



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 7)

Prepared by
Maritime & Transport Business Solutions B.V. (MTBS)
Rotterdam, The Netherlands

For Sri Lanka Ports Authority

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Asian Development Bank

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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 sphere 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 transshipment hub
- **Athens** – As a transshipment 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 qualitative 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 it is 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 is 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
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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 3 rd Party
Tugs & Pilotage	x	x	x	x	x		SLPA
Bunkering	x	x	x			x	3 rd Party
Water Supply	x	x	x	x			SLPA
Weighing and Scanning Facilities	x						3 rd Party
Warehousing and CFS	x		x	x		x	SLPA
Logistic Zones & Dry Ports	x	x					3 rd Party
Ship Repair Yards	x		x				3 rd Party
Container Maintenance and Repair	x						3 rd Party
Ship Registration & Classification	x	x	x	x			SLPA

Training Centre	x		x	SLPA
Crew services	x		x	3 rd Party
Marinas		x	x	3 rd Party
Ship Chandlery	x	x	x	3 rd Party
Fire Department	x			SLPA
Financial Services	x			3 rd Party
Medical Services	x	x	x	SLPA
Seamen club	x			3 rd 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 tugs²³ 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 thrusters 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 vessels²⁴ 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 capsized 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 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



Source: www.lnqbunkering.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 the port of Incheon offers bunkering facilities. Receiving LNG terminals with two jetties can provide bunkering services and completing transshipment.

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

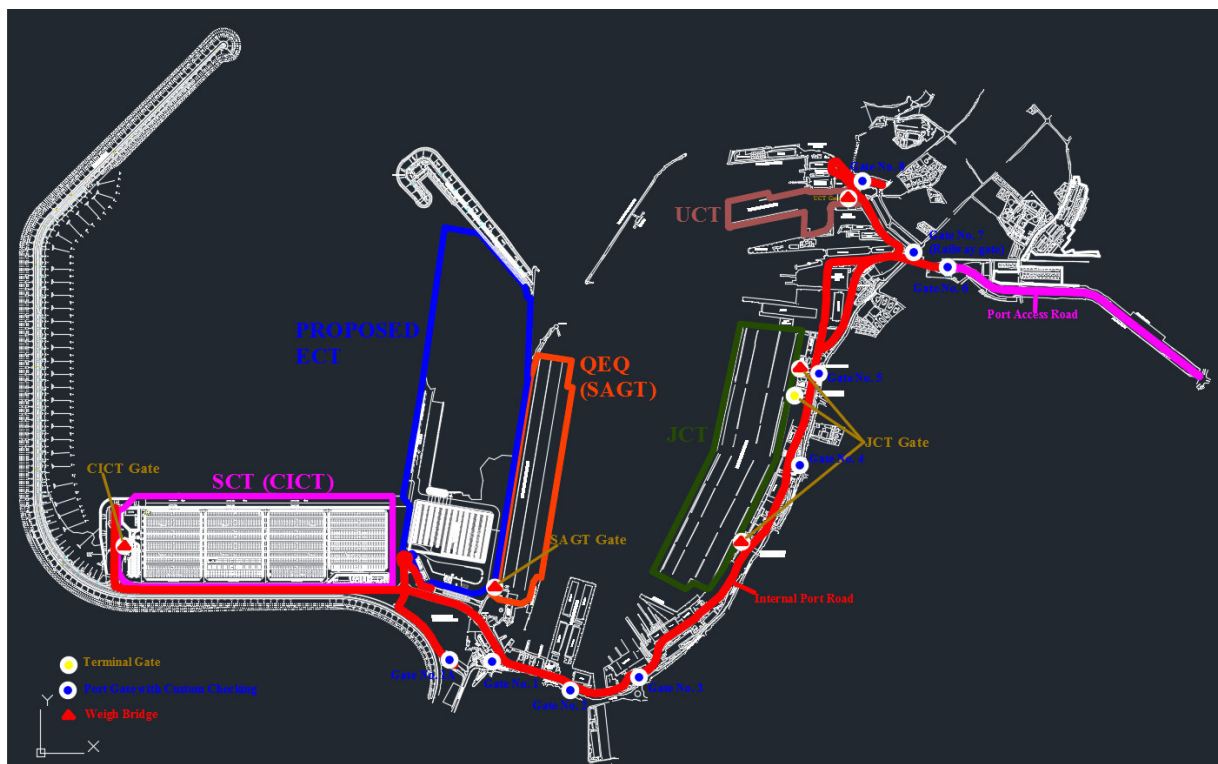
The SOLAS amendment for verification of container mass (VgM) came into force on 1st July 2016. This implies that all containers must have a certified weight and therefore Shippers and port operators and port authorities require certified weighing systems. Furthermore, the communication of this information 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 weighed 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 Lanka 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)	Craneage (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 strengthened 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 / 3 rd Party	⊗	Private sector
Bunkering	x	3 rd Party	⊗	Best operated by private sector
Water Supply	x	SLPA	⊗ ✓	Investments needed on barges & pumping capacity
Weighing and Scanning Facilities	x	3 rd 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	3 rd Party	⊗	SLPA not as operator but as land lord
Ship Repair Yards	x	3 rd Party	⊗	Outsource as much as possible
Container Maintenance and Repair	x	3 rd 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		3 rd Party	⊗	Private sector
Licensing	x	SLPA	✓	Future need less, open port boundary, secured terminal areas
Ship Chandlery	x	3 rd Party	⊗	Private sector
Fire Department	x	SLPA	✓	Under harbour master's control
Medical Services	x	SLPA	⊗	Merge with public medical institution
Financial Services	x	3 rd Party	⊗	Private sector
Seamen club	x	3 rd 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 transshipment 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	2	3	4	5	6
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		
		1	2	3	4	5	6
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 Nuturajewe 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 due 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			

