MASTER PLAN FOR COCHIN PORT

Master Plan for Cochin Port

Prepared for

Ministry of Shipping / Indian Ports Association

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1.0 INTRODUCTION

1.1 Background

The Sagarmala initiative is one of the most important strategic imperatives to realize India's economic aspirations. The overall objective of the project is to evolve a model of port-led development, whereby Indian ports become a major contributor to the country's GDP.

As shown in **Figure 1.1**, the Sagarmala project envisages transforming existing ports into modern world-class ports, and developing new top notch ports based on the requirement. It also aspires to efficiently integrate ports with industrial clusters, the hinterland and the evacuation systems, through road, rail, inland and coastal waterways. This would enable ports to drive economic activity in coastal areas. Further, Sagarmala aims to develop coastal and inland shipping as a major mode of transport for the carriage of goods along the coastal and riverine economic centres.

As an outcome, it would offer efficient and seamless evacuation of cargo for both the EXIM and domestic sectors, thereby reducing logistics costs with ports becoming a larger economic diverse.

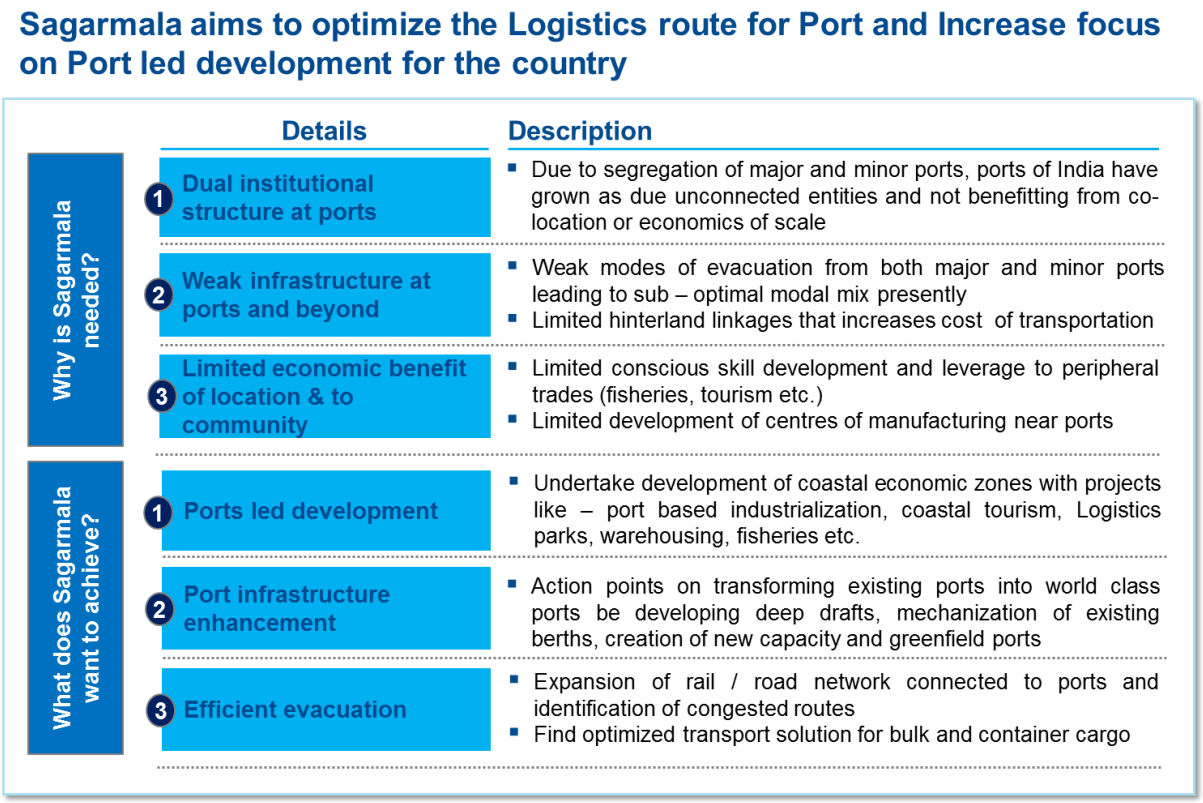


Figure 1.1 Aim of Sagarmala Development

In order to meet the objectives, Indian Port Association (IPA) appointed the consortium of McKinsey and AECOM as Consultant to prepare the National Perspective Plan as part of the Sagarmala Programme.

1.2 Scope of Work

Based on the experience in port-led development, the major engagement challenge to develop a set of governing principles for our approach is shown in **Figure 1.2**.

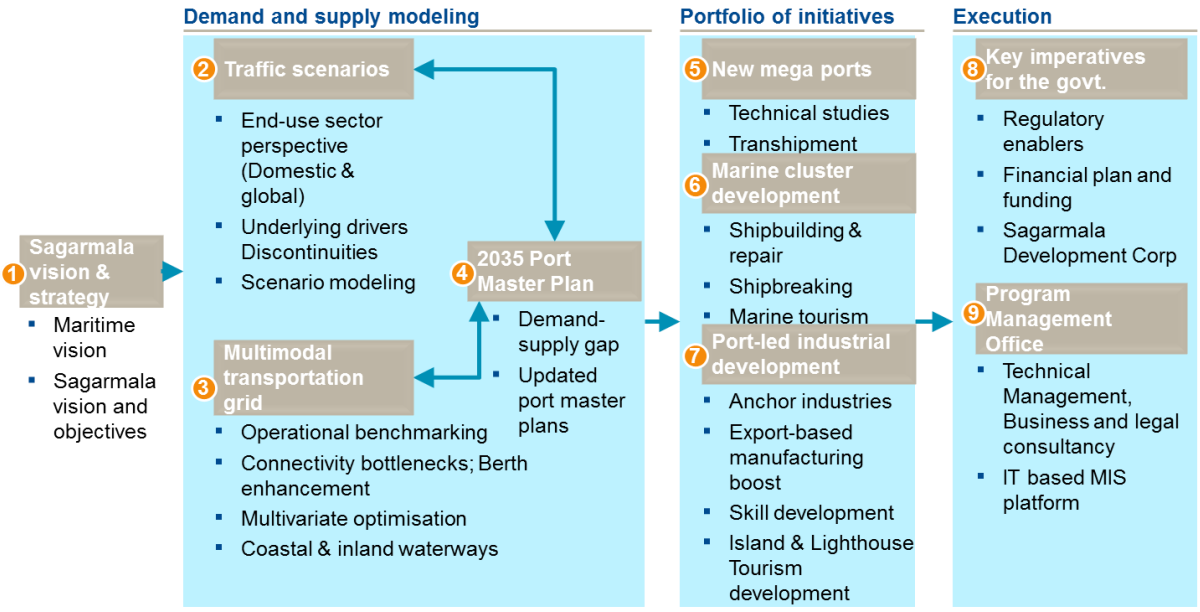


Figure 1.2 Governing Principles of Our Approach

As indicated above, the origin-destination of key cargo (accounting for greater than 85% of the total traffic) in Indian ports shall be mapped to develop traffic scenarios for a period of next 20 years. The forces and developments that will drive change in the cargo flows shall also be identified. This would lead to the identification of regions along the coastline where the potential for expansion of existing port exists. The various activities involved in the port led developments are charted in **Figure 1.3**.

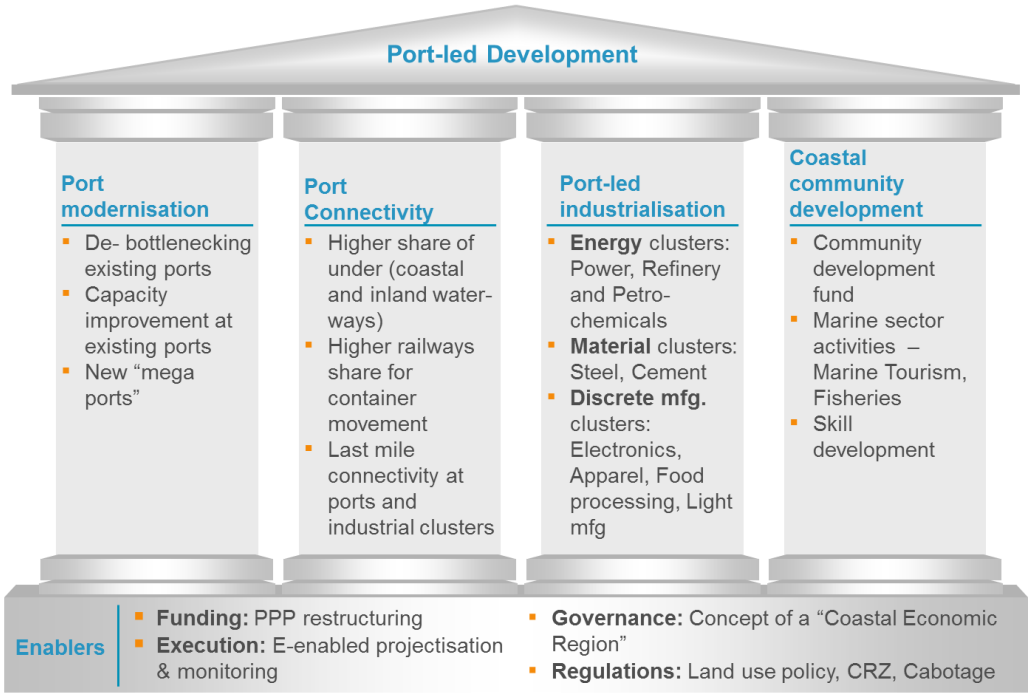


Figure 1.3 Port Led Developments

1.3 Present Submission

The present submission is the Master Plan for Cochin Port. This report is organised in the following sections:

Section 1 : Introduction
Section 2 : The Port and Site Conditions
Section 3 : Details of Existing Facilities
Section 4 : Performance, Options for Debottlenecking & Capacity Assessment
Section 5 : Details of Ongoing/ Planned Developments
Section 6 : Traffic Projections
Section 7 : Capacity Augmentation Requirements
Section 8 : Scope for Future Capacity Expansion
Section 9 : Shelf of New Projects and Phasing

2.0 THE PORT AND SITE CONDITIONS

2.1 Cochin Port as at Present

Cochin Port is one of the 12 major ports in India and is located on the south-west coast of India, in the state of Kerala at 9°58'N and 76°14'E (**Figure 2.1**). The Port of Cochin is an all-weather natural Harbour. The location of the port offers calm and placid channels for ships throughout the year, even during the Monsoon season.

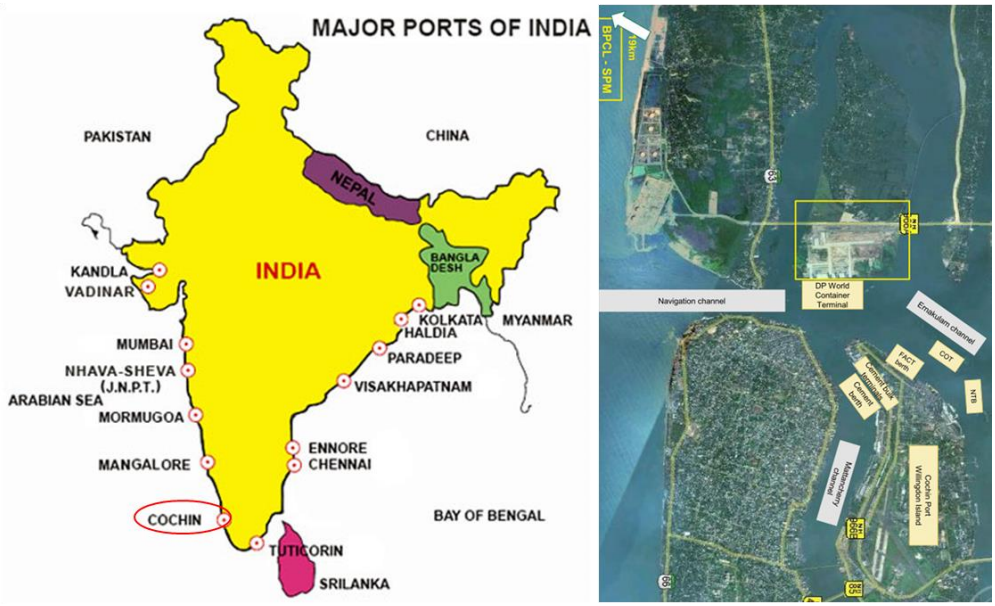


Figure 2.1 Location of Cochin Port

2.1.1 Road Connectivity

Cochin is connected to other states through the following national highway network.

- NH 17 – Cochin to Panvel takes off from Edapally at Cochin.
- NH-47 – Salem to Kanyakumari Passes through Cochin.
- NH 49 – Cochin to Madurai/ Dhanushkodi, takes off from NH 47 from Kudanoor at Cochin.
- NH 47 A – National highway link connecting Willingdon Island and NH 47 at Kudanoor.

All-important destinations in India whether on the North, West or East could be accessed through any one of these Four National Highways as shown in **Figure 2.2**.

Figure 2.2 Road Connectivity to Cochin

2.1.2 Rail Connectivity

Port facilities located on Willingdon Island are served by a 8 km long section of broad gauge which branches off at Ernakulum from the main line to Shoranur - Trivandrum. While, International Container Transhipment Terminal (ICTT) on Vallarpadam Island is connected to Edapally, a suburb in Cochin City through an 8.86 km long rail corridor. The ICTT Vallarpadam railway link also has longest rail bridge in India, i.e., 4.62 km. This rail link is very crucial for the operations of ICTT as is exclusively used for container traffic to and from the terminal as shown in **Figure 2.3**.

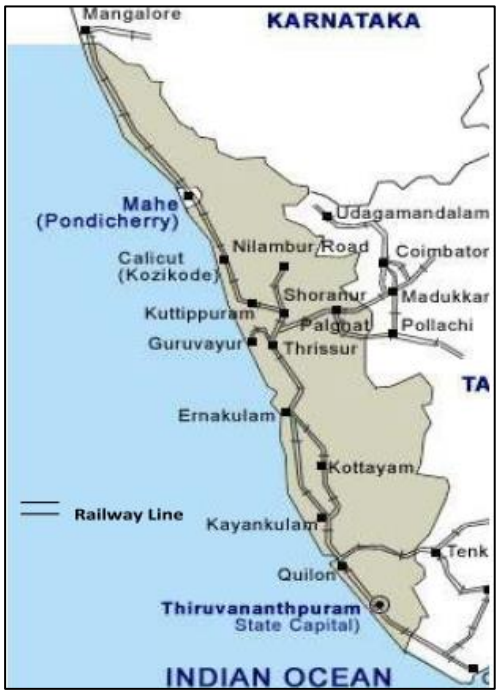


Figure 2.3 Rail Connectivity to Cochin

2.1.3 Inland Waterways

Cochin is accessible through a series of interconnecting waterways, canals and lagoons which allow movement of barges and crafts between Alleppey and Quilon in the south and Porur in the north. The main linkages are provided by the West Coast Canal, the Udyogamandal Canal and the Champakkara Canal. Of these, the west coast canal is the most significant in terms of potential capacity.

2.2 Site Conditions

2.2.1 Meteorology

The climate at Cochin is governed by the monsoons. In the months June-September, the south-west monsoon occurs, followed by the north-east monsoon during the months of October, November and December. The months of January and February marked as winter period, while March to May is usually the hot weather period.

2.2.1.1 Winds

The wind speed and wind direction is determined by the season and by the daily temperature differences between land and sea. The predominant wind direction during the monsoon period i.e., from June to September is west to south-west and the effect of land breeze is not dominant during this period.

During the non-monsoon periods, the predominant wind direction is from north-east during the morning and west during the evening, which shows influence of land breeze. The Wind Rose diagram at Cochin Port is presented in **Figure 2.4**.

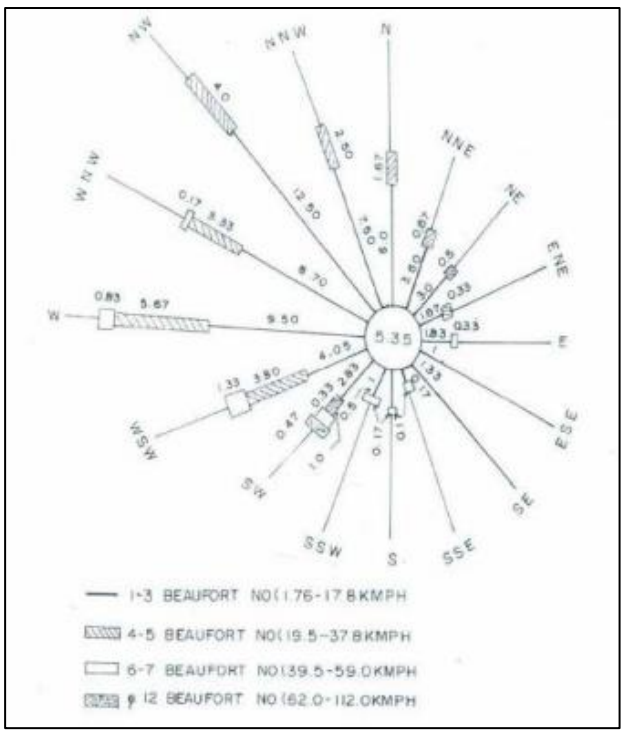


Figure 2.4 Wind Rose Diagram

The month-wise predominant and extreme wind directions, as per the long term meteorological data collected by the Indian Meteorological Department over the past 40 to 50 years period, are presented in **Table 2.1**. The maximum wind velocity given is the highest ever in that particular month considered over a period of 40/50 years' observations.

The maximum wind speed observed was of the order of 112 KMPH from WSW direction.

Table 2.1 Wind Data at Cochin Port

Month	Observed Wind Maximum Velocity		% time speed Exceeded 20 KMPH	Predominant Direction
	KMPH	Direction		
January	58	SSE	10	W
February	53	N	20	W
March	80	SSW	26	W
April	88	SSW	23	W
May	112	WSW	23	W
June	86	WNW	13	W
July	93	SW	13	NW
August	93	NNW	16	NW
September	77	WNW	15	NW
October	67	NNW	6	W
November	69	WNW	5	W
December	64	SSE	3	W

2.2.1.2 Rainfall

The maximum rainfall usually occurs during the monsoon period i.e., from June to September. The annual rainfall in the region varies between 2500 to 3500 mm. The maximum rainfall recorded over a 24 hour period was 240 mm. The average monthly distribution of the rainfall is presented in the **Table 2.2**.

Table 2.2 Average Monthly Distribution of Rainfall on Willingdon Island

Month	Rainfall (mm)	
	Maximum	Minimum
January	85	0
February	11	0
March	64	6
April	201	35
May	553	39
June	702	387
July	1063	514
August	536	104
September	513	199
October	503	199
November	305	75
December	276	1

2.2.1.3 Air Temperature

Annual temperatures range between 23° and 31° C (73° and 88° F) with the record high being 36.5° C (97.7° F), and record low of 16.3° C (61.3° F).

2.2.1.4 Visibility

Generally, the visibility at the port location is very good, except a few days during monsoon and winter season.

2.2.2 Oceanography

2.2.2.1 Tides

Cochin experiences semi diurnal tides with marked by daily inequality. The tides enter harbour basin through Cochin Gut and propagates southwards and northwards to the extremities of the basin and the tidal prism is estimated to be 100 million cum. About 75% of the tidal prism moves to south and balance to north. The tidal levels as per Naval Hydrographic chart No. 2004 are as follows.

- Mean Highest High Water Level (MHWL) + 1.20 m
- Mean Lowest High Water Level (MLHWL) + 0.80 m
- Mean Sea Level (MSL) + 0.60 m
- Mean Highest Low Water Level (MHLWL) + 0.60 m
- Mean lower Low Water Level (MLLW) + 0.30 m

The above levels are with respect to chart datum, which is approximately the level of lowest Astronomical tide.

2.2.2.2 Currents

The currents along the coast of Cochin consist of tide, wave and wind induced components. As per observations the maximum current velocities at the Cochin Gut during the non-monsoon periods is of the order of 3 knots, which could increase to as high as 5.5 knots during the monsoon periods. Inside the harbour the current velocities are low, of the order of 0.5 knots only.

2.2.2.3 Waves

The wave climate is governed by the South West monsoon with prevailing wave directions from north-west to south-west. Deep water (15 m) wave observations in the past indicate the significant wave heights of 4 m, 2 m and 1 m at the water depths of 10 m, 5 m and 2 m respectively, the predominant wave direction being west.

Wave action inside the harbour is insignificant because of narrow entrance between Cochin Gut and Fort Cochin and the configuration of the land.

Generally calm conditions prevail throughout the year except during the times of extreme wind action.

