, and he shall be permitted to inspect the books kept in connection therewith and the stocks therein.

74. Contracts of the Ports Authority
The Ports Authority may in accordance with such rules as may be made by the Authority enter into such contracts as are necessary for the discharge of its functions, and in the case of contracts for the supply of goods or material or for the execution of works, such rules shall-
(a) as far as is practicable and except as otherwise therein provided, require that notice of the intention to enter into such contracts shall be published and tenders invited; and
(b) specify the manner in which such notice shall be published and tenders invited:

Provided that a person entering into a contract with the Ports Authority shall not be bound to inquire whether such rules have been complied with, and all such contracts, if otherwise valid, shall have full force and effect notwithstanding that the rules applicable thereto have not been complied with.

75. Powers of companies &c. to enter into contracts with the Ports Authority

Any company or other body of persons may, notwithstanding anything to the contrary in any written law or instrument relating to its functions, enter into and perform all such contracts with the Ports Authority as may be necessary for the exercise of the powers and performance of the duties of the Authority.

78. Powers to enter upon lands

Any person who is an employee, agent or contractor of the Ports Authority may, if so authorised by the Authority, enter, after sufficient notice at all reasonable hours of the day into or upon, any building or land for the purpose of making any survey or inspection or of executing any work required to be made or executed for the purposes of this Act. Such person shall not be liable on account of such entry or on account of anything done bona fide in any part of such building or land which is necessary in the execution -of his duties in pursuance of this Act,

87. The provisions of this Act to be in addition to provisions of Customs Ordinance

The provisions of this Act shall be construed to be in addition to and not in derogation of the provisions of the Customs Ordinance,

88. The provisions of this Act to bind the Republic

The provisions of this Act shall apply to and shall blind the Republic or any Department of the Government,

89. Interpretation

In this Act, unless the context otherwise requires

" beacon " means any light, mark or sign used as an aid to navigation, other than a lighthouse or buoy;

" buoy" includes any floating light, mark or sign used as an aid to navigation, other than a lighthouse;

" charges " include charges, rates, fees and dues of every description which the Ports Authority is, for the time being authorised to demand, take and recover and

" charge " shall be construed accordingly;

" dangerous goods" include aquafortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitro glycerine, petroleum, carbide of calcium and any explosive within the meaning of the Explosives Act;

" goods " include animals, carcases, baggage and any other movable property of any kind whatsoever;

" land " includes land covered by water and any interest in land;

"local authority" means any Municipal Council, Urban Council, Town Council or Village Council and includes any Authority created and established by or under any law to exercise, perform and discharge powers, duties and functions corresponding to or similar to the powers, duties and functions exercised, performed and discharged by any such Council;

"master" includes every person, except a pilot having for the time being the command, charge or control of any vessel;

"owner" when used in relation to goods, includes any consignor, consignee, shipper or agent of the owner for the sale, custody, loading, handling, discharge or delivery of such goods; and when used in relation to any vessel, includes any part-owner, charterer or operator thereof or any duly authorised agent of any such person;

"Port (Cargo) Corporation" means the Port (Cargo) Corporation established by the Port (Cargo) Corporation Act, No. 13 of 1958;

"Port Commissioner" means the Port Commissioner appointed under the Port of Colombo (Administration) Act and includes any officer acting under the authority in writing of such Port Commissioner;

" port premises " means the landing places and all other works and land at any time vested in, belonging to or administered by the Ports Authority;

" Port Tally and Protective Services Corporation " means the Port Tally and Protective Services Corporation established by the Port Tally and Protective Services Corporation Act, No. 10 of 1967;

" stevedoring " means the operations connected with the loading, discharging, shipping, transhipping and storage of cargo in the holds of, or on board, any vessels;

" tallying and protecting services " means tally and watchmen and other protective services performed by persons employed on board a ship or ashore in the interest of the owner, agent or master of the ship and includes receipt keepers, assistant receipt keepers, supervisors, plan clerks and pier clerks;

"transit shed" includes all buildings, yards and other places owned or occupied by the Ports Authority and appropriated by the Authority for the landing and shipping of goods and any foreshore so owned or occupied and used for such purposes, but shall not include any portion of the foreshore or other places not so owned or occupied;

" vessel" includes any ship or boat or any other description of vessel used in navigation; and "wharf" includes a quay, pier, jetty or other landing place.