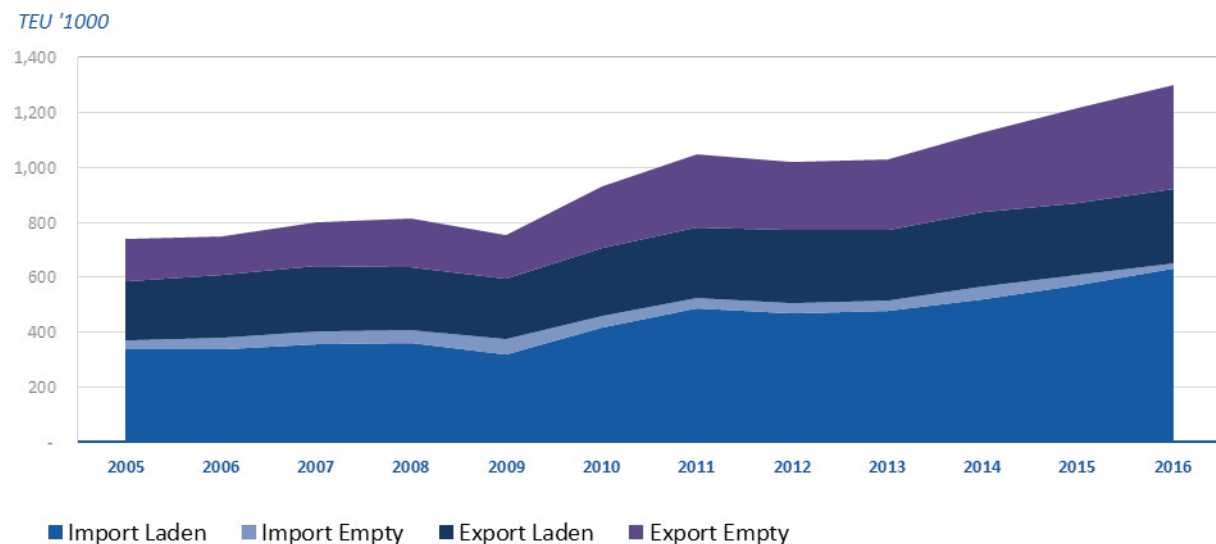
Appendix IV Commodity Assessment and Forecast Assumptions

Gateway Containers

Gateway containers are boxes destined to and originating from Sri Lanka totalling 1.3 M containers in 2016²⁵. 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

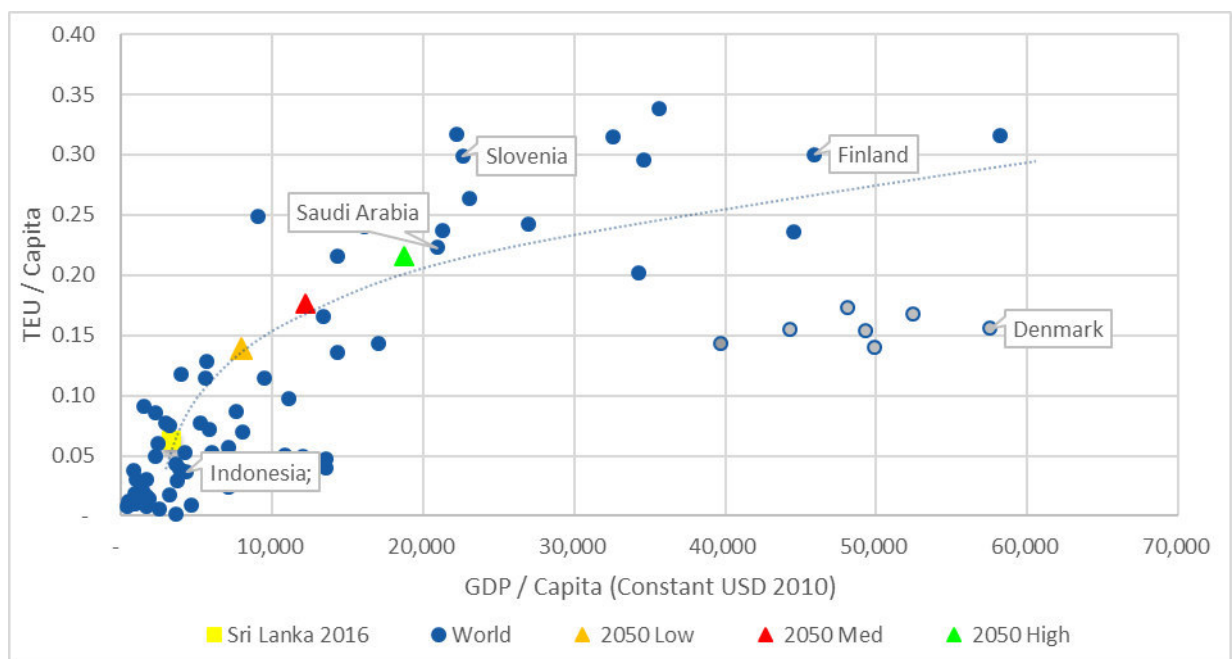
Figure 13-4 shows the analysis performed for this forecast: a set of 75 countries spread worldwide with population and throughput data was used to calculate the TEU per capita for the year 2013. This is the most recent year which yields a full data set for comparison.