2.2.2.4 Salinity

The salinity of the harbour waters varies with the season due to the influx of fresh water from the rivers. During the monsoon, the salinity can be almost negligible, whereas during the dry season the water can become as saline as the outer sea. The sea-water analysis is given below:

- pH value : 6.7
- Chlorides : 14350 ppm at 5.10 m depth; 14310 ppm at 30.68 m depth
- Sulphates : 1974 ppm at 5.10 m depth; 1981 ppm at 30.68 m depth
- Suspended sediments : 0.2 mg/litre to 12.4 mg/litre

2.2.2.5 Mud banks

Mud banks are unique geological phenomenon confined to the Kerala coast. The mud banks are not stationary and have a tendency to move in the coastal region. These are formed during the southwest monsoon and the sea water has concentration of suspended mud at the surface up to 1200 mg/l and at the bottom up to 1500 mg/l. The important constituent of the mud banks are silt, clay and very little sand. To the immediate north of Cochin, mud bank is reported at Narakkal and to the south at Manasseri / Chellanam. It is reported that the mud bank at Narakkal plays an important role is silting of the Cochin Harbour Channel.

2.2.2.6 Siltation

Littoral drift takes place during both the monsoons as a result of which the channel experiences siltation. This gets compounded when material from the mud banks finds its way to the entrance channel during the flood tides. The sediments getting deposited in the Cochin port and immediate offshore are cohesive sediments and are essentially composed of fine clays.

Bar formation at the entry of the port is a natural phenomenon and takes place during the south west monsoon season. Hence, annual maintenance dredging needs to be resorted to in order to keep the necessary depths and widths in the navigational channel.

2.2.2.7 Bathymetry

The seabed slopes gently in the offshore region and is about 1 in 500/600. A sequential overlay analysis of the various isobath maps generated over the past few decades shows progressive changes of the contour pattern with time. A seaward movement of the contours up to over 1 km has been noted. A significant consequence of this is the accretion of a vast stretch of land on the western side of Vypeen which has come up gradually during the last few decades.

3.0 DETAILS OF EXISTING FACILITIES

3.1 General

The port has many facilities for cargo handling which include wharfs at Mattancherry and Ernakulam, Container Terminal at Vallarpadam, LNG Terminal at Puthuvypeen and Single Point Mooring (SPM) at an offshore location and a cruise terminal (**Table 3.1**).

Table 3.1 Berthwise Details

S. No.	Name of Berth	Length (m)	Draft (m)	Max Size of Ship (DWT)	Commodities Handled
1.	Single Point Mooring		22.5	3,00,000	Crude
2.	COT	250	12.5	1,15,000	Crude / POL
3.	NTB	213	9.1	30,000	POL
4.	STB	170	9.1	20,000	POL
5.	Ernakulam Wharf (Q5-Q6)	250	10.0	20,000	Dry Cargo / CBFS
6.	Ernakulam Wharf (Q7)	250	10.5	60,000	Dry Cargo
7.	Ernakulam Wharf (Q8-Q9)	250	11.0	60,000	Dry Cargo
8.	Fertilizer Berth (Q10)	207	10.7	60,000	Fertilizers/Phos./Acid
9.	SCB	170	9.1	15,000	Liquid Bulk
10.	NCB	410	9.1	35,000	Dry /Liquid Bulk
11.	BTP		10.0	35,000	Dry /Liquid Bulk
12.	Mattancherry Wharf (Q1-Q3)	180	9.1	16,000	Dry Bulk
13.	Mattancherry Wharf (Q4)	180	9.1	65,000	Dry /Liquid Bulk
14.	ICTT Vallarpadam (V2-V3)	335	14.5	1,10,000	Containers
15.	LNG Puthuvypeen	320	12.5	1,20,000	LNG

3.2 Navigation Channel

The main inward shipping channel divides the port into Ernakulam and Mattancherry channels. The Ernakulum Channel is 4.90 Km long, with the width varying from 250 to 500 m and has a draft of 12.5 m up to the Oil Terminal and Q8 / Q9 and a draft of 9.14 m up to the wharves and the north and south tanker berths. The 1024 m long Ernakulam Wharf has six alongside berths, five for general cargo and a fertilizer berth. Besides there are three oil berths in the Ernakulum channel. The Mattancherry channel is 4.08 km long, with the width varying from 180 to 250 m and a draft of 9.14 m except at Boat Train Pier where the draft is 10.0 m. On the Mattancherry Channel there are four alongside berths, for general cargo, one Boat Train Pier and two jetties for miscellaneous cargo.

The National waterway 3 passes through the inner harbour. Other regional waterways and ferry service routes are also passing through inner harbour.

3.3 Berthing Facilities

3.3.1 Berths at Ernakulam and Mattancherry

The 1,024 m long Ernakulam Wharf has six alongside berths, five for general cargo and a fertilizer berth. Besides these, there are three oil berths in the Ernakulum channel. The Mattancherry Wharf consists of four alongside berths, for general cargo, one Boat Train Pier and two jetties for miscellaneous cargo. The locations of the berths are shown in the following **Figure 3.1** and details are given in **Table 3.1** above.

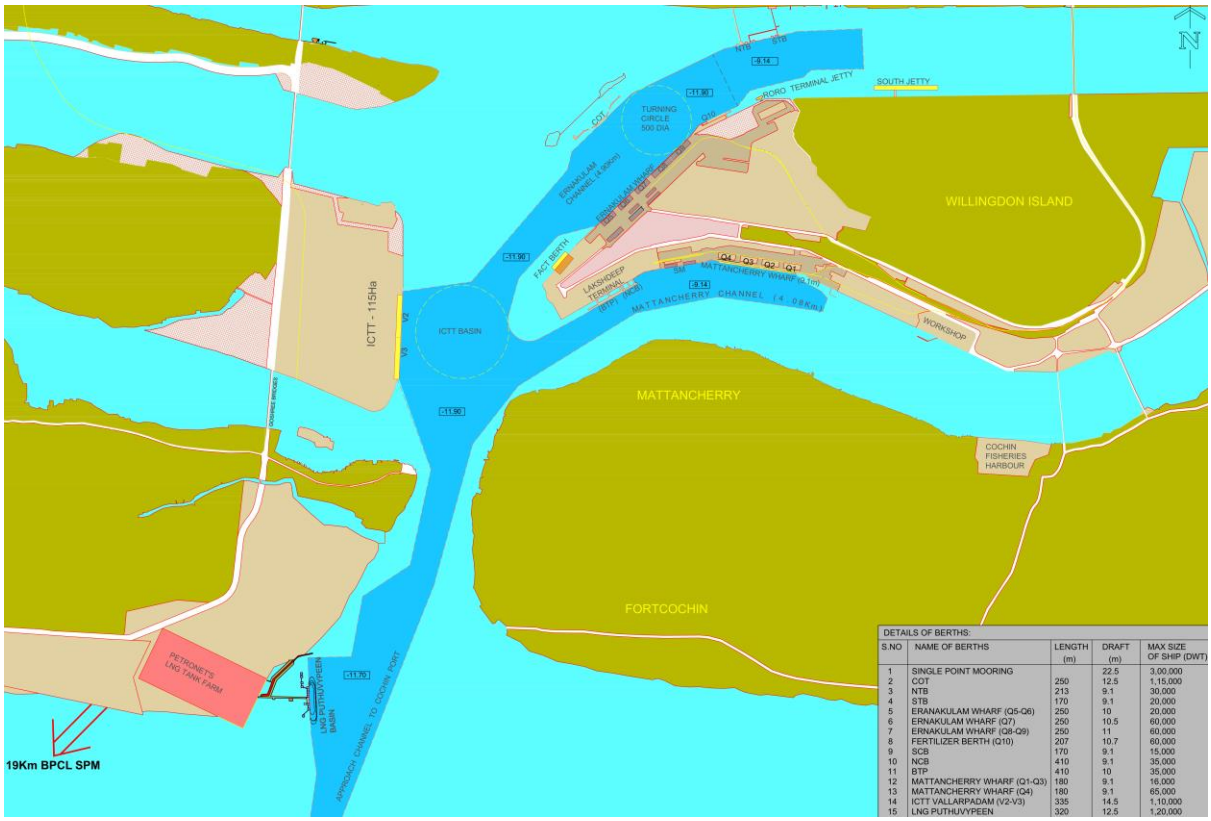


Figure 3.1 Existing Facilities

3.3.2 ICTT Vallarpadam (V2-V3)

The International Container Transhipment Terminal (ICTT) at Vallarpadam SEZ has been developed as a container transhipment terminal (**Figure 3.2**). It can handle container ships of 8000+ TEU capacities having draft of 14.5 m. The project has been executed on BOT basis by M/s. India Gateway Terminal Pvt. Ltd, a subsidiary of M/s Dubai Port World (DPW). The first phase of the ICTT consisting of a 600 m berth was commissioned on Feb. 2011. The details of the ICTT Terminal – Phase 1 and Final Phase are shown in **Table 3.2**.

This terminal is planned to have a berth length of 1,800 m to handle about 3 million TEUs of container traffic in the ultimate stage.

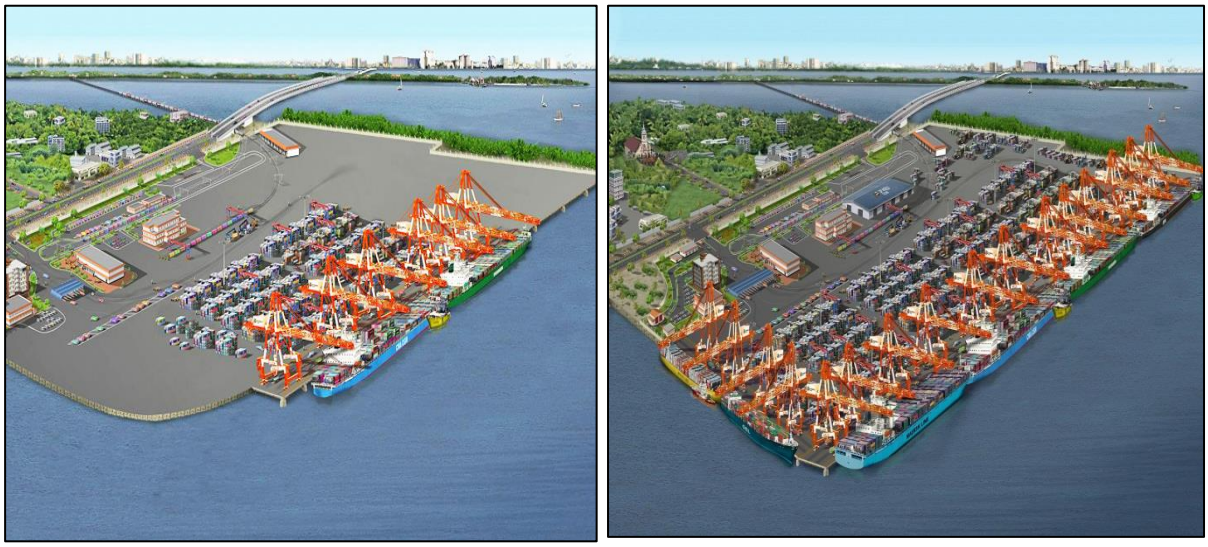


Figure 3.2 Existing and Planned Facilities - ICTT (V2-V3)

Table 3.2 ICTT Parameters

Terminal Parameters	Current Configuration	Final Configuration
Capacity	1 million TEU's	4 million TEU's
Quay Length	600 m	1800 m
Terminal Size	40 ha.	115 ha.
Depth Alongside	16 m (MSL)	16 m (MSL)
Max Draft	14.5 m (13.5 m)	14.5 m (13.5 m)
Max LOA	350 m	350 m
Container Yard	2,800 TEU's ground Slot	15,000 TEU's ground Slot
Rail Tracks	2	2
Reefer Points	450 Points (415 V, 3 Phase AC)	450 Points (415 V, 3 Phase AC)
Super Post Panamax	4	18
Rubber Tyred Gantry cranes	15	54

The infrastructure of this Container terminal is planned to be developed in three phases as below.

- In the first phase the terminal has built a container berth of 600 m Quay length with a draft of more than 15 m, and the terminal is designed and equipped to handle 1 million TEU containers annually. This phase became fully functional in Feb 2011. The traffic of Phase 1 was originally envisaged to happen in 2012 itself.

- In the second phase the capacity is designed to be enhanced to 3 million TEUs. This was originally envisaged to happen by 2014.
- In the third phase the terminal may handle up to 4 million TEUs.

3.3.3 Kochi LNG Terminal (Petronet LNG Limited)

The Kochi LNG Terminal Jetty and trestle is situated in the western reaches of the port area and is designed to receive LNG Tankers ranging from 65,000 to 2,16,000 m^3 (Q-Flex LNG tankers) with provisions for expansion up to 260,000 m^3 (Q-Max LNG tankers). The location and details are presented in **Figure 3.3** and **Table 3.3**.

Figure 3.3 Kochi LNG Terminal

Table 3.3 LNG Berth Parameters

Vessel/Berth Criteria	Berth Limitations
Maximum Vessel length overall	320 m
Maximum Allowable Draft alongside	12.5 m
Maximum Beam	50.0 m
Maximum Vessel displacement on Arrival	1,50,500 T
Maximum Cubic Capacity (LNG)	2,16,000 m^3
Jetty Alignment	063° - 243°

3.3.4 Single Point Mooring for Crude Oil Import

Kochi Refineries Ltd. (BPCL – KRL) has set up a Single Point Mooring System (SPM), at a water depth of 30 m, about 19 km from the coastline at Puthuvypeen, as captive reception for the import of Crude oil. The Single Point Mooring of M/s BPCL (KR) is located in position Latitude 09° 59' 49.93" N; Longitude 076° 02' 30.73" E within the limits of Cochin Port.

The facility is capable of receiving Very large Crude Carriers (VLCCs) of 3, 00,000 DWT. The SPM is connected by a 48 inch submarine pipeline of 19.5 km to tank storage facilities at Puthuvypeen comprising of 4 tanks of 80,000 KL each. The total area of the facility is 70 ha, which provides room for two more storage tanks of 80,000 Kl capacity. The facility became fully operational in December, 2007.

Vessels calling for discharge at the SPM are to anchor 2.5 miles south of the S.P.M, where a port pilot will board the tanker.

3.3.5 International Cruise Terminal

Cochin Port has an International Cruise Terminal as shown in **Figure 3.4** . The facilities include an air-conditioned Passenger Lounge, Customs and Immigration Counters, Luggage Counter, Public Address system, Drinking Water and Modern Toilets. The air-conditioned Passenger Facilitation Centre, named “Samudrika”, has an area of 1,500 sqm and a 4,500 sqm. Convention Centre, named “Sagara”, alongside the Cruise Jetty at NCB. The Seaport Immigration Check Post is equipped with APIS to enable speedy clearance of passengers. Around 40 cruise vessels call at Cochin every year.

The facility is also used during the non-cruise season for hosting conventions and exhibitions.

Figure 3.4 Kochi International Cruise Terminal

3.4 Storage Facilities

The Cochin port has sufficient storage area to support its operations. There are 11 sheds and 7 warehouses (**Figure 3.5**) for cargo storage covering a cumulative area of 65,000 m^2 (**Table 3.4**).

Figure 3.5 Storage Sheds at Mattanchery and Ernakulam Wharf

Table 3.4 Details of Cargo Storage Facilities

Covered Area (Transit Sheds and Overflow sheds)		
Location	**Total Sheds**	**Area (Sqm)**
Mattancherry Wharf	6	19,160
Ernakulam Wharf	4	13,200
Container Freight Station	1	10,000
Grand Total	**11**	**42,360**
Covered Area (Warehouses)		
Location	**Total Sheds**	**Area (Sqm)**
Mattancherry Wharf	4	11,800
Ernakulam Wharf	1	2,980
Cement Godown	1	1,000
BTP	1	6,000
Grand Total	**7**	**21,780**

4.0 PERFORMANCE, OPTIONS FOR DEBOTTLENECKING & CAPACITY ASSESSMENT

4.1 General

The total cargo handled through the existing facilities, during the past 5 years is presented in the following **Table 4.1**.

Table 4.1 Cargo Handled During Last 5 Years (in 000 T)

Commodity	2010-11	2011-12	2012-13	2013-14	2014-15
Liquid Bulk					
• Crude Oil	8,863	10,027	10,186	10,228	10,746
• POL	3,318	3,983	3,709	4,093	3,271
• LNG	-	-	-	115	395
• Liquid Ammonia	38	23	21	68	163
• Sulphuric Acid	-	9	8	35	10
• Phosphoric Acid	154	100	143	154	82
• Benzene	45	31	6	18	18
• Methanol	56	58	112	77	80
• Others	8	8	14	44	51
Total	**12,482**	**14,239**	**14,199**	**14,832**	**14,816**
Dry Bulk					
• MOP	76	59	22	36	68
• Urea	-	56	-	-	-
• Sulphur	194	171	148	148	173
• Rock Phosphate	158	145	183	123	204
• Cement	259	350	311	604	703
• Coal	40	34	28	-	98
• Riversand	-	-	-	32	163
• Shredded Scrap	27	27	29	27	-
• Zinc Concentrate	77	49	82	33	11
• Others	69	136	112	89	67
Total	**900**	**1,027**	**915**	**1,092**	**1,487**

Commodity	2010-11	2011-12	2012-13	2013-14	2014-15
Break Bulk					
• Defence Cargo	2	1	2	1	1
• Machinery	-	-	-	-	11
• Iron & Steel	-	43	14	6	16
• Timber logs	61	64	95	156	11
• Project cargo	2	2	1	2	1
• Others	7	-	12	13	6
Total	**72**	**110**	**124**	**178**	**46**
Containers					
• TEUs	3,12,189	3,37,053	3,34,925	3,46,204	3,66,377
• Weight	4,419	4,715	4,607	4,785	5,246
Grand Total	**17,873**	**20,091**	**19,845**	**20,887**	**21,595**

4.2 BCG Benchmarking Study

BCG, as part of their benchmarking study, has looked into the operation of the berths and has suggested various measures for improving the performance. The report of BCG pertaining to Cochin Port is given in the **Appendix 1**. The key observations are also discussed in the following paragraphs.

According to them, high dredging costs, management overheads and pension expenses are the factors driving pressure on profits. Dredging costs and Management overheads comprise ~60% of total operating income. Additionally, the Port has a retirement benefits liability to the labour base on account of pension and employee benefits payable.

Almost 90% cargo is handled by six private dedicated terminals. However, there is low berth utilization across these terminals, which is one of the key sources of financial pressure.

The report indicates that the ICTT has only achieved 10% of the target set for trans-shipment in last three years due to its geographic location, lack of cost competitiveness w.r.t Colombo, small parcel size etc. Thus it was suggested to increase the parcel size whereby attracting cargo from a wide hinterland, to deal with inland transport challenges via road and rail and cost in-competitiveness to reach Cochin. In addition, certain policies need to be drafted in the interest of port and people, so that the port can attract cargoes from its natural hinterland.

Currently ~1.7 MT of rice and wheat are transported into Kerala for storage and public distribution in Kerala by FCI through rail from North India and Andhra Pradesh. Rail transport from North India to Cochin is currently more economical than a multi-modal option involving transport by rail from Punjab/Haryana to Kandla followed by coastal movement to Cochin Port. Higher cost on the coastal route is primarily on account of high labour handling and bagging costs at Cochin Port. To deal with

this, it is suggested for mechanization of food grains in dry bulk and containerization of food grains in bags as relevant.

The study identified that Kerala imports of ~0.5 MTPA, via Ports of Tuticorin and Mangalore due to cost advantage. In order to attract this cargo, Cochin port must provide tariff incentives; improve productivity by mechanisation and provision of bagging facility.

POL is the largest cargo by volume handled at Cochin Port. With the planned expansion of BPCL refinery from 10 MTPA to 16 MTPA, the current occupancy of SPM of 43% will reach to about 69%, close to acceptable norms. However, given the increase in exports of POL products (5.9 MTPA), berths occupancy of NTB and SCB will reach about 88%. To cater to increased demand, it is required to improve performance of POL handling at these berths by reducing time taken for sampling and testing, which may be done by putting a lab within the premises of port area; decreasing time taken for Export documentation may be achieved by adopting e-system; decreasing the time taken by vessel during the shifting of vessel from one berth to other to handle different commodities and re-deployment of marine loading arm to reduce idle time on account of shifting vessels.

4.3 Capacity Assessment of Existing Facilities

4.3.1 General

The cargo handling capacity of port facilities is based on many factors like the vessel size, fleet mix, equipment provided and the possible handling rates, time required for peripheral activities, capacity of stackyard, number of users, grades, capacity of evacuation system etc.

4.3.2 Capacity of Berths

The capacity of existing berths is calculated assuming the mix of cargo being currently handled at these berths and the corresponding parcel sizes.