Source: http://www.commonlii.org/lk/legis/num_act/slpaa51o1979355/

Appendix VIII Labour force

S R I L A N K A P O R T S A U T H O R I T Y

All Employee Strength as at 16-January-2017

Port/Division/Section	Permanant	Temporary	Probation	Permanant Trainee	Contract	Others	Total
Chairman Office	0	0	0	0	4	0	4
Communication & Public Relations	58	0	0	0	2	0	60
Contracts & Design	84	0	0	0	2	1	87
Engineering (Administration)	1	0	0	0	0	0	1
Engineering (Civil)	720	0	0	0	0	0	720
Engineering (Electrical & Electronics)	392	0	0	0	0	0	392
Engineering (Marine)	401	0	0	0	0	0	401
Engineering (Mechanical Plant)	563	0	0	0	0	0	563
Engineering (Mechanical Works)	249	0	0	0	0	0	249
Finance	347	0	0	0	0	0	347
Galle	348	0	0	0	0	0	348
Human Resource	201	0	0	0	0	0	201
Information Systems	96	0	0	6	2	0	104
Internal Audit	84	0	0	0	0	0	84
Legal	26	0	0	0	1	0	27
Logistics	643	0	0	0	0	0	643
Mahapola Training Institute	104	0	0	0	0	0	104
Marketing & Business Development	7	0	0	0	0	0	7
Medical	68	0	0	0	0	0	68
Navigation	773	0	0	0	0	0	773
Operations	2361	0	0	0	0	1	2362
Planning & Development	31	0	0	0	1	0	32
Secretariat	163	0	0	0	13	0	176
Security	1082	0	0	0	1	0	1083
Southern Port Development	38	0	0	0	11	0	49
Supplies	160	0	0	0	0	0	160
Trincomalee	403	0	0	0	0	0	403
Welfare & Industrial Relations	171	0	0	0	6	0	177
Total	**9574**	**0**	**0**	**6**	**43**	**2**	**9625**

Appendix IX Feedback from Stakeholders Workshop

Following email was received in follow-up to the stake holders workshop held in March 2019.
Begin forwarded message:
From: Dhanapala Godage
Date: March 10, 2019 at 6:04:38 PM GMT+5:30
To: Abeysiriwardena A A S R, Hussain F M
Subject: National Port master Plan.

Dear Susantha,

Thanks for inviting to the Workshop where for the first time I saw the National Forecast for Containers as presented.
As I indicated at the meeting the forecast from 2019 on wards seem to be at a lower level. I think Romesh David also raised this. I am not seeking you to revise your forecast but wish you note my comments for future reference. Answer given was Cabotage Rules relaxation, Vizhinjam Adani Port coming up. Vizhinjam has been talked for over 15 years now it seems that the operation has been delayed up to Oct 2020. Yet can it give a dent to our traffic so soon. When Scott Wilson SH Business Plan traffic forecast was made these were looked at. I feel that forecast will hold ground and will reach over 10 Million in 2025.
Present forecast seem to justify delayed ECT! and ECT will not happen by 2021?
Outcome of Research - Urgent need of ECT. Colombo is the most economical gateway to the ISC in terms of cost & time.

Our forecast suggests terminal 2 (ECT) operational by 2019 and terminal 3 by 2026. These dates matching the Mater Plan. Good.

Hear this also. JCT 1& 2 completed by 1988 and volume jumped from 100,000 TEUs to 600,000. and World Bank reported May 1988 ….SLPA is a success story. But indecision from then up to 1992 kept volume stagnant near 600,000.
JCT 3 & 4 came up by 1998 and volume jumped to 1,700,000 and World rank to 21st.
Again stagnant without expansion at 1998 and port congestion appeared, about 12 hrs to get a berth sometimes a day or more. Competing ports emerged PTP, Kelang, Salalah, Aden were some. World Bank warned and suggested privatization. Lloyd`s List (1998)reported "Colombo fights to retain container traffic." Port of Salalah opens and so on.
After stagnation for over 5 yrs near 1,700.000 TEUs, privatization came and SAGT appeared. Volume increased, but again no expansion until 2011 with CSH major harbor infrastructure and CICT.