Both the GDP and throughput data are derived from the World Bank. Several countries with large transshipment 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 than gas or oil based or renewable energy.

The existing coal power plant at Norochcholai is using its 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

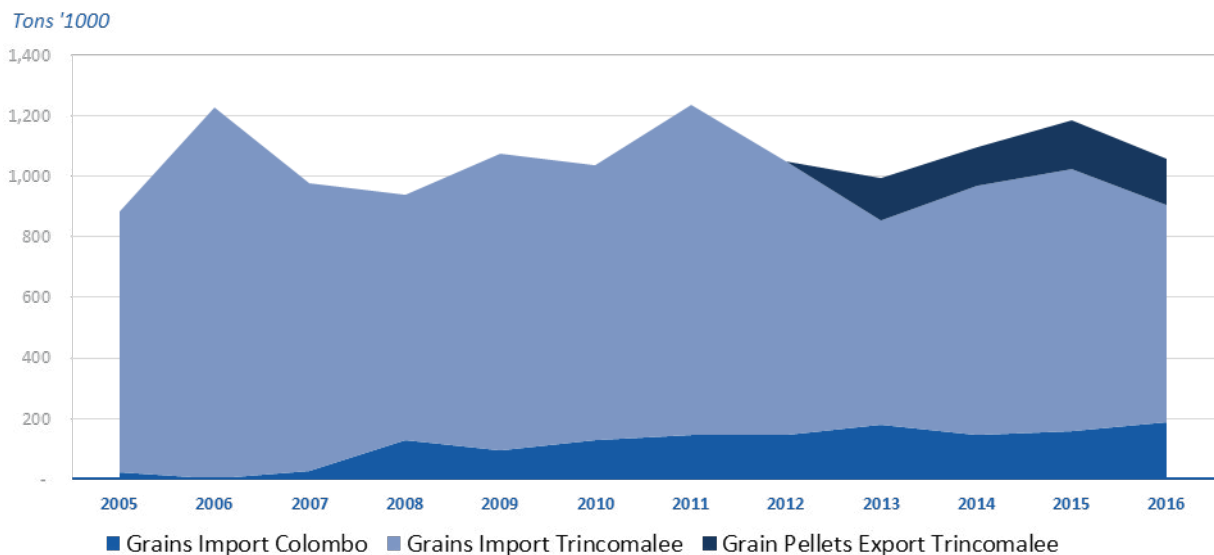
- Coal energy generation will be limited to the Norochcholai power plant in Puttalam.
- All coal needs to be imported as no coal reserves are present in Sri Lanka.
- The Norochcholai average efficiency over 2014 and 2015 are used as coal energy generation benchmark, which is 400 tons per GWh.
- Norochcholai 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

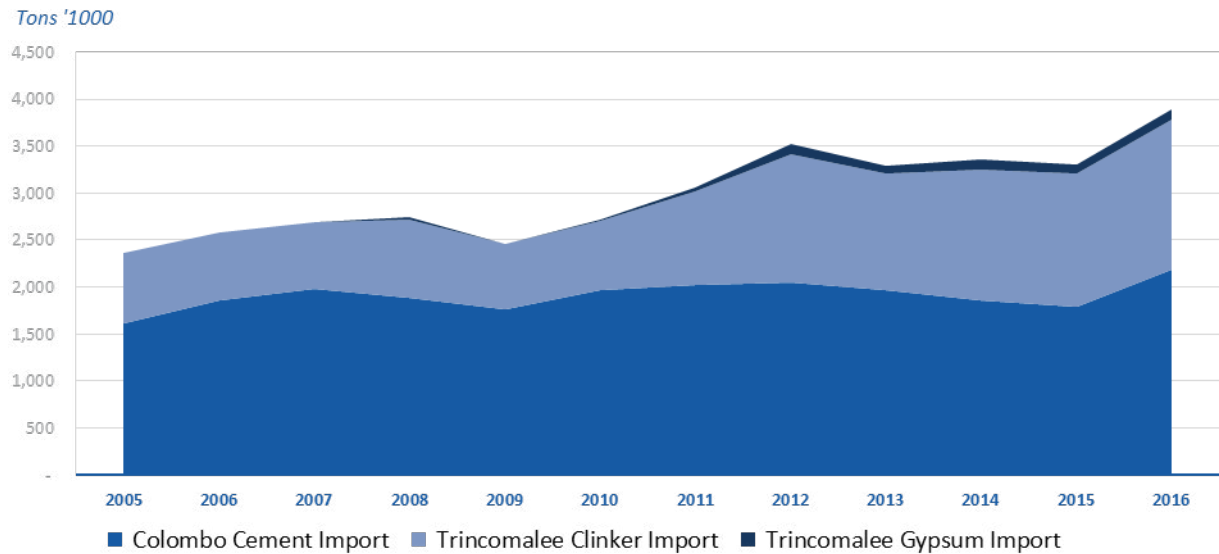
Cement as a finished product enters Sri Lanka through the ports of Colombo and Trincomalee. In Colombo, this is done at the Prince Vijaya quay whereas clinker and gypsum through the Tokyo cement facility and the Siam facility. Clinker and gypsum are grinded together to create cement in the grinding plants. The clinker destined for Galle is transhipped through Trincomalee port where the midstream vessel-to-vessel loading is replaced by transshipment 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