Another factor that is important in arriving at the berth capacity is the allowable Berth occupancy which is expressed as the ratio of the total number of days per year that a berth is occupied by a vessel (including the time spent in peripheral activities) to the number of port operational days in a year. High levels of berth occupancy will result in bunching of ships resulting in undesirable pre-berthing detention. For limited number of berths and with random arrival of ships, the berth occupancy levels have to be kept low to reduce this detention. The norms generally followed for planning the number of berths in modern ports to minimise the pre-berthing detention are given in **Table 4.2.**

Table 4.2 Recommended Berth Occupancy

No. of Berths	Recommended Berth Occupancy Factor
1	60%
2	65%
3 & above	70%

The available berths and the cargo handled at each of the berths during last year are presented in **Table 4.3**

Table 4.3 Berth Occupancy

S. No.	Berth Name	Cargo Handled	Total Cargo Handled (T)	No. of Ships	Avg. Parcel Size (T)	Standard Time at Berth (Days)	Current Handling Rate (TPD)	Berth Occupancy
1.	BTP	Dry/Liquid Bulk	4,92,089	43	11,444	74.4	6,612	23%
2.	COT	Crude/ POL Products	16,09,849	92	17,498	152.6	10,548	46%
3.	LNG	LNG	2,61,521	4	65,380	10.3	25,438	3%
4.	NTB	POL Products	14,39,864	143	10,069	209.0	6,888	63%
5.	Q1	Breakbulk	2,32,716	18	12,929	105.4	2,208	32%
6.	Q10	Breakbulk	4,69,498	25	18,780	126.4	3,715	38%
7.	Q2	Breakbulk	54,696	5	10,939	20.9	2,611	6%
8.	Q3	Containers	8,775	22	585	0.4	20,714	0%
9.	Q4	POL	2,27,172	58	3,917	47.7	4,761	14%
10.	Q5	Breakbulk	62,004	7	8,858	11.4	5,453	3%
11.	Q6	Breakbulk	22,212	1	22,212	6.8	3,252	2%
12.	Q7	Breakbulk	89,476	23	3,890	29.8	3,007	9%
13.	Q8	Breakbulk	3,61,879	24	15,078	115.2	3,142	35%
14.	Q9	Breakbulk	14,779	10	1,478	19.6	755	6%
15.	SCB	Liquid cargo	1,79,985	27	6,666	28.2	6,379	9%
16.	SPM	Oil	1,05,49,031	97	1,08,753	157.1	67,146	48%
17.	STB	POL Products	32,590	5	6,518	5.8	5,624	2%
18.	V2	Containers	30,14,985	268	11,250	256.8	11,740	>50%
19.	V3	Containers	24,67,736	257	9,602	314.0	7,859	>50%

5.0 DETAILS OF ONGOING/PLANNED DEVELOPMENTS

5.1 General

Cochin Port Trust has taken slew of developmental projects which are in various stages of implementation. The locations of these projects are shown below in **Figure 5.1**. Some of them are discussed in this section.

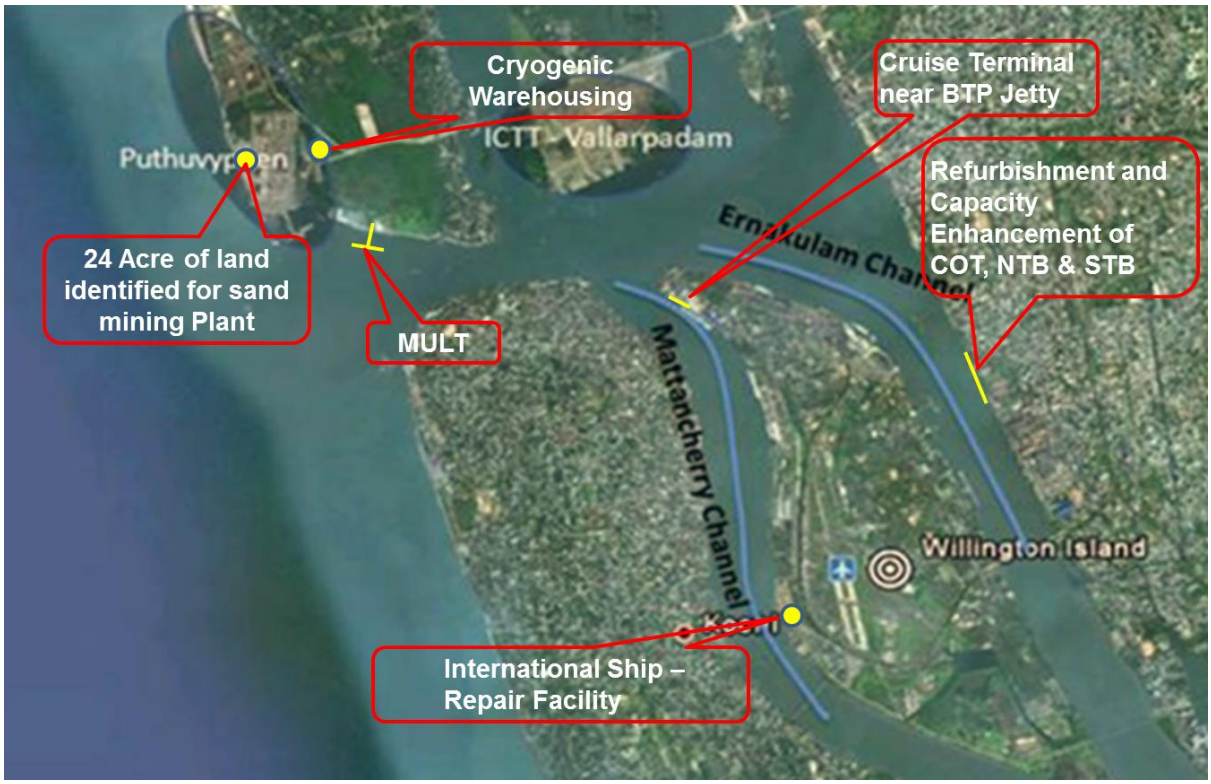


Figure 5.1 Location of Ongoing Developments

5.2 Development of an International Ship Repair Facility

The Port has awarded development of an international ship repair facility to Cochin Shipyard Limited (CSL) with an estimated investment of Rs. 970 crores. The facility is being developed on 41 acres of land on the western side of Willingdon Island along the Mattancherry channel. The facility will have a dry dock (66m × 12.5 m × 4m), slipway and a Shiplift with transfer system for 6 vessels. The Shiplift system would be approx. 120m long, with a 30 m wide lifting platform, with capacity to handle light ship weights up to 6,000 T, LOA 130 m and beam 25 m. The facility will enable ships visiting Cochin Port to undergo both floating as well as docking repairs.

5.3 Multi User Liquid Terminal (MULT)

LPG is currently imported at NMPT by IOCL and transported by road to Kerala for local consumption. This poses a safety hazard as LPG is highly combustible and numerous accidents have taken place during transportation via road. Accordingly, there is heavy pressure to move LPG off roads to avoid accidents.

Several options were explored for handling LPG with the existing port infrastructure; however, the combustible nature of the commodity poses a severe challenge in using of existing infrastructure. Existing POL berths COT and NTB are close to Ernakulam where handling of LPG is a safety concern. The existing LNG terminal set up by Petronet for LNG is under-utilized, however, the terminal has not granted permission to IOCL to handle LPG due to safety concerns.

Hence, a new facility would be required to handle LPG at Cochin Port. Cochin Port Trust and Indian Oil Corporation Limited are jointly developing 4.52 MTPA Oil cum LPG Jetty at Puthuvypeen as shown in **Figure 5.2** below. When complete, it can berth vessels with LOA up to 230 m, 13 m draft and 80,000 DWT. The berth will be captive to IOCL for 161 days a year and available to the Port for the remaining period of 204 days a year.

The jetty, when functional, will give access to 100 acres of tank farms in the Puthuvypeen Port based SEZ. 21 acres of this SEZ has already been allotted to BPCL and HPCL.

The jetty will also serve as an international Bunkering Terminal for supplying bunkers to vessels calling at the port as well as at the anchorage. The Commerce Ministry has sanctioned INR 15 crore as assistance under ASIDE for a barge jetty adjacent to the MULT Jetty for bunkering, which can handle barges with capacity ranging from 500 to 2,500 DWT.

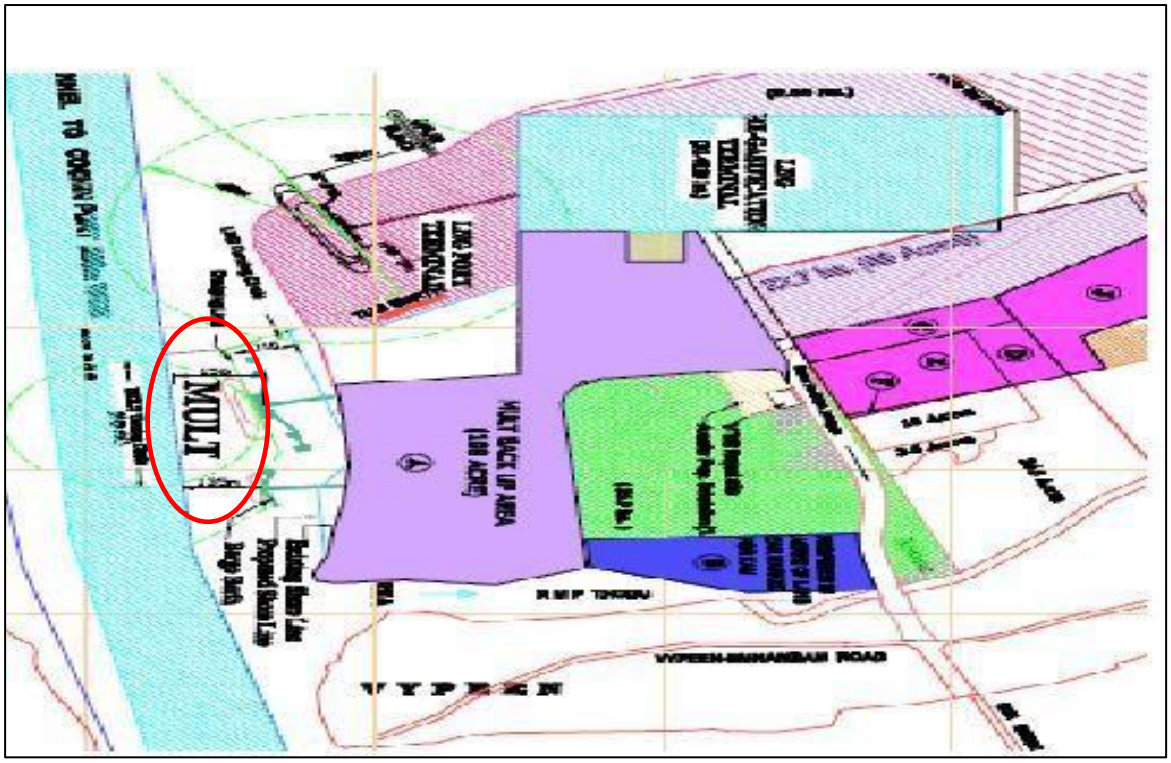


Figure 5.2 Location of Multi User Liquid Terminal

5.4 Development of Cruise Terminal cum Exhibition /Convention Hall near BTP Jetty

Cochin figures prominently in the cruise itinerary of all the major cruise lines like Carnival Cruise Lines, Royal Caribbean International and their sister affiliates. As a leading cruise destination of India, every year Cochin hosts on an average 35-45 cruise call and depending on the ship size between 500 to 3,000 international guests per call.

Buoyed by this consistent increase in the cruise tourist arrivals, Cochin Port has created a dedicated facilitation centre to cater to discerning cruise tourists. This full-fledged modern cruise terminal facility called – Samudrika - built adjacent to the all-weather BTP berth caters to the cruise ships calling at Cochin Port.

Cochin Port is also now developing a dedicated Cruise Terminal by extending the BTP/ NCB berth with the financial assistance provided by the Ministry of Tourism for INR 22.43 crores as shown in **Figure 5.3**.

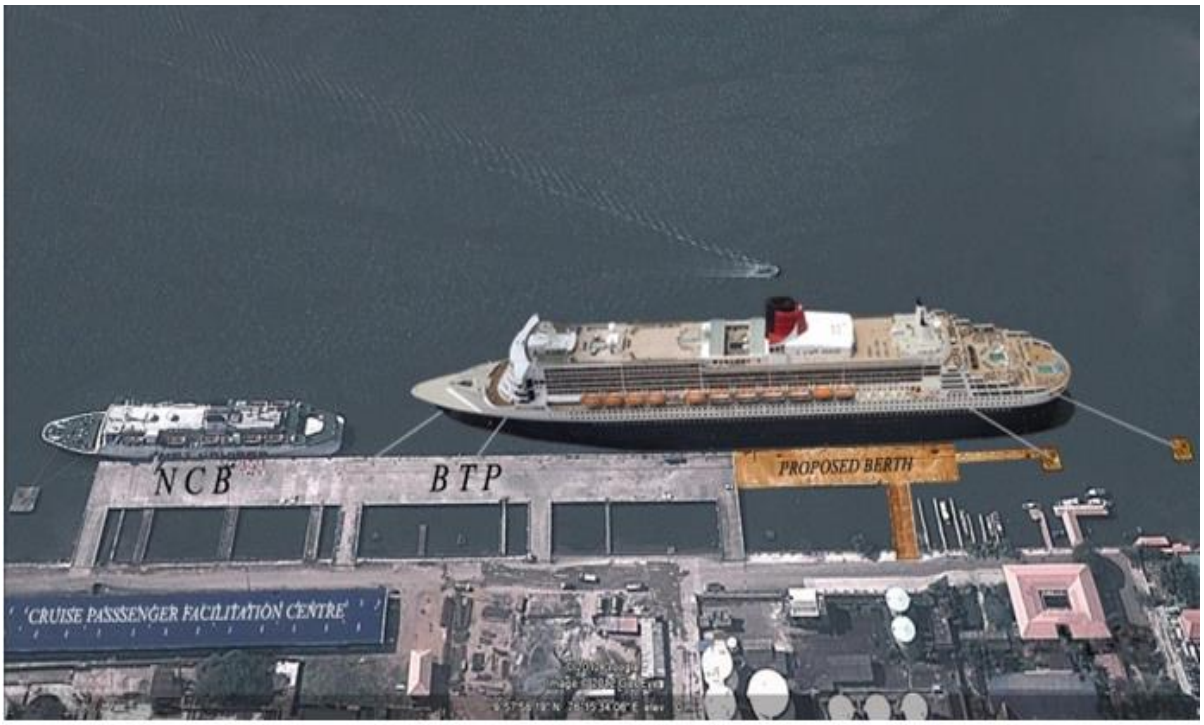


Figure 5.3 Location of Proposed Cruise Berth

5.5 Refurbishment and Capacity Enhancement of COT, NTB & STB

Cochin Port has awarded this project for INR 22.45 crores. Ministry of Shipping has sanctioned INR 14.9625 crores under assistance to Coastal Shipping Berth. The balance is being funded by BPCL. The work will be completed by September, 2016. Apart from this, the port is taking up refurbishment of STB for BPCL for handling plant fuel by laying heat traced pipelines.

5.6 Bitumen Complex

The Port is negotiating with HPCL for developing a bitumen handling facility in the site adjacent to Q4 terminal. This will serve the requirements of Kerala when Kochi Refinery stops production of bitumen.

5.7 Study for Implementing Nautical Depth Concept in Cochin Port

Many ports around the world have a problem with silt, liquid mud, deposited in the channel. Liquid silt has the characteristic of prohibiting navigation if it reaches a certain density. However, in most ports, silt with a density of 1,250 kg/l (1.2 T/m^3) and more is not navigable. The depth at which this density is found is called the Nautical Depth.

It is important to note that the sediment prevailing in Cochin channels is very fine comprising about 40% clay. The mean sediment diameter generally varies from 0.002 mm to 0.006 mm and has low density. Thus it may be relevant to study characteristic of the sediment and utilize the concept of nautical depth to reduce the maintenance dredging expenditure.

Cochin Port Trust engaged an agency for carrying out detailed study on Siltation at the Port Channels and Basins for facilitating implementation of Nautical Depth concept in the Port. The main objective of the study is to recommend parameters for implementation of nautical depth concept, so that actual depth of dredging required to be reduced.

5.8 Decongesting Vallarpadam

Cochin Port has taken up the conversion of second GIDA Bridge as an ROB and the construction of a flyover in front of the exit gate of the ICTT on the LHS of the NH - 47C on Vallarpadam to decongest the area at a cost of INR 60 crores (**Figure 5.4**). The work is expected to be completed by September, 2016. Apart from this, the port is developing a truck parking terminal on Vallarpadam in association with HPCL.

Figure 5.4 Construction of ROB to Ease Congestion

5.9 Cement Hub

Cochin Port is fast emerging as a cement hub with Ambuja Cements Limited, Ultratech Cements Limited, and Zuari Cements Limited all having Cement handling terminals. Penna Cements Limited has started construction of their facility and is expected to commission it by April, 2017, while Malabar Cements Limited is in a preliminary stage.

5.10 Grain Terminal

Kerala's consumption of rice is near about 39 lakh T/year whereas it produces only 5 lakh T/year. Considering that Kerala imports 34 lakh T of rice per annum from other states (17 lakh T by FCI and 17 lakh T by private parties) apart from 3 lakh T of wheat and pulses, the Port is trying to catalyse investments in BOT mode for a mechanised grain terminal.

5.11 Cargo Park

The port is trying to develop 1 million sqft. of warehousing space to attract traffic. The Port has earmarked 45 acres of land for the purpose.

5.12 Sand Mining Project in Cochin Port

Cochin Port Trust has been exploring methods of reducing the net expenditure on maintenance dredging. One of the possibilities in this regard is to utilise the material obtained from maintenance dredging. It is estimated that around 4 million cubic metres of sand per year is being dredged from the area around Vypeen. This area extends about 5 km into the shipping channel from the Vypeen Gut.

Figure 5.5 Sand Mining Location

The Port has secured Environmental Clearance to use the dredged spoils for beach nourishment.

It is now proposed to use this sand for construction purposes after segregating and subjecting it to washing. This will be done on a PPP (DBFOT) basis. Around 24 acres of land is available to the west of the LNG terminal in Puthuvypeen for locating the necessary plant and machinery.

Figure 5.6 Location of Availaible Land - West of LNG Terminal

When the LNG terminal runs at 5 MTPA, it will produce 2.4 MLD of de-mineralized water. This could be procured for washing operations on mutually acceptable terms from the Petronet LNG Ltd.

The Port proposes to call a tender-cum-auction for a sand mining operation to be located on this land; the period of the concession will be for 10 years. The Port will undertake the dredging and deliver the sand to this area by means of pipelines.

The bidding parameter will be the premium that the bidders offer to the Port over and above the rate charged by the Port as fixed by the Port from time to time for the dredged sand.

5.13 Cryogenic Warehousing

Cryogenic warehousing proposed is basically for perishable products like vegetables, meat, fish as also for pharma products.

The business of an LNG terminal consists of importing, storing and regasification of LNG. The process involves handling of LNG at –160° C. As a synergy many LNG terminals world over are establishing cryogenic warehouses for multiple products – perishable and other valuable products adjacent to LNG Terminals. In the process it recovers “waste cold” from LNG Terminals. The facilities will be in line with the requirements for cold storage by significantly raising the temperature from -160 ° C to -70 ° to +10° thus meeting the cooling demand of a refrigerated food warehouse and recovering the waste heat.

An area of 10 acres in Puthuvypeen next to the LNG terminal has been earmarked for setting up cryogenic warehousing using the cold energy available from the regasification process that can be used for creation of a zero CO_2 emission cold-chain hub.

Figure 5.7 Location of Cryogenic Warehouse

The Ministry of Shipping and the Ministry of Agriculture are spearheading a project to set up cold chain hubs at Ports with LNG terminals like such as Cochin Port, so that they could be developed as Perishable Handling Centres and Perishable Port Gateways.

The support from Government of India for this venture is as under:

- Fast-track Customs and phyto-sanitary clearances.
- Access to low interest fund of INR 5,000 crores from WIF from the National Centre for Cold Chain Development under the Ministry of Agriculture.
- Access to National Clean Energy Fund.
- Credit linked subsidy at 35% (upto 50%) for cold chain infrastructure.
- Investment linked 150% tax deduction.
- Automatic route clearance for 100% FDI with ECB route open.
- Service Tax exemption for warehousing or transporting of agriculture produce.

There is therefore an opportunity to utilize the earmarked area on PPP (DBFOT) basis to build and operate cold chain facilities after tying up with PLL for the cold energy.

5.14 Tea Park

Around 15 million Kg of tea gets transacted in a year at Willingdon Island in Cochin Port. However, most of the existing tea processing operations are undertaken in a traditional manner with considerable scope for improvement.

Cochin Port Trust would like to take up the development of a Tea Park with world-class infrastructure on the lines of the Dubai Tea Trading Centre to increase the quantity of tea transacted to 25 million Kg a year on PPP (DBFOT) basis.

10 acres of land on Willingdon Island has been earmarked for the same. The Tea Park would have the following operations:

1. Auction centre
2. Warehousing of teas and packing materials required for tea packaging.
3. Temperature controlled warehouses.
4. Offices for tea companies, who are users of Cochin Port.
5. Factory facility for tea companies for value added production.
6. Common blending and bulk packing facilities for tea.
7. Offices for shipping companies to bring production and export under one roof.