Vallarpadam Cochin with Dubai Ports was another threat where our shipping community shivered. Cochin Port Trust Chairman reported in Exim News Service in Sept 2006 that Cochin Port racing ahead to wean away Colombo`s transshipment cargo. In a few years , Cochin Port is set to give Colombo hub a run for its money. Did we suffer!
Another subject. When we made the 2005 forecast the published data of Indian Ports Association was analyzed. I recall about 28% Indian traffic was coming here. When I looked at 2007/8 data , India had 6.710 Mn TEUs of which about 26% was Transshipment. Of the Tr 35.8% came to Colombo and 30.5% to S`pore. So an improvement.
Again transshipment numbers had gone up in 2016/17 and contribution to Colombo 42% while S`pore 17%.
Good to do some research by statistics people.
Best regards.
Godage.

Appendix X Road map for logistics

ACTIVITIES	*Period*	Short Term	Medium Term	Long Term
SHORT TERM		**next year**	**next 2-3 yaers**	**>5 years**
Increase MCC warehousing capacity in the Port of Colombo				
Improve the administrative documentation				
Improve customs related procedures				
Digitalisation of licenses				
Ensure E-payment is allowed for all services				
Create port community system				
Full electronic processing by Customs E-declaration, E-clearance, E-Payments				
Customs to develop AEO scheme				
Improve efficiency on container scanning				
Implement electronic gate pass				
Transfer MCC warehousing from BQ to new location				
Remove MCC and dangerous goods storage from BQ				
Prepare for Bloemandhal area to develop warehouses and logistics				
Install automation solutions (warehouse software)				
Prepare for warehouse software to be connected to the port community system				
Facilitate improvements on Free trade zones and investment incentives				
Formulate dry port action plan including defining strategically located land plots				
Ensure skilled labour for warehouse division				
MEDIUM TERM				
Establish modern warehouse facilities at Bloemandhal area.				
Close warehouse IV and V and move to Bloemandhal area				
Establish port community system for warehouse goods				
Full electronic processing				
Assign new areas for logistics in the neighbourhood of ports				
Improve ease of doing business through collaboration with authorities				
Prepare for land acquisition to become landlord on the dry ports				
Prepare for green policies for logistics				
LONG TERM				
Improve warehouse part of the port community system				
Establish additional dry ports in line with formulated strategy and demand				
Improve the green factor of logistics				

Appendix XI IMO conventions and ratifications

The overview of IMO conventions is displayed in next graphic (situation as per June 2018). It can be noted that Sri Lanka as nation is poorly ratifying the conventions. Even African countries like Gahan score better. The gap with EU member states, Cananda and the US is rather large.