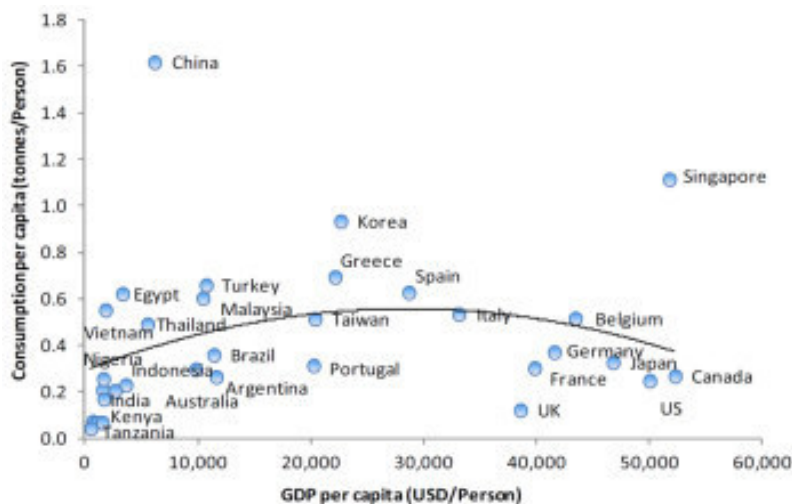
Source: SLPA

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 the Ministry 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	371,55	201,96	175,21	275,25	238,98	118,74	44,025	164,74	291,81	117,61
	5	4	8	4	8	0		7	3	8
Fertiliser Bagged Imports	136,00	341,60	171,79	269,10	234,99	333,53	291,39	354,88	306,96	196,34
	4	9	0	7	6	6	6	0	9	7
Total Imports	507,55	543,57	347,00	544,36	473,98	452,27	335,42	519,62	598,78	313,96
	9	3	8	1	4	6	1	7	2	5

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 Forecast²⁶

- Private development of a fertiliser plant 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 Forecast²⁷

- 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 & Transshipment 2007-2016

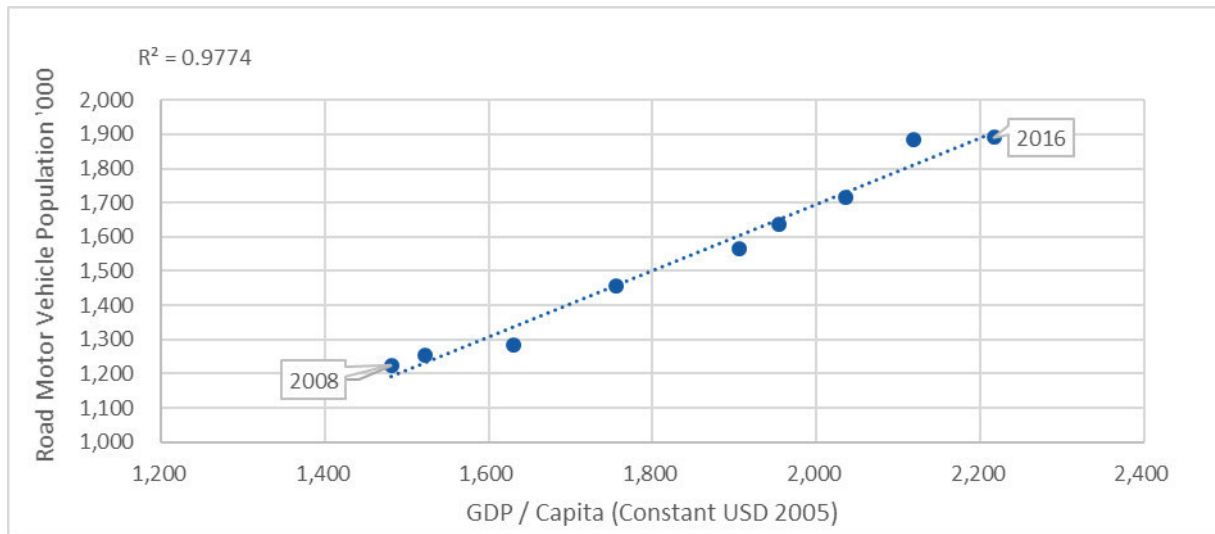
Vehicles	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic	30,047	21,875	6,732	45,779	90,824	45,297	33,109	59,219	140,933	63,407
Transshipment	10,065	2,154	4,973	2,455	993	4,521	38,530	160,502	116,270	150,921
Total	40,112	24,029	11,705	48,234	91,817	49,818	71,639	219,721	257,203	214,328

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 Transshipment

The vehicle transshipment 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 transshipment of vehicles in Colombo faced capacity constraints which is the reason of the shift of the business to Hambantota.