There is scope for funding such a development under ASIDE operated by the Department of Commerce, Government of India even for projects structured in the PPP format.

5.15 Ro-Ro Facility for Transporting Car & Cargo Bearing Trucks

Kerala is a great market for cars. The congestion on the roads is now opening up an opportunity for operating coastal Ro-Ro services for transporting cars.

Mundra to Cochin is a 5 day voyage while Cochin to Ennore is a 7 day voyage. Original Equipment Manufacturer's) OEMs like Maruti, GM, Ford, Tata, and Honda could be potential clients on the Mundra to Cochin to Ennore run while Hyundai, Nissan, Toyota, Ford, Renault could be the clients on the Ennore to Cochin to Mundra run.

Cochin Port offers good storage yards and concessional Port charges for committed, regular Ro-Ro runs.

6.0 TRAFFIC PROJECTIONS

6.1 General

Cochin is located on the south-western coast of India and serves the southern hinterland of the country primarily Kerala. Cochin currently handles ~21.4 MTPA of cargo out of which liquid cargo-POL, LNG and LPG forms the major chunk at 14 MTPA while the other commodities including containers, fertilizers, coking coal, etc. form a small share of the total traffic.

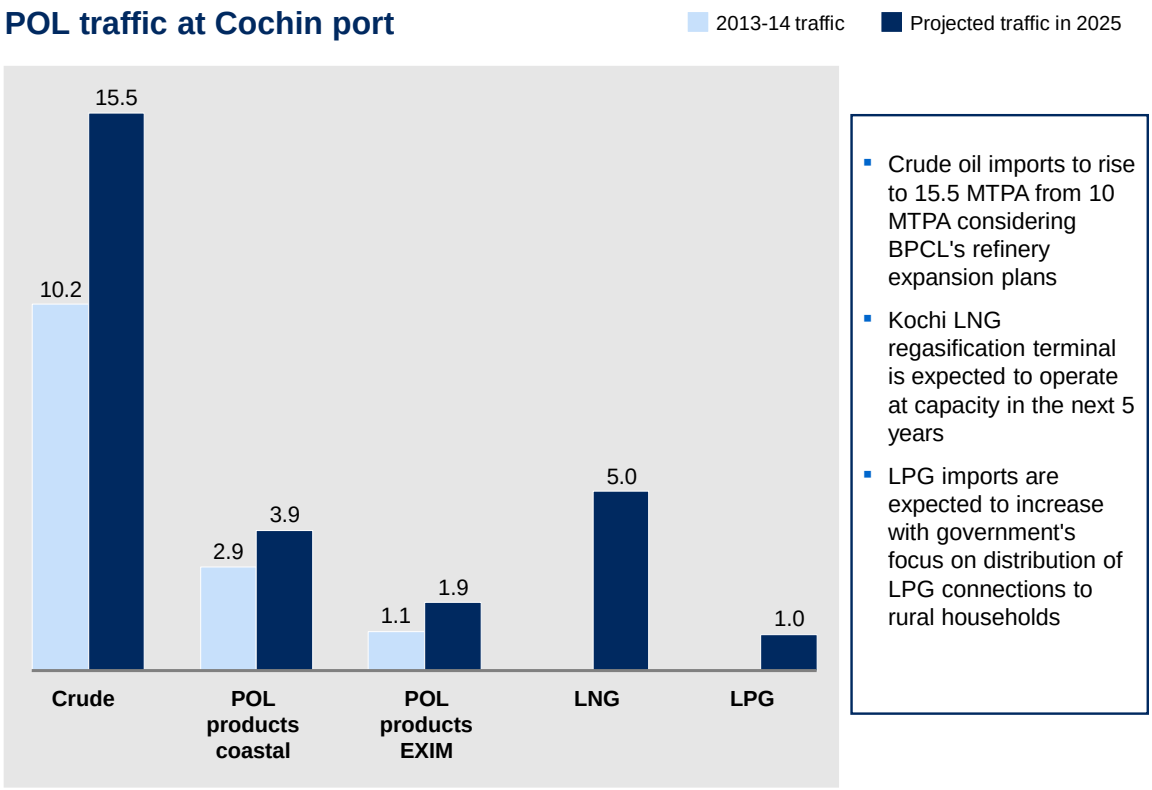
Going into the future we expect to see the total traffic handled at this port to go upto 41-43 MTPA by 2025 and 52-60 MTPA by 2035 driven primarily by the expansion of the BPCL refinery, LNG and LPG imports and growth in container volumes.

6.2 Major Commodities and Their Projections

6.2.1 POL

POL crude and product constitute the biggest portion of traffic handled at the port. Cochin handles approximately 10 MTPA of crude for the BPCL refinery out of which approximately 8 MTPA is imported and the remaining is coastal shipping of domestic crude production e.g. Bombay High to Kochi. POL products coastal and EXIM traffic form the remaining share.

Going forward, crude oil import is expected to rise from ~10 MTPA to ~15.5 MTPA considering expansion plans for BPCL refinery. BPCL currently has an installed capacity of 10 MTPA and is expected to expand to 16 MTPA by 2025. Kochi LNG regasification terminal is expected to operate at capacity in the next 5 years adding ~5 MTPA in the total traffic. LPG imports are expected to rise to ~1 MTPA by 2025 with government's focus on distribution of LPG connections to rural households. The split of the current POL traffic and the projected traffic for 2025 is shown in **Figure 6.1**.



SOURCE: Indian Petroleum and Natural Gas Statistics 2013-14; Basic Port Statistics of India 2013-14

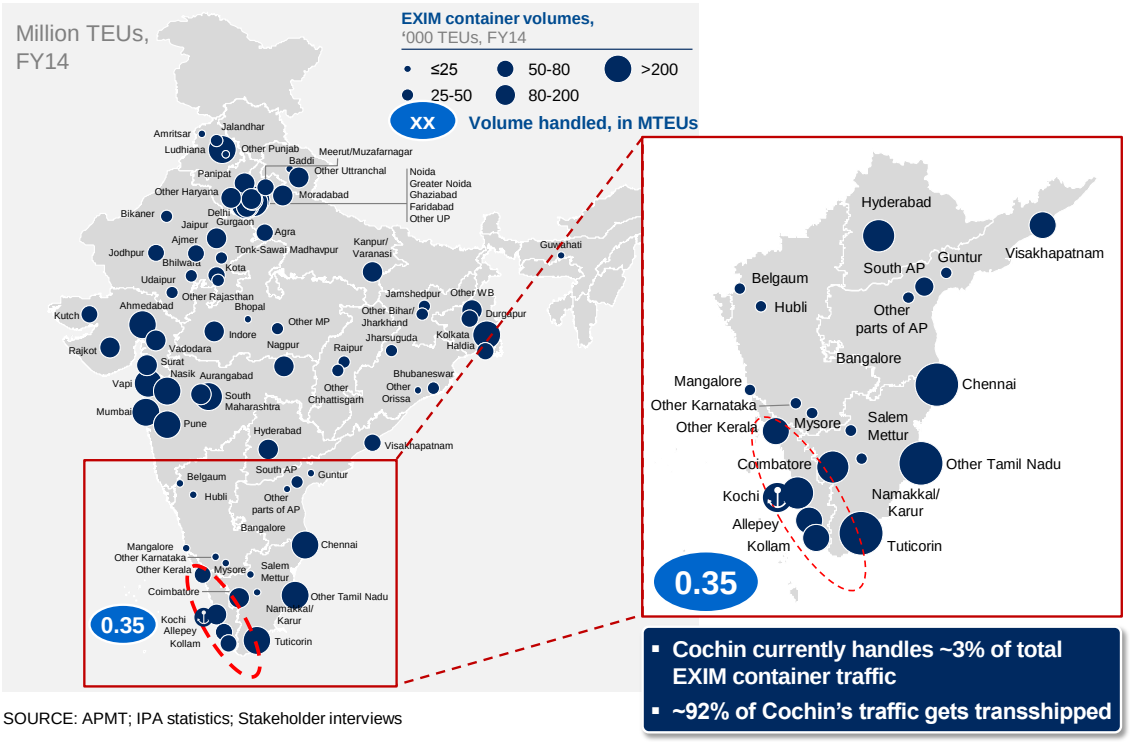
Figure 6.1 POL Traffic at Cochin Port

6.2.2 Containers

The port currently handles 0.35 MTEUs of containers serving the primary hinterland of Kerala. Kochi, Allepey and Kollam contribute ~85% to this traffic (**Figure 6.2**).

COMMODITY TRAFFIC | CONTAINER

EXIM container generating hinterlands for Cochin port



SOURCE: APMT; IPA statistics; Stakeholder interviews

Figure 6.2 EXIM Container Generating Hinterlands for Cochin Port

Table 6.1 Hinterland to Port Mapping for Containers

COMMODITY TRAFFIC | CONTAINER

Kerala is the only hinterland for container traffic at Cochin port

Primary hinterland of port

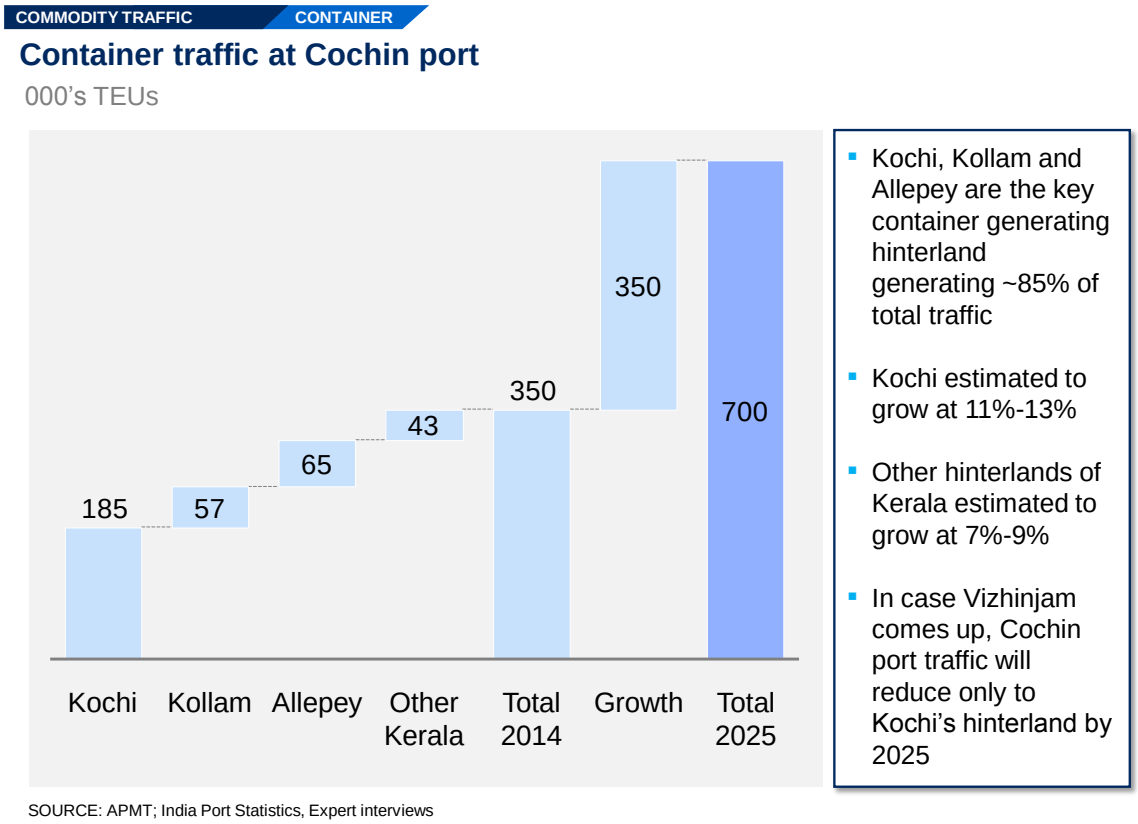
EXIM container volumes, '000 TEUs, FY14	JNPT	Mundra	Chennai	Pipavav	Tuticorin	Haldia	Cochin	Visakha-patnam	Mangalore
NCR+Punjab	936	1,264	0	329	0	0	0	0	0
Maharashtra	2,121	54	0	0	0	0	0	0	0
Tamil Nadu	0	0	1,240	0	484	0	0	0	0
Gujarat	552	262	0	169	0	0	0	0	0
Uttar Pradesh	228	274	0	107	0	0	0	0	0
West Bengal	0	0	0	0	0	458	0	0	0
Rajasthan	43	448	0	60	0	0	0	0	0
Karnataka	94	0	163	0	66	0	0	0	50
Kerala	0	0	0	0	0	0	351	0	0
Andhra Pradesh	75	0	65	0	0	0	0	110	0
Madhya Pradesh	43	70	0	14	0	0	0	29	0
Bihar/Jharkhand	0	0	0	0	0	85	0	8	0
Uttaranchal	95	0	0	0	0	0	0	0	0
Orissa	0	0	0	0	0	12	0	69	0
Chhatisgarh	15	18	0	14	0	0	0	15	0
North East	0	0	0	0	0	7	0	0	0
Port total	**4,202**	**2,390**	**1,468**	**693**	**551**	**562**	**351**	**263**	**50**

SOURCE: APMT; Expert interviews

Kochi's GDP is expected to grow at a CAGR of 11-13% while other hinterlands are expected to grow at 7-9%. Combined with the manufacturing coefficient of the state and the estimated increase in containerization, the total container traffic at the port is expected to increase to 0.7 TEUs by 2025 and 1.2 MTEUs by 2035 in the base case scenario.

The actual traffic attracted by the port would depend on a number of factors like last-mile connectivity, operational efficiency, pricing, customer preference, etc. Port has been giving a significant thrust on building a positive image and changing customer preference. In the optimistic scenario, considering an increased share of traffic from Tamil Nadu hinterlands including Coimbatore, Salem, Namakkal, etc., it is projected that the container traffic can reach ~1.1 Mn TEUs by 2025 and ~2.3 Mn TEUs by 2035.

However, this traffic might reduce only to traffic from Kochi's hinterland by 2025 if Enayam and/or Vizhinjam come up since most of the other cargo would preferably go to the gateway port. The base case projected traffic for Cochin port for 2025 is as shown below (**Figure 6.3**).



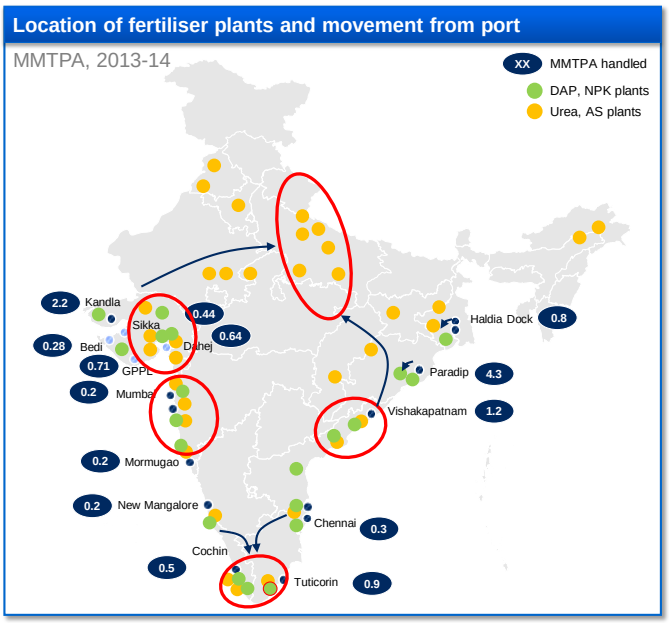
SOURCE: APMT; India Port Statistics, Expert interviews

Figure 6.3 Container Traffic at Cochin Port

6.2.3 Fertilizers

Current traffic of ~0.45 MTPA of fertilizers at Cochin port is dominated by imports of fertilizer raw material including rock phosphate, MOP, etc. The finished fertilizer forms a very small share of ~ 0.04 MTPA in the traffic. The volume of imports of fertilizer raw materials and finished products is estimated to grow to ~0.7 MTPA by 2020, 0.8-0.9 MTPA by 2025 and 1.3-1.4 MTPA by 2035. FACT-Kochi is the biggest consumer of the fertilizer raw material imports at Cochin port. The location of fertilizer plants and movement from ports is as shown in **Figure 6.4**.

The fertilisers raw material imported travels to ~4 significant clusters for processing



SOURCE: Ministry of fertilisers

Figure 6.4 Location of Fertilizer Plants

The overall commodity wise projections for the port are shown in **Table 6.2**.

Table 6.2 Traffic Forecast for Cochin Port

Units: MMTPA (except Containers)

Cochin Port – Traffic Projections

xx Base Scenario xx Optimistic Scenario

Commodity	2014-15	2020	2025		2035		Remarks
Liquid Cargo							
POL	14.0	24.1[1]	27.3	27.7	30.1	34.1	▪ Increase in crude imports driven by BPCL Kochi refinery expansion and LNG imports
Dry and Break Bulk Cargo							
Thermal Coal (Loading)	0.0	0.0	0.0	0.0	0.0	0.0	
Thermal Coal (Unloading)	0.0	0.0	0.0	0.0	0.0	0.0	
Coking Coal	0.10	0.13	0.2	0.2	0.3	0.4	
Iron Ore	0.0	0.0	0.0	0.0	0.00	0.0	
Fertilizers	0.45	0.66	0.8	0.9	1.3	1.4	
Containers and other Cargo							
Containers (MnTEU)	0.35	0.55	0.70	1.05	1.16	2.3	▪ Optimistic scenarios refer to increased share of container traffic from Coimbatore, Salem, Namakkal, etc. Development of Vizhinjam/ Enayam would reduce the traffic significantly
Others	1.8	2.5	2.8	3.2	3.8	4.2	▪ Highly fragmented
Total (MMTPA)	**21.4**	**35.3**	**41.1**	**47**	**52.1**	**73**	

1 Assuming LNG re-gasification terminal is operational at 60% capacity

Conversion Factor Used for Containers Projections: 1 TEU = 14.3 Tons

6.3 Coastal Shipping Potential

For the hinterland of Kerala and western Tamil Nadu, Kochi can facilitate the movement of coastal shipped cargo from other states. Cement and food grains can be major commodities unloaded at Cochin port in case coastal shipping revolution takes place in the country.

Cement: Cochin port can be the destination port for coastally shipped cement from Andhra Pradesh. ~3-4 MTPA cement can be coastally shipped to Cochin port by 2025. ~50% of this will be destined for serving the demand of western Tamil Nadu and remaining for Kerala hinterland. Additional ~2.5 MTPA cement can be coastally shipped to Cochin by 2025 contingent on the development of coastal cement cluster in AP and the movement of the same facilitated by the proposed Central AP port (**Figure 6.5** & **Figure 6.6**).