NIRAS

mtbs

As at 12/06/2018	IMO Convention 48	SOLAS Convention 74	SOLAS Protocol 78	SOLAS Protocol 88	SOLAS Agreement 96	LOAD LINES Convention 66	LOAD LINES Protocol 88	TONNAGE Convention 69	COLREG Convention 72	CSC Convention 72	CSC amendments 93	SFV Protocol 93	Cape Town Agreement 2012	STCW Convention 78	STCW-F Convention 95	SAR Convention 79	STP Agreement 71	Space STP Protocol 73	IMSO Convention 76	INMARSAT OA 76	IMSO amendments 2006	IMSO amendments 2008	FACILITATION Convention 65	MARPOL 73/78 (Annex I/II)	MARPOL 73/78 (Annex III)	MARPOL 73/78 (Annex IV)	MARPOL 73/78 (Annex V)	MARPOL Protocol 97 (Annex VI)	London Convention 72	London Convention Protocol 96	INTERVENTION Convention 69	INTERVENTION Protocol 73	CLC Convention 69	CLC Protocol 76	CLC Protocol 92	FUND Protocol 76	FUND Protocol 92	FUND Protocol 2003	NUCLEAR Convention 71	PAL Convention 74	PAL Protocol 76	PAL Protocol 90	PAL Protocol 02	LLMC Convention 76	LLMC Protocol 96	SUA Convention 88	SUA Protocol 88	SUA Convention 2005	SUA Protocol 2005	SALVAGE Convention 89	OPRC Convention 90	HNS Convention 96	HNS PROT 2010	OPRC/HNS 2000	BUNKERS CONVENTION 01	ANTI FOULING 2001	BALLASTWATER 2004	NAIROBI WRC 2007	HONG KONG CONVENTION
Australia	x	x	x	x		x	x	x	x	x	x			x		x			x	x		x	x	x	x	x	x	x	x	x	x	x	d	x	x	x	x	x						d	x	x	x			x	x			x	x	x	x		
Bangladesh	x	x		x		x	x	x	x					x		x	x	x	x	x			x	x	x	x	x	x			x															x	x				x					x	x		
Belgium	x	x	x	x		x	x	x	x	x			x	x	x	x			x	x			x	x	x	x	x	x	x	x	x	x	d	x	x	x	x	x	x	d	d		x	d	x	x	x			x	x			x	x	x	x	x	x
Canada	x	x		x		x	x	x	x	x				x	x	x			x	x		x	x	x	x	x	x	x	x	x			d	x	x	x	x	x							x	x	x			x	x		x		x	x	x		
China	x	x	x	x		x	x	x	x	x				x		x			x	x			x	x	x	x	x	x	x	x	x	x	d	d	x					x	x					x	x			x	x			x	x	x		x	
Colombia	x	x	x			x		x	x					x		x			x	x			x	x	x	x	x						d	d	x	d	x														x			x					
Egypt	x	x	x	x		x	x		x					x			x	x	x	x			x	x	x	x	x		x	x	x	x	x	x	x					x		x		x		x	x			x	x			x	x	x	x		
Germany	x	x	x	x	x	x	x	x	x	x		x	x	x		x			x	x		x	x	x	x	x	x	x	x	x	x	x	d	x	x	x	x	x	x					d	x	x	x	x	x	x	x			x	x	x	x	x	
Ghana	x	x	x			x		x	x					x		x			x	x			x	x	x	x	x	x		x	x		x		x		x									x	x				x						x		
Greece	x	x	x	x		x	x	x	x	x				x		x	x	x	x	x			x	x	x	x	x	x	x				d	x	x	x	x	x		d	d		x	x	x	x	x	x	x	x	x			x	x	x	x		
India	x	x	x	x		x	x	x	x	x				x		x	x	x	x	x			x	x	x	x	x	x			x		d	x	x	x	x							x	x	x	x			x	x					x		x	
Indonesia	x	x	x	x		x	x	x	x	x				x		x	x	x	x	x			x	x	x	x	x	x					x		x																				x	x	x		
Italy	x	x	x	x		x	x	x	x	x		x		x		x			x	x			x	x	x	x	x	x	x	x	x	x	d	x	x	x	x	x	x							x	x			x	x				x	x			
Jamaica	x	x	x	x		x	x	x	x					x		x								x	x	x	x	x	x		x	x			x		x							x	x	x	x	x	x	x	x				x		x		
Japan	x	x	x	x		x	x	x	x	x				x		x			x	x			x	x	x	x	x	x	x	x	x		d	x	x	x	x	x						d	x	x	x				x			x		x	x		
Kenya	x	x	x	x		x	x	x	x	x				x		x			x	x			x	x	x	x	x	x	x	x			d		x		x								x	x	x			x	x				x	x	x	x	
Netherlands	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x			x	x		x	x	x	x	x	x	x	x	x	x	x	d	x	x	x	x	x	x				x	d	x	x	x	x	x	x	x			x	x	x	x	x	
Republic of Korea	x	x	x	x		x	x	x	x	x				x		x			x	x			x	x	x	x	x	x	x	x			d	x	x		x	x								x	x				x			x	x	x	x		
Singapore	x	x	x	x		x	x	x	x					x		x			x	x			x	x	x	x	x	x					d	x	x		x							x		x					x			x	x	x	x	x	
Spain	x	x	x	x		x	x	x	x	x		x		x	x	x			x	x		x	x	x	x	x	x	x	x	x	x	x	d	x	x	x	x	x	x	d	d	d	x	d	x	x	x	x	x	x	x			x	x	x	x		
Sri Lanka	x	x				x		x	x					x			x	x	x	x			x	x	x	x	x				x		d		x		x									x													
Thailand	x	x				x		x	x					x					x	x			x	x											x		x														x								
United Kingdom	x	x	x	x	x	x	x	x	x	x				x		x	x	x	x	x			x	x	x	x	x	x	x	x	x	x	d	d	x	d	x	x		d	d		x	d	x	x	x			x	x				x	x		x	
United States	x	x	x	x		x	x	x	x	x				x		x			x	x			x	x	x		x	x	x		x	x														x	x	x	x	x	x					x			

x= ratification

d=denunciation