Demand Driver & Proxy

The transshipment 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 transshipment 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

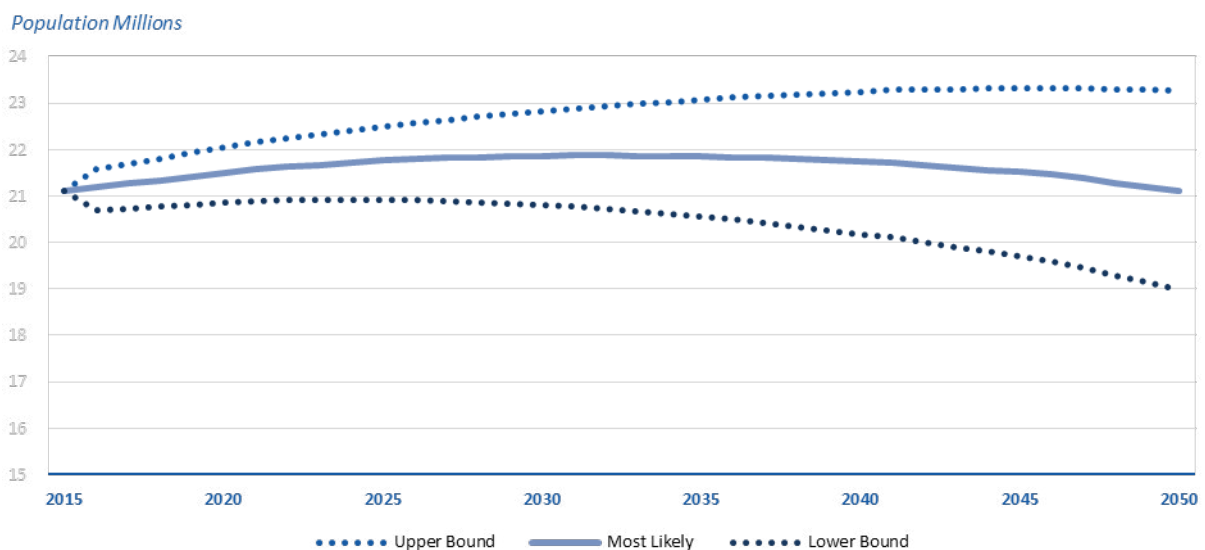
Population Forecasts

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:

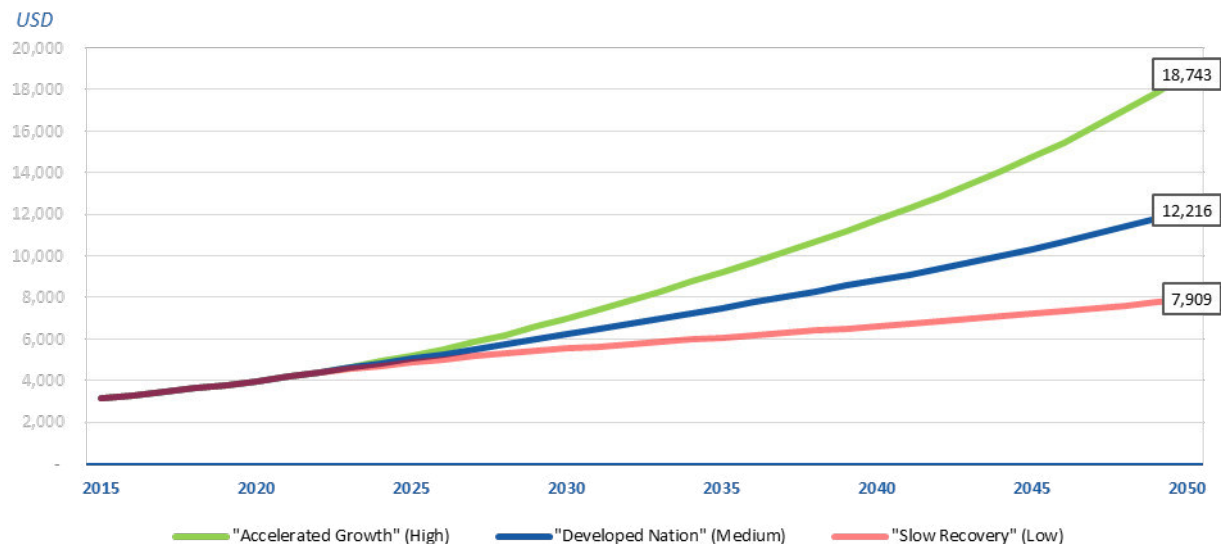
Table 13-34: GDP Growth Scenarios Overview