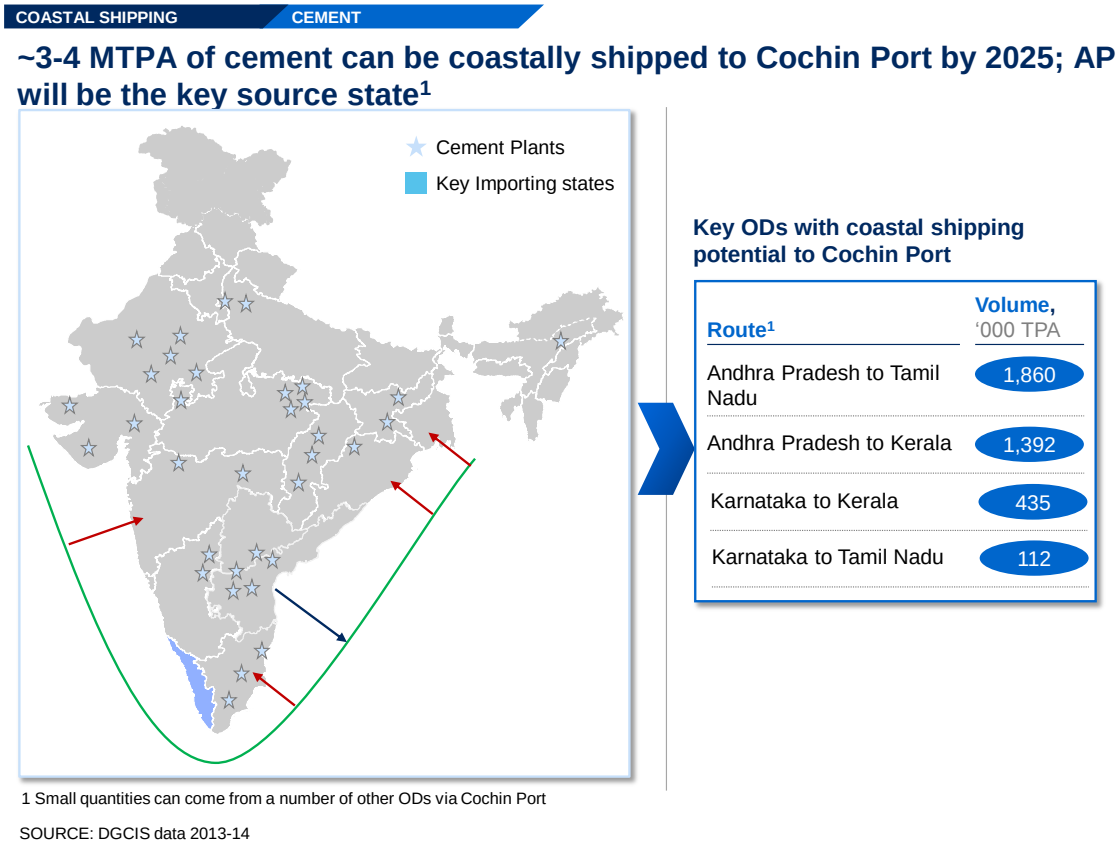


Figure 6.5 Coastal Shipping Potential of Cement to Cochin Port by 2025 from AP

COMMODITY TRAFFIC CEMENT

Additional ~2.5 MTPA can be coastally shipped to Cochin Port from the proposed cement cluster in AP by 2025

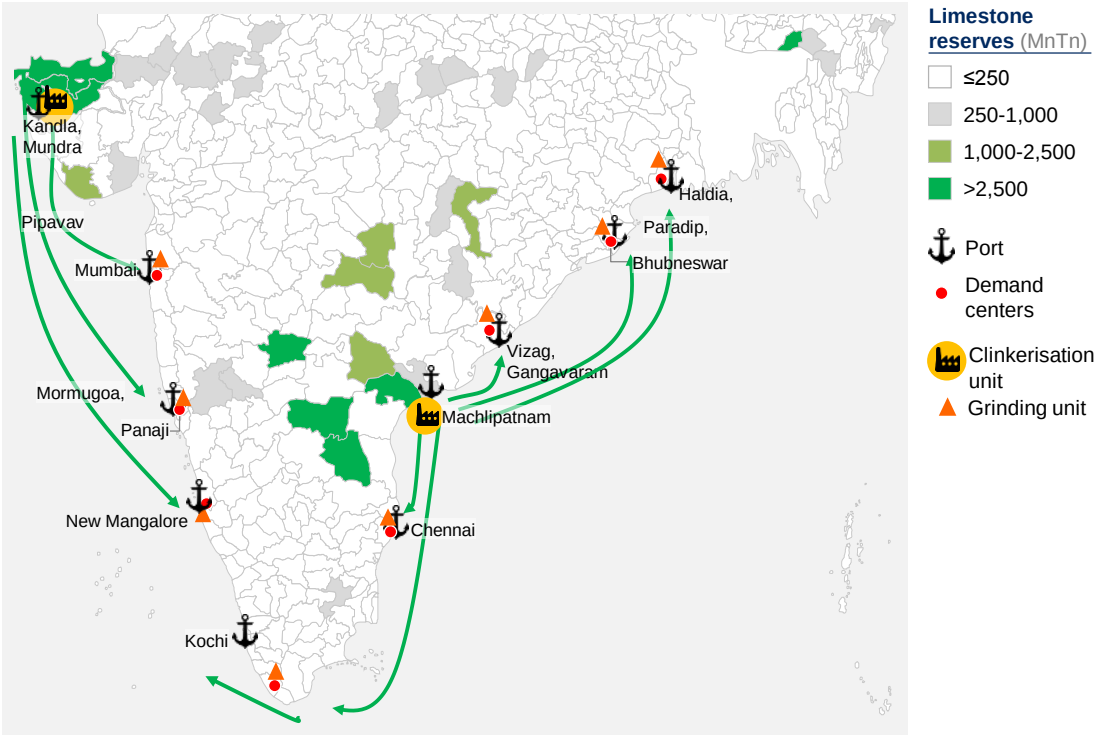
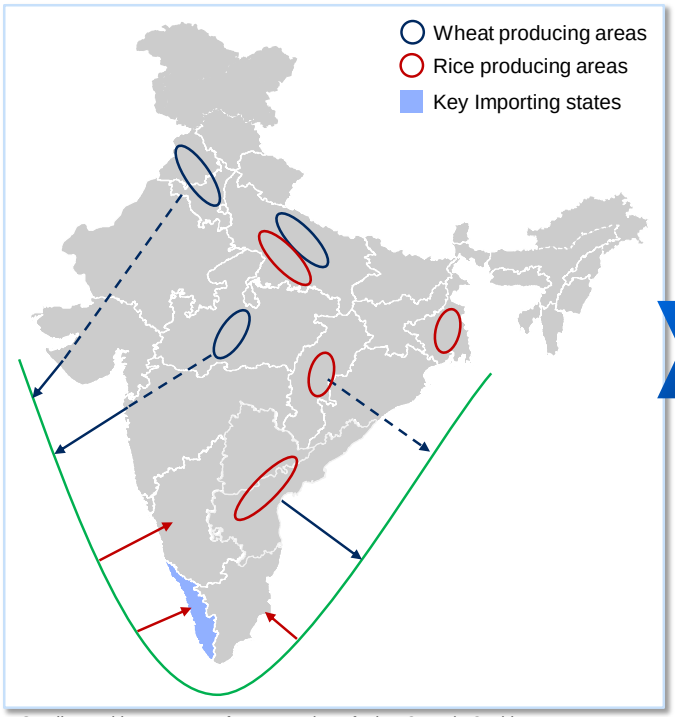


Figure 6.6 Coastal Shipping Potential of Cement to Cochin Port by 2025

- **Food Grains:** There is a potential for coastal shipping of ~1.6 MTPA of food grains to Cochin port by 2020 which is expected to grow to ~2 MTPA by 2025 and ~3 MTPA by 2035. This would serve the demand from hinterland of Kerala and western Tamil Nadu. This traffic will mostly come from states of Punjab (Wheat) and Andhra Pradesh (Rice). The increase of coastal traffic of food grains is contingent on the development of food grains handling facility at the exporting terminals in Kakinada and Kandla. For the same, mechanization projects have been suggested under Sagarmala to enable the coastal movement (**Figure 6.7**).

COASTAL SHIPPING | FOODGRAINS

~2 MTPA of food grains can be coastally shipped to Cochin Port by 2025; Punjab being the key source of wheat and AP for rice



Key ODs with coastal shipping potential to Cochin Port

Route[1]	Volume, '000 TPA
Punjab to Kerala	503
Punjab to Tamil Nadu	141
Madhya Pradesh to Tamil Nadu	251
Haryana to Kerala	169
Haryana to Tamil Nadu	128
Andhra Pradesh to Kerala	242

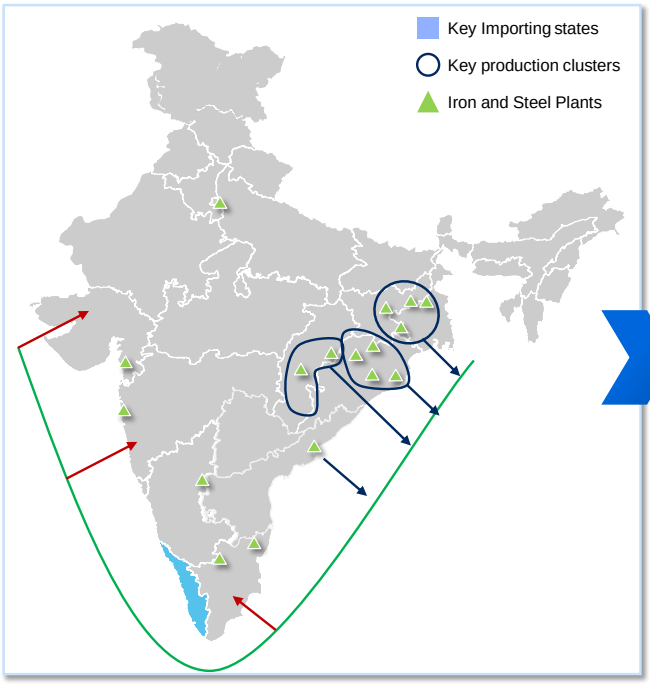
1 Small quantities can come from a number of other ODs via Cochin Port

Figure 6.7 Coastal Shipping Potential of Food Grains to Cochin Port

- **Steel:** Cochin can also facilitate ~0.6 MTPA of coastal movement of steel by 2025 most of which will serve the demand of western Tamil Nadu. This traffic is expected to increase to ~1.15 MTPA by 2035. Andhra Pradesh and Odisha will be the primary source states for this movement. Multiple steel plants on the eastern coast- Vizag (Through Vizag port), Rourkela (Through Paradip port), Jamshedpur (Through Kolkata port), Meramandali (Through Paradip port), etc. have the potential to move traffic to coastal route (Figure 6.8**)**.

COASTAL SHIPPING | IRON AND STEEL

~0.6 MTPA of steel can be coastally shipped to Cochin Port by 2025; Andhra Pradesh and Odisha being the primary source state



Key ODs with coastal shipping potential to Cochin Port

Route[1]	Volume, '000 TPA
Andhra Pradesh to Tamil Nadu	233
Andhra Pradesh to Kerala	66
Odisha to Tamil Nadu	198
Jharkhand to Kerala	55
Jharkhand to Tamil Nadu	76

1 Small quantities will move on a number of other routes via Cochin port

SOURCE: DGCIS data 2013-14

Figure 6.8 Coastal Shipping Potential of Steel to Cochin Port

- **Fertilizers:** There is a potential for coastal movement of fertilizers from Cochin of ~0.24 MTPA by 2020. Coastal districts of Andhra Pradesh and West Bengal will be the primary consumers of the same. This traffic can increase to ~0.30 MTPA by 2025 and ~0.44 MTPA by 2035.

The table below summarizes the potential of coastal movement for key commodities.

Table 6.3 New Opportunities Possible via Coastal Shipping

Cochin Port – New Opportunities Possible via Coastal Shipping

Units: MTPA (except Containers)

Commodity	2020	2025	2035
Steel (Loading)	0.06	0.08	0.15
Steel (Unloading)	0.48	0.64	1.15
Cement (Loading)	0.01	0.01	0.02
Cement (Unloading)	2.85	6.32	9.34
Fertilizer (Loading)	0.24	0.30	0.44
Fertilizer (Unloading)	0.04	0.05	0.08
Food Grains (Loading)	-	-	-
Food Grains (Unloading)	1.64	2.00	2.96

- 2.5 MMTPA can be shipped from Central AP cement cluster (If Central AP port comes up)

7.0 CAPACITY AUGMENTATION REQUIRMENTS

7.1 Existing Port Capacity

Based on the analysis of existing port infrastructure, the current capacity of the port is assessed as given in **Table 7.1**.

Table 7.1 Existing Port Capacity

S. No.	Berth Name	Cargo Handled	Total Cargo Handled (T)	No. of Ships	Avg. Parcel Size (T)	Standard Time at Berth (Days)	Current Handling Rate (TPD)	Berth Occupancy (%)	Capacity (MTPA)
1.	BTP	Dry/Liquid Bulk	4,92,089	43	11,444	74.4	6,612	23%	1.53
2.	COT	Crude/ POL Products	16,09,849	92	17,498	152.6	10,548	46%	2.44
3.	LNG	LNG	2,61,521	4	65,380	10.3	25,438	3%	5.88
4.	NTB	POL Products	14,39,864	143	10,069	209.0	6,888	63%	1.59
5.	Q1	Breakbulk	2,32,716	18	12,929	105.4	2,208	32%	0.51
6.	Q10	Breakbulk	4,69,498	25	18,780	126.4	3,715	38%	0.86
7.	Q2	Breakbulk	54,696	5	10,939	20.9	2,611	6%	0.60
8.	Q3	Containers	8,775	22	585	0.4	20,714	0%	4.78
9	Q4	POL	2,27,172	58	3,917	47.7	4,761	14%	1.10
10.	Q5	Breakbulk	62,004	7	8,858	11.4	5,453	3%	1.26
11.	Q6	Breakbulk	22,212	1	22,212	6.8	3,252	2%	0.75
12.	Q7	Breakbulk	89,476	23	3,890	29.8	3,007	9%	0.69
13	Q8	Breakbulk	3,61,879	24	15,078	115.2	3,142	35%	0.73
14.	Q9	Breakbulk	14,779	10	1,478	19.6	755	6%	0.17
15.	SCB	Liquid cargo	1,79,985	27	6,666	28.2	6,379	9%	1.47
16.	SPM	Oil	1,05,49,031	97	1,08,753	157.1	67,146	48%	15.51
17.	STB	POL Products	32,590	5	6,518	5.8	5,624	2%	1.30
18.	V2	Containers	30,14,985	268	11,250	256.8	11,740	>50%	7.50
19.	V3	Containers	24,67,736	257	9,602	314.0	7,859	>50%	7.50
Total									**55.30**

It may be noted that the existing port capacity is based on the current port infrastructure. However the mechanisation of the berths to handle specific cargo shall improve the capacity of that particular berth.

7.2 Requirement for Capacity Expansion

Considering the traffic potential and the capacity of existing berths, the requirement of capacity augmentation have been worked out. These are indicated **Table 7.2**.

Table 7.2 Capacity Augmentation Required (MTPA)

Cargo Handled	Berths Assigned	I/E	Current Capacity (MTPA)	2020		2025		2035	
				Projected Traffic (MTPA)	Capacity Augmentation Required over current (MTPA)	Projected Traffic (MTPA)	Capacity Augmentation Required over current (MTPA)	Projected Traffic (MTPA)	Capacity Augmentation Required over current (MTPA)
Crude & POL	Q4,COT,NTB,STB,SPM, BTP,NCB,SCB	I	24.94	18.10	0.00	21.30	0.00	24.10	0.00
LNG	LNG	I	5.00	5.00	0.00	5.00	0.00	5.00	0.00
LPG	MULT	I	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Dry & Breakbulk	Q1-Q3,Q5-Q10,UTL	I	10.36	3.29	0.00	3.80	0.00	5.40	0.00
Containers	V2, V3	I/E	15.00	7.87	0.00	10.01	0.00	17.40	2.40
Total		I/E	**55.30**	**35.26**	**1.00**	**41.11**	**1.00**	**52.90**	**3.40**

It could be observed that while there is no specific need for creation of the additional berths to cater to projected traffic, several initiatives in terms of mechanisation of the specific cargo and redevelopment of existing berths needs to be taken.

8.0 SCOPE FOR FUTURE CAPACITY EXPANSION

8.1 General

Presently, the cargo profile of Cochin port traffic is dominated by Crude and POL followed by Containers, Cement and Fertilizers in that order. The rest of cargoes beyond these are highly fragmented and their individual volumes are too small.

The OD studies as part of the assignment though continue to uphold the order of importance of these cargoes over the master plan horizon in terms of volumes, it also projects opportunities that can be expected in respect of certain other cargoes that are not handled hitherto in any significant quantity like import of food grains, steel and a quantum jump in cement and fertilizers through coastal shipping opportunities. The import of crude palm oil which now stands banned may be revived if there is policy shift by the Government.

Keeping the above cargoes in view, the cargo augmentation proposals outlined below are envisaged on the basis of the following guidelines:

- That the existing berthing infrastructure which has a low occupancy need to be put to optimal use by handling the cargo over the master plan horizon to the possible extent.
- All present and future handling systems shall ensure clean and environmental friendly methods and shall be in line with ecology of inland waterways, the naval base in the wellington island and the habitation in and around the place.
- Diversion of cargo from other mode of transportation now in vogue viz., Rail and Road shall be considered.
- The traditions and practices in Kerala in general and Cochin port in particular more specifically the labour force not being inclined to handling by manual labour methods unlike those in other ports need to be kept in view apart from high labour costs.

The proposals therefore envisage the highest level of mechanisation and automation which may be different from other ports.

8.2 Cargo Augmentation Projects

8.2.1 Container Cargo

8.2.1.1 General

International Container Transhipment terminal (ICTT) at Vallarpadam terminal, with its strategic location close to international sea route was envisioned to bring back India's international container cargo that is being transhipped through the port of Colombo and Dubai. With this vision it became the first container terminal in the country to operate in a special economic zone.

However, the terminal has actually handled 0.37 MTEUs in 2014-15, which is far below the figure of 0.55 MTEUs that it needs to handle to just breakeven.

This is in spite of the fact that about two years ago, the Government granted the ICTT a cabotage exemption, which permits foreign lines to operate feeder service between Vallarpadam and any other port in India. It was thought that this would attract mother vessels bringing containers from other ports but that did not happen and the ICTT continues to handle very little transhipment cargo. Though ICTT does match the tariff of Colombo to some extent, the facilities that Colombo has established and more particularly the number of liner services that call has no comparison.

8.2.1.2 Issues Identified with the Terminal

During the course of this Master Plan study some of the issues relating to the lower container throughput at ICTT have been identified as mentioned below:

- The terminal has no freedom to have its own tariff as it is regulated by TAMP thus lacking a level playing field.
- Initial disputes between Customs and SEZ authorities over jurisdictional control with customs insisting on examining transshipment containers which does not happen anywhere as they are already cleared by customs at load port.
- There is only one liner which brings deep draft large mother vessels. DP World despite being a global port operator with business association with several shipping lines could not bring any major lines.
- The perceived and actual labour problems that plague the region.
- Development of Vizhinjam and Colachel ports as transshipment hubs, which if happen may reduce the container traffic significantly.
- Other Indian ports competing for the same traffic.

Apart from the above the following is also noted with regard to the equipment provided at the terminal:

1. For two berths of total 600 m length only 4 RMQCs and 2 Mobile harbour Cranes have been provided.
2. RMQCs and mobile harbour cranes in tandem are not ideally suited for ship handling due to basic difference on how they place containers on the ITVs. Unlike RMQC the ITVs lane is beyond the footprints of the mobile harbour crane. This is also a reason that the two mobile harbour cranes are hardly being used.
3. At the Transhipment ports and also ports having direct calls, it is a usual practice to deploy 4 to 5 cranes on the mainline vessels for faster turnaround. In the present case two cranes per vessels can be deployed (assuming the other berth is also occupied).
4. It is further observed that the present 15 RTGS are just sufficient for the present fleet of Quay cranes. The equipment in the terminal may need matching augmentation of equipment in all the areas.

The points are just to indicate that there could be a negative perception of the users about the adequacy of the terminal facilities. The decision to deploy additional equipment has to be best left to the PPP operator.

8.2.1.3 Suggested Measures

Based on the traffic projections, the terminal does not need any additional berthing facilities till 2025 and thereafter also there is provision for the present operator to create additional berths.

Apart from that, the operator has to assess whether an additional berth of say 150 m length (extension of existing berths to west) could be provided specifically for the feeder vessels where the existing two mobile harbour cranes could be deployed. Alternatively, the operator may provide additional RMQC for increasing the berth productivity that can reduce the turnaround time of ships.

The terminal operator has to merely augment the onshore facilities in the terminal to the appropriate level and the port has to maintain the promised depths of 15.5 m below CD which is contractual obligation on the part of the port, thus enabling main line vessels of requisite draft call at ICTT.

In order to avoid congestion on roads and to ensure that the container trailers entering the terminal does not block the road margins, it is proposed that a holding yard be created for which adequate land area belonging to FACT is already identified. Before the traffic reaches a level of 0.5 MTEUs, it is proposed that the terminal operator may develop such facility with systems to regulate movement of container trailers before they enter the main terminal. The holding yard will serve this purpose of regulating the inward movements before they enter Vallarpadam.

8.2.2 Setting of Edible Oil Terminal

8.2.2.1 General

Till 2007, Cochin Port was handling palm oil imports. The volume ranged from 0.1 to 0.15 MTPA. However, during October, 2007, the Union Commerce Ministry imposed a ban on Palm oil imports based on request from the State Government which felt that the interest of the coconut farmers in the state would be better served if palm oil import through Cochin port is stopped. This has resulted in the increased spending of about INR100 crores extra for palm oil imported through the neighbouring port of New Mangalore while port facilities at Cochin are lying severely underutilised. This should be brought to the notice of the State Government as well as the Central Government and impressed upon to lift the ban.

8.2.2.2 Market Overview

India has a large consumption of edible oil in consonance with the population. India's local production of edible oil (mustard oil; soya bean oil; groundnut oil; sunflower oil & palm oil) is just short of 10 MTPA while the consumption is more than double this. During 2014-15, the domestic production was 9.74 MT and the imports were about 12 MT. The break up details as well as the source countries is given in the tables hereunder.

During 2013-14, Kolkata/Haldia ports handled about 2.1 MT of edible oil; Chennai port handled about 1.0 MT; Mumbai/JNPT ports handled about 1.2 MT; Kandla port handled about 2.5 MT and the balance by other ports.

8.2.2.3 Cochin Port and Palm Oil Imports

The Board of Trustees of Cochin Port had been trying to impress upon the State Government on the futility of the ban. The issue had been taken up in the past as it was apparent that the ban was not serving the purpose for which it came into effect.

In reality the Palm oil imports that take place through the port of New Mangalore get moved through road mostly after refining and packing for open market. This thrives as there is no ban on such movement or trade. The net result is that the cost of Palm oil in Kerala costlier by about INR 2.50 per kg than it would cost of imported through Cochin. At this rate for an estimated 0.4 MT being received through New Mangalore for the Kerala Market there is an additional cost of INR100 crores per annum. This has an impact on the State economy. This additional cost is on account of road transport.

8.2.2.4 Policy Change Required – Flagging the Issue

This fact viz. that the people of Kerala are spending around INR 100 crores extra for palm oil imported through the neighbouring port of New Mangalore while port facilities at Cochin are laying severely underutilised should be brought to the notice of the State Government as well as the Central Government. Both the Governments should be impressed upon to lift the ban.

While there is nothing novel about handling crude Palm oil through Cochin port as such, the proposal now envisages flagging the issue. The proposal seeks a modal shift by permitting imports of Palm oil through Cochin port rather than its transportation into the state of Kerala from the Port of New Mangalore by road which is now taking place with an additional cost. The proposal also envisages creation of well-defined facilities for import of Crude Palm oil through the Port and for making use of existing berth and other port infrastructure and more particularly the land area.

8.2.2.5 Advantages of Channelizing Imports through Cochin

The import of crude palm oil through the port of Cochin has the following advantages.

- Import of Crude Palm oil can be affected through the existing berthing infrastructure with no additional investment to port authority.
- Importers who have earlier created storage tanks for Palm oil but have subsequently modified them for other purposes may make use of them more effectively. They may get encouraged to put up further facilities for storage, refineries to convert raw Palm oil into ready to use refined Palmolein oil and packaging units in the vicinity of port. They may consider putting up Palm oil refineries in the port lands which means their leasing of port lands on long term basis, as it would be a port related activity.
- This may generate income to the port authority from land which is otherwise lying idle. For this purpose, the port may consider long term lease (of say 30 years).
- It may generate local employment and encourage local skills and entrepreneurship.
- Most importantly, there will be savings on account of reduction in road freight and may help decongest highways from Mangalore to Kerala, albeit in a small way.
- Import of Edible oils in bulk does not create any labour issues as involvement of manual labour is negligible.

8.2.2.6 Development of Handling Facilities in the Port for Palm Oil Imports

In the eventuality of the proposal materialising, it is proposed that a berth/group of berths be identified for berthing of edible oil vessels. It is noted that the BTP and NCB berth is eminently suitable for this purpose on account of the following.

1. The berth has a length of about 425 m. The maximum DWT of Palm oil vessels is in the region of 45,000 DWT with an LOA of 183 m. As such two edible oil vessels can be handled simultaneously at this berth. The draft will be limited to 10.15 m.
2. This is a captive berth for cruise vessels which will have priority. But it is not expected to pose any serious limitation as cruise calls are about 40 or so in a year and their stay is limited to day light hours during these days. Also they call up during season which is confined to Nov to April. In any case cruise vessels have a firm time table and planning around them will be easy for other vessels.
3. Being a cruise berth, edible oil handling will not in any way cause problem in maintaining clean environment in berth and the berth can be vacated at a short notice and in a matter of a few hours.

8.2.2.7 Infrastructure Proposed - Pipelines

Edible oil requires only a shore pipe line for their conveyance from wharf side to their storage tanks. The size of pipe line required would depend on the rate of discharge aimed at and the length of pipe line.

In India edible oil imports over a period have consolidated around a few edible oil importers who have their own port based tankages. In addition there are two or three service providers who serve importers by way of putting up storage facilities and hire them to importers. Such infrastructure includes edible oil tanks, pipe lines from berths to tankage, lorry loading facilities for evacuation in addition to safety; security etc., as the edible oil by each importer comes is small parcels, a pipe line size of 200 mm dia. or so would be normally adequate. In almost all government owned Indian ports where edible oil is handled individual importers puts up their exclusive pipe lines and in many cases where same or similar edible oil is handled from the same berth, they end up having multiple pipe lines corresponding to each importer.

It is proposed to rationalise this by proposing only two pipe lines from BTP Berth to enable handling two vessels simultaneously as the berth has adequate length for the purpose.

Based on the geography of BTP berth vis- a- vis existing and potential storage tank farms, it is expected that the length of pipe lines will be in the region of s less than a km. For a vessel parcel size of 10,000 T an average pumping rate of about 150 TPH is achieved with an 8” dia pipe lines while handling crude palm oil.

It is proposed that two no. 12”dia pipe lines be laid from BTP Berth to a point nearest to the land area where the prospective edible oil tank farms will be located. The two pipe lines will serve the two edible oil vessels that can be berthed and handled simultaneously in BTP Berth area.

It is relevant to note that edible oil from a single berth is handled through a single pipe line in some of the private ports. For example in the port of Krishnapatnam, crude Palm oil is discharged through a single 16”dia pipe line over a length of about 6.5 km to various private tankage and edible oil refineries

and a high handling rate of 600 TPH is achieved. The port authority itself does this and charges for the service. This enables avoidance of multiple pipe lines.

8.2.2.8 Operation of Pipe Lines and Pigging

It is further proposed that the pipelines may be piggable with a pig launching station on the berth end and the pig receiving station on the other end.

Normally after completion of discharge of crude palm oil of one user, the line contents will be evacuated by suck back arrangement from the tank farm side of the respective user installation. Normally they may handle crude palm oil and the same pipe lines can be used for multiple users one and after another in each of the berths. In case the same pipe line is to be used for others like refined palm oil or any other oil, the line can be cleared by launching a PIG which process is very uncomplicated, inexpensive and widely used.

8.2.2.9 Way Forward

The proposal elaborated herein is meant for flagging the issue to be taken up by port with the State Government and Central Government. The expenditure involved in implementation is close to Nil. The edible oil importers can share the cost of pipe line among themselves which is a onetime capital expenditure for them.

At the estimated potential of o.4 MTPA, the port may get revenue of over INR 4 Crores (@ INR 109.20/T) on cargo related charges alone. This is in addition to revenue on account of vessel related charges and estate rentals.

The proposal would involve a political decision on the part of Governments as it would involve public opinion as well.

8.2.3 Mechanised Fertilizer Loading Facility

As per the above possibilities for loading of fertilizers range from 0.24 MT in 2020 increasing to 0.3 MT by 2025. Assuming that the fertilizer to be exported will be in bulk and it will be brought to the port in bulk, it is proposed that the same may be handled berth no Q7 and through a flat storage arrangement.

The fertilizer will be brought from the factory in bulk and unloaded in a shed adjoining the present berth and when the vessel arrives the cargo shall be fed by special loaders into hoppers which in turn feed on to a conveyor inside the shed and that is led through an elevated conveyor into a fertilizer loader for loading into the ship seamlessly. The entire arrangement will be semi-mechanized with the following steps in the process.

Receipt of fertilizer bulk through Tipper Lorries → Unloading in flat storage shed by tippers → stacking by front end loaders → Reclaiming by Front end loaders for ship loading → feeding into ground level hoppers → Shed conveyor and dock conveyors → Fertilizer loader.

A typical fertilizer loader that can be deployed will alone cost about 20 Crores. But the loading facility for handling the projected small quantity of 0.2 to 0.3 MTPA will be very unviable. It is therefore recommended that the fertilizers in bulk be handled by ship's gear and its grabs loading into ship's holds.

8.2.4 Mechanised Food Grain Handling Facility

8.2.4.1 General

The state of Kerala is predominantly consumes rice and the consumption of food grains is about 3.5 MT of which only about 0.4 to 0.5 MT is produced in the state. The state predominantly imports rice from the state of Andhra Pradesh. The movement of rice presently takes place by rail and only a small portion is by sea and that too for the last two or three years as can be found from **Table 8.1** below.

Table 8.1 Details of Food Grain Movement by FCI from Other Regions/States into Kerala

S. No.	Year	Rice (T)			Wheat (T)		
		By Road	By Rail	By Sea	By Road	By Rail	By Sea
1.	2012-13	0	9,68,348	0	0	5,46,253	0
2.	2013-14	0	11,61,043	0	0	3,90,145	0
3.	2014-15	0	11,08,231	1,09,075	0	3,39,463	0
4.	2015-16 (Anticipated)	0	10,50,000	60,000	0	4,20,000	0
5.	2016-17 (Projections)	0	10,50,000	60,000	0	4,20,000	0
6.	2017- 18 (Projections)	0	10,50,000	60,000	0	4,20,000	0

The supply of rice to the state government's public distribution system is channelled through Food Corporation of India which procures and transports the same from one region to the other. The table above indicates the amount of rice and wheat that is moved by FCI and it is found that the movement of rice is predominantly from Andhra Pradesh to Kerala and all by rail. The origin is predominantly from east Godavari, west Godavari and Krishna districts of present Andhra Pradesh and Nalgonda district of Present Telangana state. The rice is transported by rail in bags and with loading taking place in various sidings of FCI godowns in that the origin state, transported to Kerala and unloaded at similar FCI godown sidings in Kerala.

In addition various private agencies from Andhra Pradesh and more specifically by rice millers of Andhra Pradesh who get permissions to move to other states after supply of government levy rice to that state government, transport rice for open market consumption of Kerala. On detailed interactions with FCI and other informed agencies it is found that movement by sea in large volumes from Andhra Pradesh to Kerala many not be feasible in near future in view of subsidised railway tariff and as the port of Kakinada is not close enough to a number of paddy producing centres in that state and as it involves multiple handling and ultimate costing is not favourable. In view of this the volume of rice movement through sea from Andhra Pradesh will remain low.

As regards wheat the requirement is mostly by flour mills which are supplied by FCI and by private trade. During the current year it is seen that about 3 shipments of wheat was imported from abroad of

which a large quantity is stored still in port's covered storage sheds. Never the less the government of India has plans to promote model shift in logistics of food grain movement and it is identified that the port of Kandla will the exporting port where mechanized bulk loading facilities will be put up both for foreign and coastal shipment of wheat and Cochin is identified as a potential port for unloading.

In order to handle the projected food grain traffic in bulk it is proposed that a bulk food grain unloading terminal be planned in berth in Q6 in Ernakulam wharf. The unloading terminal may be developed for 0.5 MT.

8.2.4.2 Receipt through Coastal Shipments and Unloading

The wheat received through coastal vessels in bulk is unloaded by deploying a gantry screw type unloader which lifts the grains from the ship's hatches and through a horizontal conveyor discharges into a closed type shore conveyor on the rear of the berth

8.2.4.3 Types of Storage

There are broadly two types of bulk storage of food grains viz., Flat storage and Silos. The former can be resorted to when land and labour is cheap whereas the later viz., Silo storage is the preferred option when full scale mechanization is required with least manual intervention.

Flat Storage Facility

In a mechanized flat storage shed the unloaded grain received from the dock conveyor will be conveyed to a roof top conveyor from which the grain is dropped through a mobile tripper to spread evenly on the shed for the designed height (**Figure 8.1**).

Figure 8.1 Flat Storage Shed

For the purpose of evacuation the grain from the flat storage is reclaimed by front end loaders and through bagging hoppers is directed to bagging and stitching machines and the bags are then loaded into Lorries through a bag conveyor.

Silo Storage

In this the unloaded food grains brought by the dock conveyor is fed to a ground level hopper and is lifted through an elevator in to Silos for vertical storage. The silos may be of either fabricated steel or constructed of masonry Concrete.

The silos can be in multiple units to accommodate different types of grains simultaneously (**Figure 8.2**).

Figure 8.2 Steel Silos for Food Grains

Recommended Type of Transit Storage

AECOM proposes transit storage for the imported food grains shall be of steel silos for the following reasons:

1. Being a vertical storage arrangement, will occupy least space and the silos can be located either closer to the berth or away depending upon the layout and architecture
2. The food grains will be fully protected from outside atmosphere.
3. The evacuation of food grains is from the bottom of the silos and with directing it to automatic bagging and stitching of bags and loading into lorries in an automatic system in a seamless manner.

Capacity and Number of Silos

It is proposed to have 2 silos each with a holding capacity of 10,000 T. This will enable adequate capacity to unload the largest parcel size of vessel proposed viz., 15,000 T and yet have a buffer capacity.

Each silo of this size will be typically of about 30 m dia. and about 25 m height which will be within the mandatory height restriction to be adhered to in Cochin's Wellington Island.

8.2.4.4 Evacuation of Food grains

The grain in the transit storage in Silos will be evacuated from the bottom of silos through a closed conveying system onto an automatic bagging machine and the same after weighing to the required capacity of each bag of typically 50 Kg will be automatically stitched and the stitched bags will be roll through a conveyor into the lorry loading machine. This machine will be programmable in terms of no of bags to be loaded into a particular lorry in terms of no of rows, and the number of layers that will be loaded height wise. Once the details like the capacity of lorry the size of loading body etc. are programmed, the machine will automatically formulate the same and load the required numbers like 10 no. bags in one go.

Figure 8.3 Typical Food Grain Ship Unloader

8.2.4.5 Capacity of Grain Unloading Terminal

A fully mechanized and automated terminal for unloading food grains in Cochin is initially planned with a capacity of 1,000 TPH to achieve average rate of unloading of food grains from the ship to about 15,000 TPD. This will enable handling food grains of 0.5 MTPA in a single berth with berth occupancy of about 20%.

8.2.4.6 Conclusion and Way Forward

The facility proposed is meant for Wheat, Maize and Soya bean in bulk and not for rice. The grain terminal is proposed to be installed in berth Q6 in Ernakulam wharf. The indicative Capital cost for developing the mechanised grain terminal is about INR 85 crores.

8.2.5 Dedicated Berth for Handling Steel

Significant volume of steel products is projected at Cochin port by way of coastal shipping. It is therefore that the existing berths Q8 and Q9 in the Ernakulum wharf be earmarked for handling of the steel, heavy cargoes, timber etc., and unloading will be means of two mobile harbour cranes. The existing Italguru make 40 T capacity Mobile crane which now has a low demand will have significant utilization for unloading of such heavy cargo. Also the large open area behind berth 8 and 9 will make it eminently suitable for the transit storage.

8.2.6 Cement Handling Facilities

8.2.6.1 General

Kerala as a state, has a booming building construction industry and together with other uses like CC roads consuming about 10.5 MTPA. Of this, only about one MT is produced by the only cement factory located in Kerala viz., Malabar Cements. This is mainly on account of the state not having deposits of Limestone.

8.2.6.2 Cement Handling – Status as of Now

The port of Cochin has already started developing a cement importing hub by enabling a shift in logistics of transport of cement in bags from the cement factories from the bordering states of Tamil Nadu and Karnataka which themselves though are surplus their quantum is not large. The states of Gujarat and Andhra Pradesh which have surplus are exporting to other deficient states. Of them Gujarat is strategically positioned for movement of cement in bulk with its port based cement factories and the port of Cochin is equally strategically located to receive it.

However, the marketing efforts coupled with automatic systems available in recent times are slowly but steadily pushing its volumes through the port.

Figure 8.4 Zuari Automated Cement Plant at Ernakulam Wharf (Q5)

M/s. Ambuja was the first to establish a cement terminal in Cochin port by way of importing cement through coastal vessels. This company has installed the facility in the backup area of Q1 berth in Mattancherry wharf by taking over the transit shed of this berth in 2001 on 30 year lease. They have installed a flat storage facility and automatic bagging plant with a bag conveyor delivering the bagged cement to load into Lorries where they are manually staked for despatch.

The terminal works in a shift of 8 hours between 8AM and 4PM and has an agreement to handle a minimum guaranteed throughput of 0.3 MTPA. During 2014-15 a quantity of 0.265 MT was handled through 27 vessels with an average parcel size of about 12,000 T.

Though the company has contracted for a guaranteed minimum throughput of 0.3 MTPA it has handled slightly lesser quantity during the year. It is seen that the berth occupancy of Ambuja's cement vessels was a little less than 30% and the backup facilities work for one shift only. It is seen that the type of facilities installed by M/s. Ambuja are somewhat of old in terms of technology in terms of stacking, evacuation of stored cement by means of front end loaders into bagging bins, bag stitching, loading through a bag conveyor into lorries requiring manual stacking . With this type of facility this terminal has maximum capacity of about no more than 0.7 to 0.8 MTPA even if it works round the clock. However if the terminal operator puts up silo storage and a fully automatic evacuation system it is possible to upgrade the capacity of this berth to 1.5 MTPA.

M/s. Ultratech has installed their cement terminal in the backup area close to BTP berth with four silos each of 6,000 T capacities totalling to 24,000 T. The packing and evacuation facility is fully automatic with very little manual intervention and the installation is able to handle 0.4 MT with berth occupancy of 17%. It is seen that this company has brought in cement in chartered cement vessels of about 20,000 DWT with an LOA of about 145 to 150 m, a beam of about 25 m and a designed full load draft of about 9.4m. However the average parcel size of vessels was about 15,000 T as can be seen from the **Table 8.2**.

From the studies it is found that the combined effect of higher vessel parcel size, the silo storage with a capacity of 24,000 T, the fully automatic evacuation system as installed by Ultratech, the terminal can handle 1.5 MTPA. In other words a cement berth backed by a fully automated terminal working round the clock has a capacity 1.5 to 1.75 MTPA.

Table 8.2 Cement Handling During FY15 - A Review

S. No.	Importer	Berth	No of Vessels	Quantity Handled (T)	Max. Parcel Size (T)	Min. Parcel Size (T)	Average Parcel Size (T)
1.	Ultratech	BTP	27	4,10,210	20,522	9,000	15,193
2.	Ambuja	Q1/Q2	22	2,65,359	16,453	6,740	12,062
3.	MBK	Q5	1	6,134	6,134	6,134	6,134

More recently during 2015 a third cement terminal of the port was installed by M/s. Zuvari in berth no Q5 in Ernakulam wharf. Their backup facilities consist of a 2 Silos each of 8,000 T capacity and a fully automatic evacuation system of bagging and lorry loading as also bulk lorry loading facility. This cement terminal operator has also contracted for a guaranteed minimum throughput of 0.3 MTPA. The study has revealed that if the capacity has to be scaled up a third silo of 8,000 T has to be put up.

It is understood that in addition to these three cement terminals two more viz., M/s. Pennar cements and M/s Malabar cements will put up similar facilities in berths Q5 and Q6 respectively with their backup facilities in the backup area of the respective berths.

As can be seen that of the total demand of the state for import of 10.5 MT after accounting of state's production of 1 MT, the imports through the port of cochin accounts for just less than 10%. The traffic projections indicate that there exists opportunities increase them manifold.

8.2.6.3 Planning of Facilities for Cement Handling

A cement terminal with a berth for unloading cement vessels of about 20,000 DWT with an average parcel size of 15,000 T with a berth occupancy of about 60%, backed by a silo storage of about of 24,000 T and a fully automatic bagging, automatic loading of bags into lorries and bulk cement loading into lorries and working round the clock has a minimum capacity of about 1.5 MTPA.

Apart from berths BTP, Q1 and Q5 through which cement is imported by Ultratech, Ambuja and Zuvari respectively, the berths Q2 and Q3 may be planned as berths for import of cement over the master plan period. This in the course of time will involve complete reconstruction of berths Q1 to Q3 as already proposed and up gradation of facilities by terminal operators which will depend on their market.

In this connection it is relevant to note that each terminal need not exactly be tied to particular berth and in case the terminal has a capacity of less than 1.5 MTPA, more than one cement handling terminal can operate from one berth and the storage, bagging and evacuation terminal need not exactly be in the transit area of the berth and can be far away about 100 m or more. In this way more than one operator can import through the same berth without hindering each other.

The above proposal envisages development of Mattancherry wharf as a cement import hub over a period.

8.2.7 Crude, POL, LNG & LPG Handling Facilities

The port is presently handling about 10.746 MT of crude through single SPM and about 3.271 MT of POL products through a number of jetties. The LNG terminal though operational has handled just 4 shipments totalling to about 2.6 Lakh T with occupancy of less than 3%.

The BPCL's Cochin refinery has an installed capacity of 10 MTPA and is currently expanding to about 16 MTPA. This is expected to be operational in the current year itself i.e. 2016. However, the requirement of full capacity of refinery is likely to build up over the years. Expansion of BPCL along with increase in imports of LNG and LPG in the future will lead to POL traffic of roughly 25 MTPA by 2020, 30-32 MTPA by 2025 and 34-45 MTPA by 2035.

In 2025, out of ~30 MTPA, LNG and LPG import is expected to contribute 5 MTPA and 2 MTPA respectively. Kochi LNG regasification terminal is expected to operate at capacity in the next 5 years while LPG imports will be driven by government's focus on distribution of LPG connections to rural households. Crude and POL products are estimated to be ~16 MTPA and ~7 MTPA respectively The total traffic of 7 MTPA of POL products include ~3 MTPA of coastal shipping potential from Cochin to Southern Tamil Nadu.