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



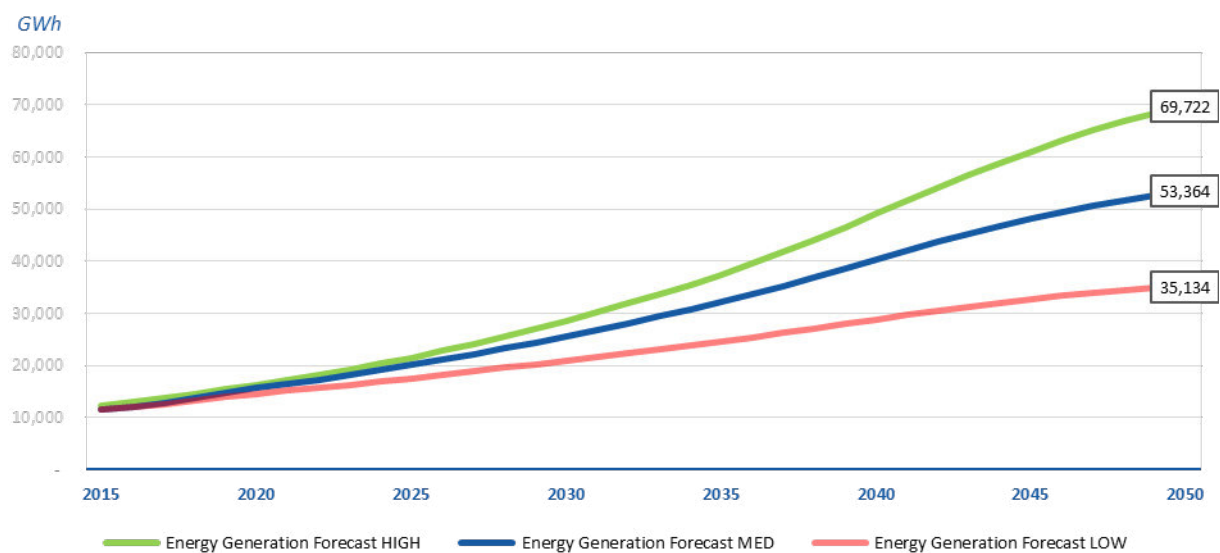
Source: MTBS

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

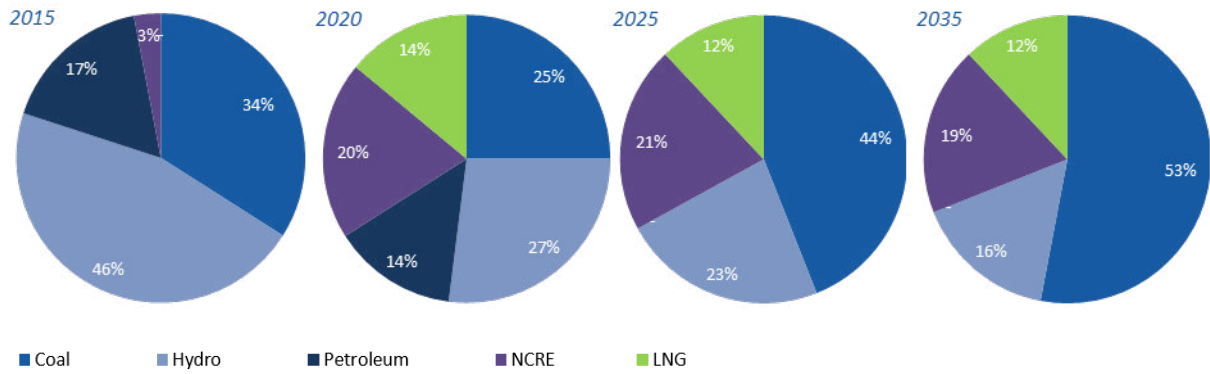


Source: CEB - Long Term Generation Expansion Plan 2015-2034

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 Transshipment Forecasting Methodology

Forecast Methodology & Process

Transshipment 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 transshipment 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 transshipment 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.

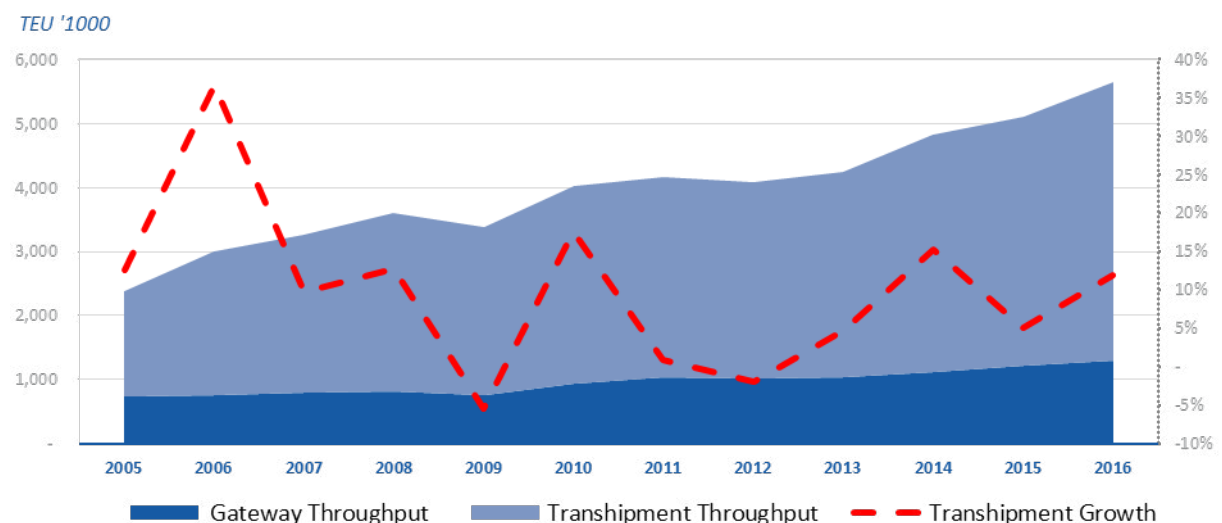
Colombo used to be dominant in transshipment to West India and the Middle East. The transshipment to west India has been reduced due to newly developed port facilities and the development of direct trades to this area. However, some relay transport has remained to these destinations. East India is still the traditional transshipment market contributing to most of the transshipment growth today.

Figure 13-14 also displays the volatile nature of the transshipment 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 transshipment trade is the fact that it is “footloose”. This means that shipping lines can easily redirect transshipment to other port along the transportation chain. Where they choose to perform their transshipment 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 transshipment 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 Transshipment Containers



Source: SLPA

Demand Driver & Proxy

Sri Lanka’s transshipment 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 transshipment. Besides transshipment to feeder regions, transshipment at Colombo takes place because of Relay. The latter is the transshipment between two main vessels which connect at the transshipment hub to optimise the distribution to the end destinations.

Forecast Methodology & Process

Due to the importance of transshipment 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 transshipment 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 transshipment 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 transshipment regions (step 6), Colombo’s total estimated capacity should equal Colombo’s total actual transshipment 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 transshipment markets can be derived. The table below provides an overview of the estimated 2015 volumes for each of the transshipment markets. Subsequently, assumptions concerning the transshipment markets are applied, in order to forecast Sri Lanka’s future transshipment volumes towards these markets.

Table 13-35 Sri Lanka - Estimated Transshipment Volume Breakdown

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

Region	Port	Colombo Trade est. Volume (TEU)	Colombo est. Handlings (TEU)*
	Calcutta	76,536	153,073
	<i>Total – East India</i>	<i>937,930**</i>	<i>1,875,860</i>
West India	Cochin	64,449	128,898
	Nhava Sheva (JNPT)	197,326	394,653
	<i>Total – West India</i>	<i>261,775**</i>	<i>523,551</i>
Bangladesh	Chittagong	471,297	942,593
	Mongla	-	-
	<i>Total - Bangladesh</i>	<i>471,297</i>	<i>942,593</i>
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 Transshipment			3,848,375
Total Actual Colombo Transshipment			3,888,321
Discrepancy (Allocated to “Other Markets”)			39,946

Assumptions

In order to forecast Colombo’s transshipment volumes, assumptions need to be made regarding economic development in Sri Lanka’s transshipment markets, as well as regarding port development in Sri Lanka, its transshipment markets, and other regional hubs. The sections below provide an overview of the key assumptions applied to forecast transshipment 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.
- Transshipment 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 transshipment. Specifically, it is assumed that the transshipment 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 transshipment. Specifically, it is assumed that the transshipment share will decrease to 10% of total West Indian container demand by 2050.
- Sri Lanka Share of Transshipment Assumptions

- East India: currently, over 40% of East India's transshipment 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 transshipment 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 transshipment 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.
- Transshipment Share Assumptions
 - Currently, more than 80% of container traffic towards/from Bangladesh is transhipped. This dependence on transshipment 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 Transshipment 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 transshipment hubs. Specifically, Sri Lanka's transshipment 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.
- Transshipment Share Assumptions
 - Currently, more than 70% of container traffic towards/from the Maldives is transhipped. This dependence on transshipment 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 Transshipment 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.

- Transshipment Share Assumptions
 - Currently, approximately 65% of container traffic towards/from the Seychelles is transhipped. This dependence on transshipment 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 Transshipment 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 transshipment 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 transshipment 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 transshipment 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
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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 transshipment 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:

$$\sum_{j=1}^n \text{Estimated Volume}_{jk} = \text{Actual Volume}_k$$

Item	Description
Estimated Volume _{jk}	Estimated TEU volume from shipping loop <i>j</i> to port <i>k</i>
∑ Estimated Volume _{jk}	The sum of estimated TEU volumes from all shipping loops to port <i>k</i>
Actual Volume _k	2015 Throughput for port <i>k</i>

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
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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
<i>Colombo Share</i>					<i>73.50%</i>

Step 7 – Shipping Loop Model Calibration (Overall)

Once Colombo's capacity share has been estimated for each of the identified transshipment regions (step 6), Colombo's total estimated capacity should equal Colombo's total actual transshipment 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:

$$\sum_{j=1}^n \text{Estimated Volume}_j = \text{Actual Volume}_{\text{Colombo}}$$

Item	Description
Estimated Volume _j	Colombo's estimated TEU volume for transshipment region j
Σ Estimated Volume _j	The sum of Colombo's estimated TEU volumes for all transshipment regions
Actual Volume _{Colombo}	Actual total 2015 transshipment volumes for Colombo port