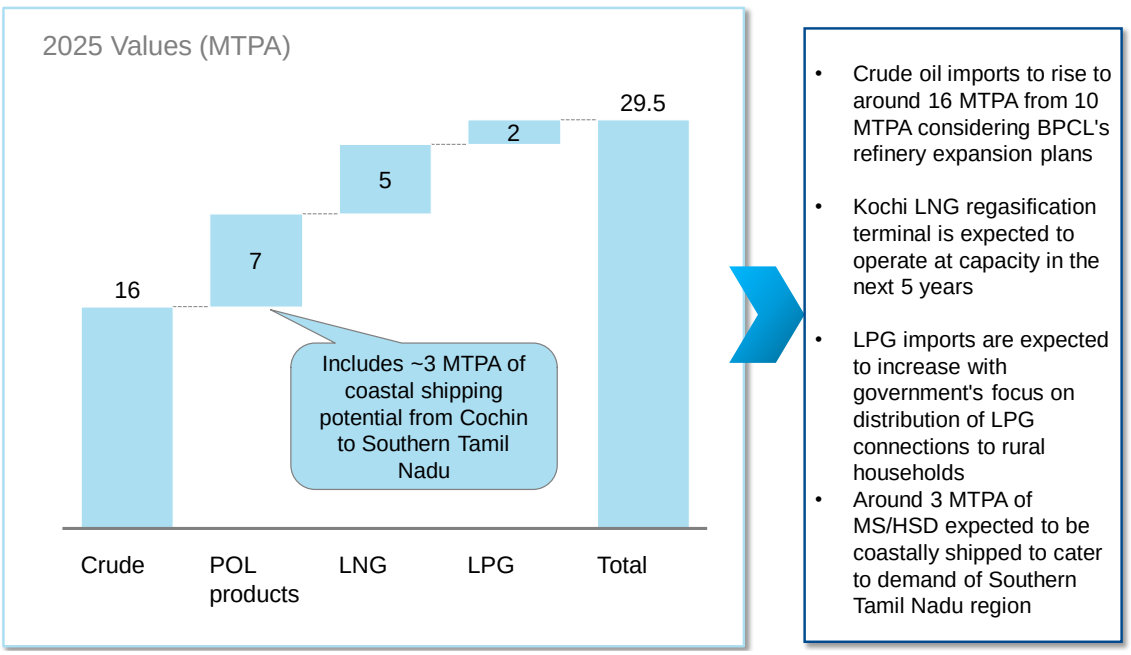


Figure 8.5 POL Traffic at Cochin Port

8.2.7.1 Crude

The projected crude of 15 to 16 MTPA will be handled by the SPM which quantity roughly corresponds to the capacity of a single SPM.

8.2.7.2 LNG

Similarly the LNG of 5 MTPA will be handled by the LNG jetty and the LNG terminal which is ready for use. Though the LNG facility is ready for use since a long time the holdup has been the pipe line is not laid simultaneously. Presently the laying of pipe line the state of Kerala both on north and south side out of a total length of 520 km about 360 km is progressing with ROW having been obtained. The Kerala state portion of work is expected to be completed by 2016. Though the portion of pipe line laying for Karnataka and Tamil Nadu portion of this LNG pipe line has made no progress so far this is also expected to be completed by 2017 end. By that time the port's LNG terminal is expected to come to full utilisation and no other infrastructure in the port would be required.

8.2.7.3 POL Products

The POL products being handled in Cochin port broadly consists of HSD, MS, SK, FO and Naptha and are predominantly being handled in COT and NTB. They are also being handled in STB, Q4 and BTP. The berth SCB while mostly handles Liquid ammonia, also handles a small quantity of FO. The total quantity of POL products handled is about 3.2 MTPA.

Table 8.3 POL Products Handled During 2014-15

S. No.	Berth	Quantity (T)	Vessels	Exports (T)	Imports (T)	Max. Parcel Size (T)	Average Parcel Size (T)	Berth Occupancy (POL/ Chemicals)	Type of POL Products and Chemicals Handled
1	BTP	63,674	14	NIL	63,674	9589	4548	8%	LSHS, FO, HSD
2	COT	14,08,845	88	10,38,852	3,69,993	40,859	16,009	46%	HSD, MS, SK, FO, NAPTHA.
3	NTB	14,39,863	142	8,63,557	5,76,306	25,200	9,996	63%	HSD,MS,SK,FO, NAPTHA
4	SCB	1,79,984	27	NIL	1,79,984	7,875	6,666	9%	Liquid Ammonia and FO Vessels
5	STB	32,590	5	NIL	32,590	15,200	6518	2%	Four FO and one HSD Vessels
6	Q4	2,27,171	58	NIL	2,27,171	11,600	2,917	14%	FO, HSD, MS & Chemicals (Methanol, EDC, Acetone)
	Total	**33,52,127**	**334**	**19,02,409**	**14,49,718**				

As regards to capacity for POL handling, while the capacity of COT is 2.5 MTPA, the capacity of NTB, SCB and STB is about 1.5 MTPA. Of them NTB is already handling to its near full capacity. The COT has a spare capacity of about 1 MTPA.

8.2.7.4 LPG

In addition the port has already entered into an agreement with IOC for setting up a Multiuser Liquid Terminal (MULT) for handling LPG and POL products and more particularly products for bunkering. Its capacity is estimated as 4 MTPA consisting of 2 MTPA of LPG and 2 MTPA of POL products. Once the MULT is developed the port will have adequate capacity to handle the projected POL products as also the projected LPG. In this connection it is pertinent to note that of the present import of refined products totalling to about 1 MTPA, some of it will get reduced once the expanded refinery goes into operation in stages.

8.3 Reconstruction of Mattancherry Wharf

The Mattancherry wharf consisting of four berths Q1, Q2, Q3 and Q4 was originally constructed in 1930s with steel sheet pile earth retaining structure for a length of 457.6 m and concrete/rubble masonry monolith on either side for a total length of 221.5 m. Subsequently a 10.7 m frontage with RCC decking supported on screwcrete piles was constructed in 1950s. The present Mattancherry wharf has a total length of about 661 m. Of this a portion of the wharf (Q4 and part of Q3) covering a length of 251m has been reconstructed in 2005.The remaining length of wharf with old structures is 410 m consisting of Q1, Q2 and part of Q3.

The berths Q1 to Q3 were originally used for handling of general cargo and the quay structure was designed for a dredged depth of -9.75 m CD in front. The wharf frontage of Q1 to Q3 is 10.7 m wide and consists of 2 crane rails at a spacing of 5.5 m. The original earth retaining steel sheet pile quay has been very badly corroded and is beyond economical repairs. Due to this reason the wharf has become not fit for safe berthing of vessels. The berth apron has developed huge settlements to the extent that cargo handling equipment cannot operate in the areas.

Since the berth Q1 is a captive berth for the cement terminal of M/s. Ambuja Cements, a length of about 53 m in the middle of Q1 was recently reconstructed and fitted with new cellular fenders. At the back of the berth Q1, there is a shed (which was originally a transit shed) housing the cement terminal of Ambuja cements.

The Q1 to Q3 berths has a backup area of nearly 7.5 Ha. There are facilities like transit sheds and ware houses.

It is therefore imperative that the berths Q1 to Q3 need reconstruction for length of about 410 m as shown in the image below as marked in red.

Figure 8.6 Proposed Reconstruction of Mattancherry Wharf Q1 to Q3

The reconstruction may be done in line with the following overall guidelines.

- The new berth may be constructed so as to be in alignment with berth Q4 which has an offset of about 20 m from the berthing face of Q1 to Q3.
- Whenever such reconstruction is taken up it shall be done without detriment to the berthing and operations of cement vessels belonging to M/s. Ambuja cements whose vessels need either Q1 or Q2 so that they can lay their pipeline and flexible hoses as and when required.

Therefore the construction of Q1 and Q2 shall be done only after another.

- The reconstruction of Q1 to Q3 may be designed to handle fully loaded handysize vessels up to an LOA of 180 m and a maximum depth of 11 m, which approximately corresponds to vessels of 35,000 DWT capacities. This proposal envisions handling of ships by the new

berthing structure for the next 50 to 75 years. The limitation in the LOA of the vessels is on account of the limitation of width in the Mattancherry Channel and the turning circle.

As of now it is understood that the CoPT has already firmed up plans to hand over berths Q2 and Q3 to the naval authorities for berthing of naval craft for the next five years or so or till the completion construction of navy's berths. However subsequent to that these berths should be reconstructed so that they could be utilised for import/export of moderate parcels of bulk and break bulk cargoes like food grains, cement, edible oil etc.

8.4 Outer Harbour to Cochin Port

Although the traffic projections for Cochin port do not justify development of the outer harbour, however the proposed development could be considered due to the following reasons:

1. The breakwaters built as part of the development would trap the littoral movement and also help in reducing the sedimentation in the entrance channel and harbour basin.
2. There is a requirement from Navy for having higher draft berths, which could be provided in the lee of one of the breakwaters.
3. It would be possible to create large area by way of reclamation that could be used for setting up of petroleum refinery or thermal power plant. This is however subject to approval from MoEF, which prohibits such development in CRZ.

Considering the above aspects four alternative layouts have been developed which are more or less similar to what have been earlier prepared by the port as shown in **Figure 8.7**.

Alternative 1 – This layout provides for building of one north breakwater (2,000 m long) and one south breakwater (3,250 m long) at the port entrance upto 4 m contour so as to block the alongshore sediment movement. This would help in reducing the sedimentation in the channel and hence lower maintenance dredging.

Alternative 2 – In this layout the north breakwater is kept same as that in case of alternative 1 but the much larger south breakwater of length 6,500 m has been proposed to provide berthing facilities for navy vessels and the backup area. This would however leave most of the quay length of Navy exposed to the waves from W and NW directions, resulting in unfavourable berthing conditions for some part of the year, which are unlikely to be acceptable to Navy.

Alternative 3 – This layout is developed basically to cover the shortfall of layout 2 and involves longer north breakwater (4900 m length) to provide full protection to the navy berths.

Alternative 4 – This layout is similar to alternative 3 except that the root of north breakwater is shifted towards north to provide space for reclamation to create vast land area that could be utilised for setting up of an industry like petroleum refinery or thermal power plant. To handle the raw material/product requirements of the refinery additional berthing facilities could be built on the face of reclaimed area. This main issue in this option is while it is permissible to use the reclaimed land for port related works like storage and operations; the MoEF guidelines prohibit its use for setting up any industries, housing, commercial use etc.

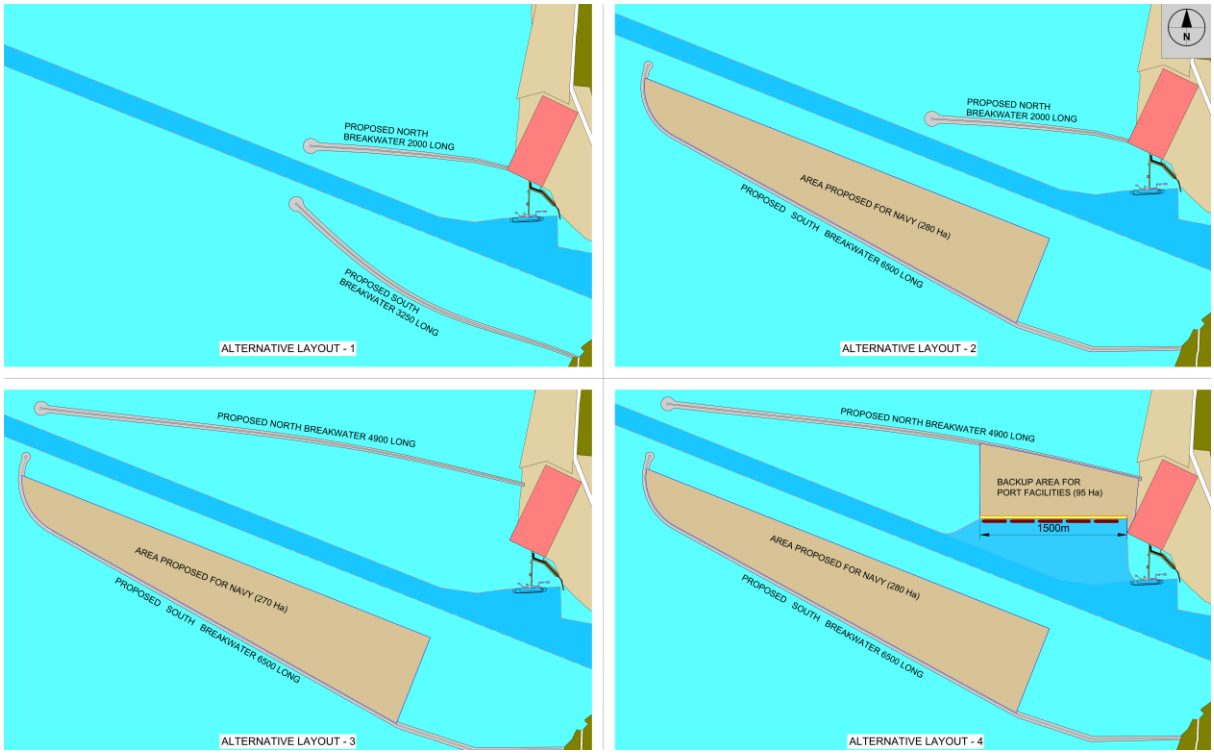


Figure 8.7 Cochin Outer Harbour - Alternatives

While proceeding ahead with the development following factors also need consideration:

1. The soil conditions comprise of Soft silty clay for a depth of 20 m from bed level. This means that it cannot support the load of breakwater and thus would resulting in excessive settlements, endangering failure of structure. This may need either very flat slope of the breakwater or ground improvement along the breakwater before dumping the rock. In either case the structure would be very expensive particularly due to the large length.
2. Similar to above the proposed reclamation would need borrowed fill as the dredged material is not suitable for reclamation. Further considering the weak underlying strata ground improvement would need to be carried out resulting in high cost of reclamation.

The investment to create the basic infrastructure of two breakwaters and reclamation is expected to cost over INR 6,500 crores and the total land area obtained from reclamation would be about 3,250 acres i.e. the land would cost about INR 2.0 crores per acre. The immediate apparent benefit seems to be the reduction in the dredging cost by 40% i.e. about INR 60 crores per year. As it is not possible to establish a power plant or petroleum refinery on the reclaimed land as per MoEF guidelines any investment by port on the proposed outer harbour development does not seem to be financially viable.

8.5 Smart City

8.5.1 Vision of Ministry of Shipping (MoS)

The vision of MoS is that each major port will construct one smart city – a "Smart Port City". These cities will be built as per international standards and have wide roads, green energy, advanced townships and greenery. These will have e-governance links, international standard facilities, special economic zones, ship breaking and ship building centres besides allied things.

Port water will be recycled. Port wastes will be turned into bio gas. Vehicles will run on bio fuel. Solar energy and wind power will be generated at ports. These cities will be pollution-free and very green smart cities. Besides, these smart cities would house schools, commercial complexes and other amenities.

This vision is aiming for a sort of port city continuity. It starts with the needs of the city, albeit in a "systemic" way: the port city must be liveable whilst maintaining its port industry competitive. This means satisfying the logistics requirements of the port as well as the social needs of citizens; if one is to achieve the enhancement of both.

8.5.2 Developing Willingdon Island as a Smart Port City

In line with Government of India's vision of developing smart cities the port also can contribute in their own limited way by developing smart port cities. Since Cochin has been selected as one of the smart cities to be developed in the very first phase, it will be appropriate for the port of Cochin to take up similar development that can get integrated with such smart city development. Fortunately Cochin port has a land bank that can be developed in such lines it is considered appropriate to propose some concepts as part of master plan proposals.

8.5.3 SWOT Analysis

While developing such proposals it is considered relevant to analyse the Strength, Weakness, Opportunity and Threat (SWOT) that underlie such proposals in the case of Cochin Port.

8.5.3.1 SWOT – Background and Approach

The SWOT is a common analytical technique for integrated evaluation of an area in order to provide a systematic basis for decision-making in planning, marketing and branding. SWOT refers to strengths, weaknesses, opportunities and threats. It focuses on major issues likely to influence development and does not attempt to list all minor points.

8.5.3.2 Analysis Summary

From the analysis the most significant strengths/opportunities and the threats/weaknesses are summarised. This summary assists in the identification of development framework and the related factors that are significant in identifying potential development agenda and other key supporting amenities.

8.5.3.3 Strengths/Opportunities

Accessibility

- Proximity to Ernakulam and Fort Kochi; lies in the centre of Ernakulam and Fort Kochi;
- Major port of the region and has strong economic ties with the surrounding area;
- Major Arterial roads passing through the Willington Island connecting Fort Kochi and Ernakulam mainland;
- Destination for a limited number of cruise ships that halt at Willingdon Island for a period of 12 to 16 hrs in a particular season.

Significant Assets

- Gateway to the Fort Kochi area which has significant built heritage attracting tourists from around the globe and surrounding region of Ernakulam mainland;
- Presence of significant flora and fauna attracting visitors for bird watching;
- Relocation of container operations from Willingdon Island to Vallarpadam has freed up considerable amount of land that can be used for non-port related activities;
- This land measures 206.53 acres at the south end of Willingdon Island and is fragmented in nature (125 acres near Maritime university, 57.55 acres at south end of island, 4.5 acres between Mattancherry bridge and Thoppumpady, 19.48 acres on western side of tank farms);
- The net area available for development after considering CRZ regulations and flying cone restrictions is about 186 acres or 76 hectares;
- Existing railway line infrastructure; not in use and offers potential for development as a pedestrian walkway dispersed with informal commercial (i.e. food kiosks, food on wheels);
- Efforts in place for developing a promenade; needs high quality facilities and detail planning.

Significant Built Assets

- Existence of a few heritage buildings (Bristow School) on Willingdon Island and the neighbouring Fort Kochi offering opportunities to explore the heritage resources of Willingdon Island and surrounds.
- Mattancherry Bridge proposed to be converted into a heritage bridge.
- Key hotels that operate from the islands are Taj Malabar, Trident, Casino and ATS Willingdon Island.
- Opportunities for incubator development and expansion for start-ups which can directly tie back to the start-up mission of the GoI.
- Further the residency education establishments and opportunities for expansion including association with tourism; potential for rental affordable housing.

Markets and Marketing

- Opportunities for traditional Kerala Ayurveda centre/spa to be set-up at Willingdon island in order to increase time spent by tourists on the island and hence increasing tourism spend.
- A possible destination for conventions and MICE tourism.
- Youth visiting Kerala through Cruises; youth of the region and their entertainment requirements.
- Opportunities to consolidate existing markets through raising standards and upgrade facilities and services to attract higher spending market sectors.

Kochi Development Plan and Surrounding Development in Mainland

- The DP envisages Kochi to be a Global City focussing on a diversified economy by promoting port related activity, industries, IT, tourism, healthcare & trade.
- Focuses on shifting new commercial sub-centres to hinterlands thereby creating opportunities for developing the new parcels in Willingdon Island for commercial purposes.

8.5.3.4 Weaknesses/Threats

- The earlier product mix, for which tenders were floated, looked into development of a Free Trade and Warehousing Zone (FTWZ) which did not see any responses (120 acres); need for recalibrating the product mix;
- Limited land area which has further built restrictions due to the CRZ regulations and flying cone restrictions; G+1 floor buildings allowed;
- The port trust can give the land on a maximum lease period of 30 years; commercial development would need flexibility in lease tenure to reach break-even;
- Limited range of recreational activities and tourism product;
- No 'flagship' developments for Willingdon Island;
- Threats to adjacent natural and cultural heritage sites due to lack of management plans;
- Lack of ground tour operators;
- Little tourism information, presentation/interpretation;
- Lack of market research data;
- Increased competition from other commercial developments in the Region;
- Lack of security of investment.

8.5.3.5 The Need for a Development Framework for Willingdon Island

The overall objectives for a strategic development framework are as follows:

- Develop prospects of economic development and improve the living standard of the population;
- To diversify the economic base by introducing strategic project related to tourism as well as businesses and creating employment opportunities for local people and investors;
- Conserve the natural characteristics of Willingdon Island;
- Develop a liveable environment;
- Focus on efficiency of land utilization.