Example

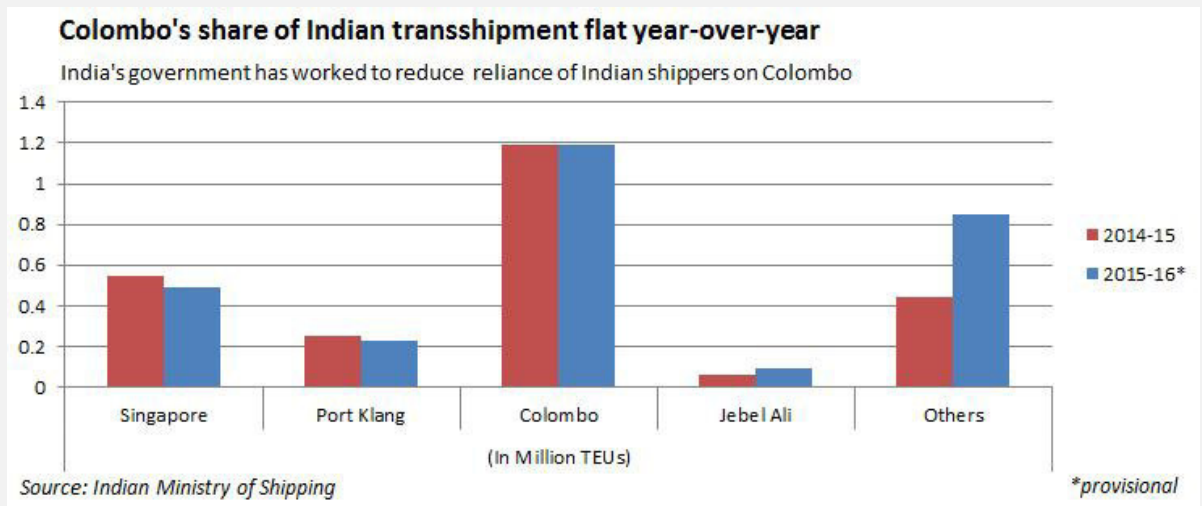
Following the assessment of all of Colombo's identified transshipment services (comprising both end-feeder loops and relay services), the following volumes are estimated for the transshipment regions:

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 Transshipment			3,848,375
Total Actual Colombo Transshipment			3,888,321
Discrepancy			39,946

As each transhipped container to/from a transshipment market results in 2 handlings at the transshipment port (e.g., discharged from mother vessel and loaded onto feeder vessel), the estimated transshipment trade volumes need to be multiplier by 2 in order to arrive at the TEUs handled at Colombo.

****Colombo's total estimated transshipment 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 transshipment 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 transshipment volumes, assumptions need to be made regarding economic development in Sri Lanka's transshipment markets, as well as regarding port development in Sri Lanka, its transshipment markets, and other regional hubs. The sections below provide an overview of the key assumptions used to forecast transshipment container demand for each of the regions. Subsequently, summarized forecast volumes are provided.

8a TEU Demand Growth in Transshipment Markets

First, the overall TEU demand growth of the transshipment 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 transshipment 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 transshipment 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 Multiplier	Growth Factor	1.03**	1.46	1.43	1.39	1.35	1.15	1.05	1.00
Maldives TEU-GDP Multiplier	Growth Factor	1.99***	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Seychelles TEU-GDP Multiplier	Growth 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 transshipment 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 transshipment 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 Transshipment 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 transshipment 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
Transshipment 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%
Transshipment 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
Transshipment 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%

Transshipment 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
Transshipment 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%
Transshipment Handlings*	'000 TEU	3,153	3,944	4,392	4,872	5,366	6,551	11,683	15,167

*For transshipment 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 transshipment 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 transshipment cargo is allocated to Hambantota as Colombo remains the dominant port in Sri Lanka.
- Transshipment 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 transshipment demand will be restricted at Vizhinjam and Colachel. The following restrictions are assumed to reflect the dominance of Colombo:
 - For East India transshipment cargo, utilization of the combined East India transshipment capacity at Vizhinjam and Colachel will not exceed 50%.
 - For East India transshipment cargo, combined throughput at Vizhinjam and Colachel will not exceed 50% of total East India South Asia Hub transshipment demand.
 - For West India transshipment cargo, utilization of the combined West India transshipment capacity at Vizhinjam and Colachel will not exceed 60%.

- For West India transshipment cargo, combined throughput at Vizhinjam and Colachel will not exceed 60% of total West India South Asia Hub transshipment demand.
- For Bangladesh transshipment cargo, utilization of the combined Bangladesh transshipment capacity at Vizhinjam and Colachel will not exceed 50%.
- For Bangladesh transshipment cargo, combined throughput at Vizhinjam and Colachel will not exceed 50% of total Bangladesh South Asia Hub transshipment 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 transshipping, 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 dismooing 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 execute 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, warehousing 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 section 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 Ports 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 transshipment 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 for 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 bind 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, carcasses, 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, transshipping 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

SRI LANKA PORTS AUTHORITY

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)	382	0	0	0	0	0	382
Engineering (Marine)	401	0	0	0	0	0	401
Engineering (Mechanical Plant)	363	0	0	0	0	0	363
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	2061	0	0	0	0	1	2062
Planning & Development	31	0	0	0	2	0	33
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: Abeysirwardena 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 onwards 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 1988SLPA 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
		next year	next 2-3 yaers	>5 years
SHORT TERM				
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 Ghana score better. The gap with EU member states, Canada and the US is rather large.