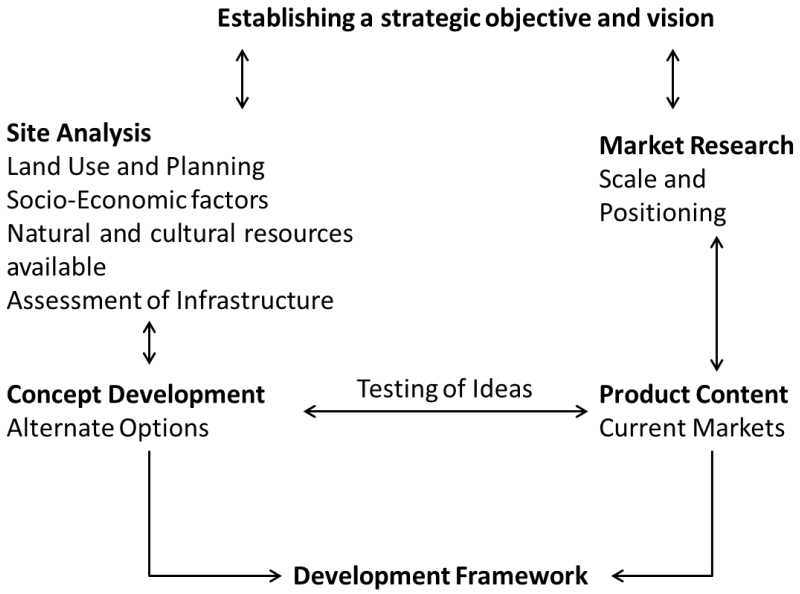
In consultation with the Port Trust, the possibilities for developing a smart port city were explored. It was concluded that in order to develop a smart port city the land development opportunities will need to have a robust development program which is informed by a market analysis. The market analysis would confirm the penetration of commercial development in the region vis-e-vis the absorption capacity of commercial development on the island.

The existing program for the development of the available land parcels as identified by the Port Trust includes the following:

- Hospitality use for around 57 acre site;
- Business District on a 23 acre site;
- Commercial development on a 4.5 acre site; and
- Free Trade Warehousing Zone (FTWZ) for around 102 acre site.

Based on the inputs from the port trust it is established that the programme for development of a FTWZ on a 102 acre site did not receive a positive response from the market and potential investors. This development provides an opportunity for recalibrating the development program and accordingly a development framework will have to be established for the same.

In order to establish a development framework the following steps needs to be followed:



The following are the logical steps to be followed for starting the process:

- On-boarding of a consultant
- Detailed site analysis
- Program development – Initially based on ideas
- Market assessment to test the ideas
- Detail concept master plan based on market assessment and programme validation
- Guidelines for the development
- Financial and revenue model based on the program

8.5.3.6 Initial Ideas for Development of Land Parcels

(Ideas are subject to validation through a market study)

Market segments that could be explored:

- MICE (Meetings, Incentives, Conferences and Exhibitions) across all sectors.

- Youth markets related to art, music, and festivals. The island could also offer to construct a performing arts centre akin to Sydney Opera House which could be used for promoting traditional dance forms such as Kathakali, martial arts (Kalaripayattu) and Carnatic music providing significant revenue to the Port Trust. This effort could be dove-tailed with the existing initiatives of Kerala Kathakali Centre and Cochin Cultural Centre.
- Creating visitor attractions such as exploring the Ayurveda Centre located at Willingdon Island. Willingdon Island could promote an Ayurveda eco-system.
- Activities related to water sports could also be explored and could be themed as 'Willingdon Waters'.
- Willingdon Island being a separate entity also has very strong linkages to the Fort Kochi (Heritage) and the Ernakulam main land. This provides ample opportunity to create rope-ways to and from the Willingdon Island offering unique views of the place to the visitors.
- Marketing the Indira Priyadarshini Park as a nature asset, and creating similar destinations to the south of the island in order to promote nature tourism.
- Since there is limited vehicular traffic on the island, this could be a perfect opportunity for promoting bicycling tours linking various destinations or just identifying biking circuits for tourists with various amenities provided along the circuit.
- The smallest parcel (4.5 acres) could be developed as a commercial destination with retailing opportunities for businesses.
- Since Willingdon Island has a fisheries technology institute, it could also be developed as the gastronomy destination associated with sea food.
- The Port Trust is also keen on developing residential housing schemes on the released land. This could be possible if the lease period of land could be relaxed and rental housing be promoted at Willington Island.
- A small scale boat making workshops could be created in defunct warehouses in order to retain tourists further promoting local employment.
- Further promoting small scale spice markets on the island which are unique to Kerala.
- Promoting the formation of a 'Central Business District' on the large land parcels following the suggestions made in the master plan for Willingdon Island. This will require a study of the absorption capacity of the region for more commercial, retail and office space.
- As a short term measure, the possibility of renting out the large number of vacant port quarters to general public.
- In order to have affordable rapid transport for general public, Indian Railways may be approached to run local trains between Ernakulum and Cochin Harbour Terminus as part of metro rail system

9.0 SHELF OF NEW PROJECTS AND PHASING

As part of the Cochin Port Master Plan several projects have been identified which need to be taken up in phased manner with the built up in traffic. The proposed phasing, capacity addition and the likely investments are discussed in paragraphs below.

It may be noted that apart from these projects there could be several other projects which port would be implementing as part of the routine operations and maintenance of the port facilities. Further the phasing proposed is not cast in stone but could be reviewed periodically and revised based on the economic scenario and demand for port at that particular point of time.

9.1 Ongoing Projects

The details of the projects which have already been awarded and development is ongoing are given below in **Table 9.1**

Table 9.1 Ongoing Projects

S. No.	Project Name	Capacity Addition (MTPA)	Investment Required (INR in Crores)	Mode of Implementation
1.	Development of an International Ship Repair Facility	-	970	PPP
2.	Multi User Liquid Terminal (MULT)	4.10	230	PPP
3.	Development of Cruise Terminal cum Exhibition /Convention Hall near Boat Train Pier Jetty	-	-	Port's Funds
4.	Refurbishment and Capacity Enhancement of COT, NTB & STB	-	22.45	Port's Funds
5.	Decongesting Vallarpadam	-	60	PPP
6.	Malabar Cement Terminal	1	160	PPP

9.2 Projects to be Completed by Year 2020

The details of the projects which are envisaged to be completed by year 2020 are given in **Table 9.2**

Table 9.2 Projects to be Completed by Year 2020

S. No.	Project Name	Capacity Addition (MTPA)	Investment Required (INR in Crores)	Mode of Implementation
1.	Setting up of fertilizer bagging facility at Cochin	-	155	PPP
2.	Setting up of food grain import terminal at Cochin	1	120	PPP
3.	Setting of Edible Oil Terminal at Cochin	-	10	Port fund
4.	Cryogenic Warehousing	-	-	PPP
5.	Sand Mining	-	-	PPP

9.3 Projects to be Completed by Year 2025

The details of the projects which are envisaged to be completed by year 2025 are given in **Table 9.3.**

Table 9.3 Projects to be Completed by Year 2025

S. No.	Project Name	Capacity Addition (MTPA)	Investment Required (In Crores)	Mode of Implementation
1.	Development of Cochin Outer Harbour	-	>6,500	PPP

Appendix 1 - **BCG Benchmarking Study for Cochin Port**

4 Cochin Port Deep-dive

4.1 Port overview

Cochin port houses numerous private terminals and dedicated berths to handle commodities that include cement, fertilizer, POL, containers and general cargo. Cochin Port comprises two channels—Ernakulam Channel and Mattancherry channel on either side of the Willingdon Island. The general cargo, dry bulk and liquid bulk berths are located on the island along the two channels. The container terminal is situated at Vallarpadam Island, to the North of the entrance channel. Additionally, an SPM for handling crude oil imports for BPCL is located ~19km away from the Port basin in the high seas.

Figure 99: Private terminals and berths at Cochin port

Despite Cochin port's revenue growth, profitability is under pressure as there has been narrow operating surplus in 2015. The trend of negative total profit has been continuing since FY09.

Figure 100: Profitability trend of Cochin port

High dredging costs, management overheads and pension expenses are the factors driving pressure on profits. Dredging costs and management overheads comprise ~60% of total operating income. Additionally, the port has a retirement benefits liability to the labor force on account of pension and employee benefits payables.

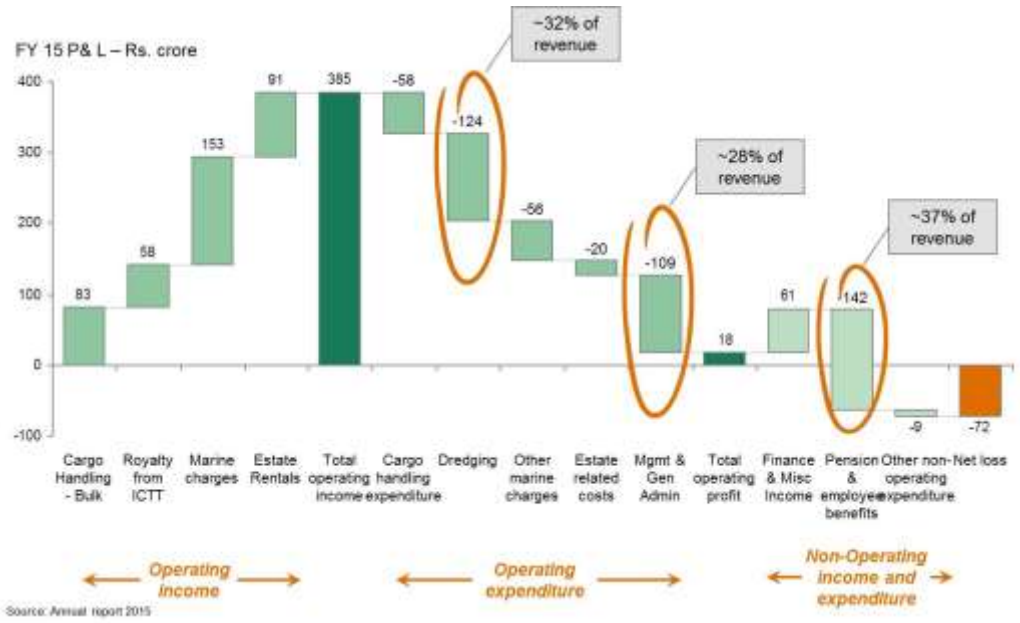


Figure 101: Income and expenditure

Almost 90% cargo is handled by 6 private dedicated terminals. However, there is low berth utilization across these terminals, which is one of the key sources of financial pressure.

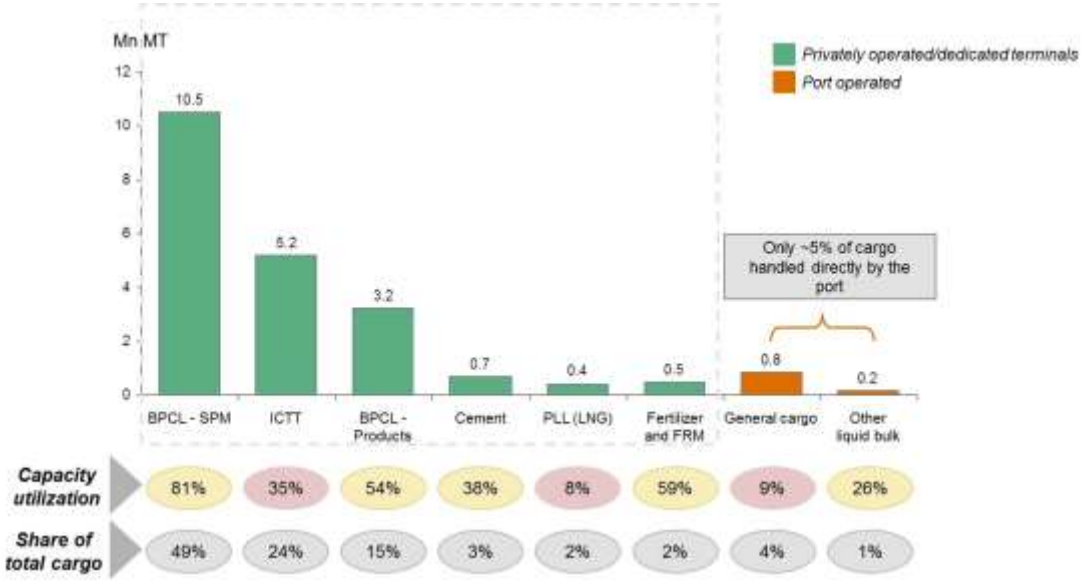


Figure 102: Terminal utilization

4.2 Key findings and initiatives from deep-dive

	Problem statement	Key findings	Initiative	Initiative #
1	Low capacity utilization of container terminal; can additional demand be stimulated to improve utilization?	Container traffic from Coimbatore currently moving to Tuticorin Port due to high cost of inland haulage to Cochin despite shorter distance. Low utilization of rail connection due to high costs and low reliability	Incentivize and increase reliability of rail movement of containers between Coimbatore and Cochin	CoPT 1.1
		High inland haulage costs from secondary hinterland areas in TN on account of delays and penalties at inter-state check-point	Reduce checkpoint delays for containers moving by road from Coimbatore to Cochin	CoPT 1.2
		High cost of feeder services at Cochin Port on account of small uneconomic vessels deployed	Relaxation of cabotage on coastal goods – bulk and containers	CoPT 1.3
		High dredging cost of ~120 crore to maintain 14.5m depth. <1% of vessels since 2013 required more than 13.5m draft	*Potentially reduce nautical depth maintained to 13.5m*[1]	CoPT 1.4
2	Low capacity utilization of general cargo berths; can additional demand be stimulated to improve utilization?	High volumes of food-grain transported to Kerala from North/East India by rail. Higher cost of handling at Ports due to manual handling of cargo	Develop coastal movement of rice & wheat from North India with FCI and 3rd party logistics players	CoPT 2.1
		Fertilizer traffic bound for Kerala is imported at NMPT and VOC due to lower total cost. High bagging costs at Cochin make it uneconomical.	Attract fertilizer imports through investment in mechanized bagging plant	CoPT 2.2
3	Increase in POL volumes on existing berths; berth occupancy projected to be >85% with increase	High portion of idle time at berth attributed to transporting of sample to BPCL lab on mainland for quality test prior to commencing operations	Set up POL quality testing facility at the berth to reduce non-working time for imports	CoPT 3.1
		High portion of idle time on exports on account of transit time for BPCL officials to personally travel to the berth and sign off on documentation	Reduce documentation time for coastal export vessels by starting Early Departure Procedure(EDP)	CoPT 3.2
		Increase in vessel traffic projected with potential for shortage of pilots	*Employ additional pilots to prevent pre-berthing delays for projected POL traffic at COT*[1]	CoPT 3.3

1 Recommended solutions; detailed initiative charter not required

Figure 103: Key findings

4.2.1 Containers

International Container Trans-shipment Terminal ('ICTT') operated by DP World at Cochin is a gateway port with 2 mainline services calling each week. Additionally, 9 feeder services call at Cochin connecting it to the Middle East, West Coast Indian Ports, Colombo and East Coast Indian Ports. With only 2 mainline service calls, Cochin's connectivity outside India is very sparse.

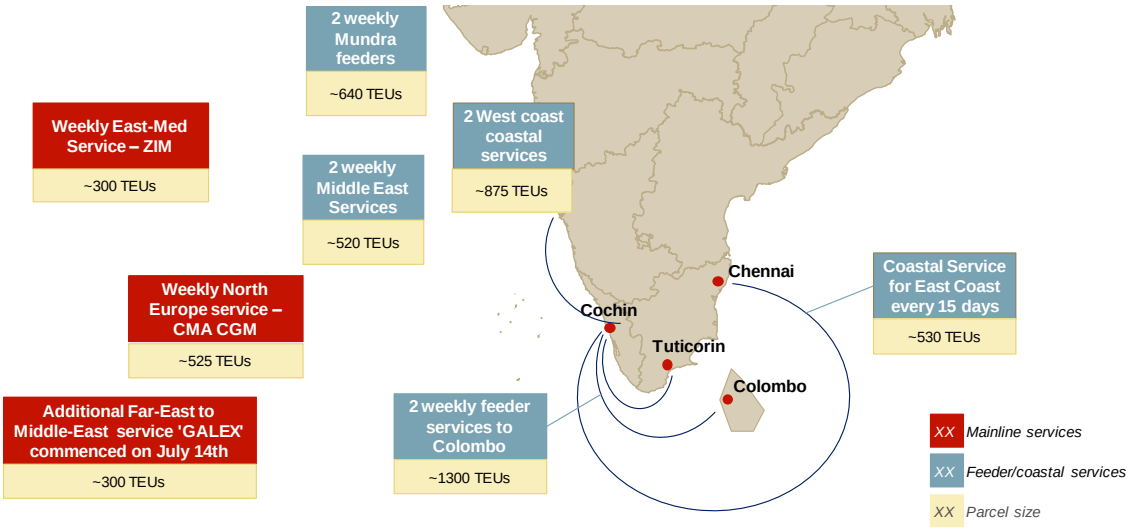


Figure 104: Cochin network's 2 mainline services and a sparse feeder network

ICTT Cochin was set up as a trans-shipment terminal. However, trans-shipment volumes have consistently under-performed vs. targets set. Over the past 3 years, less than 10% of the target set for trans-shipment traffic has actually materialized.

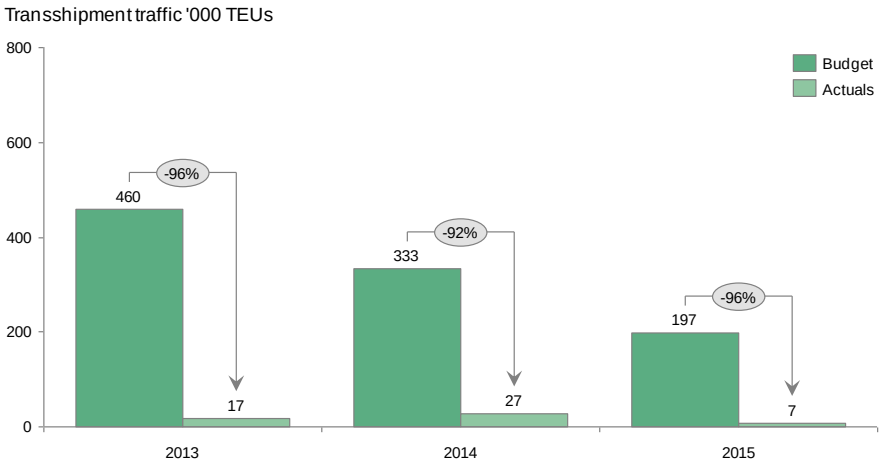


Figure 105: Trans-shipment volumes vs. budgets

Gateway traffic has also under-performed vs. targets, although to a lesser extent than trans-shipment cargo.

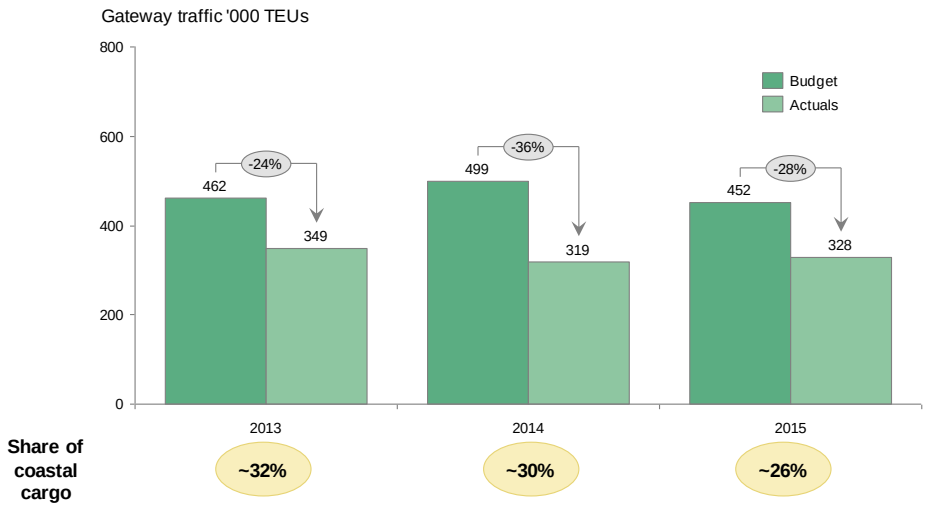


Figure 106: Gateway volumes vs. budgets

Liners have not preferred to use Cochin as a trans-shipment hub, primarily due to four reasons:

1. Geographic location:

Cochin Port is located on the West Coast of India. While other ports are already supported by mainline services, only 7-8% cargo trans-ships from Cochin. The distance to the East Coast ports (where trans-shipment traffic is high) is higher than Colombo and liners require multiple vessels on a route to operate a weekly service, hence driving up costs. There is a higher THC for operating feeder network at Cochin vis-à-vis Colombo.

2. Lack of cost competitiveness vs. Colombo:

Cochin THC and vessel related costs are ~30% higher than Colombo. Further, Colombo extends volume-based incentives to liners, which increases the gap in tariffs between Cochin and Colombo. Splitting volumes between Cochin and Colombo is not favourable to liners as their incentives are reduced.

3. Low volumes with unviable parcel size:

Cochin has been unable to grow gateway volumes on mainline calls to achieve a viable parcel size. Existing mainline calls attract parcel sizes of ~450 TEUs per call, whereas viable parcel sizes for large liners are usually 1,200–2,000 TEUs per call. High VRC rebates are required to make smaller call sizes viable for liners.

4. Regulatory challenges

Shippers face a delay in getting credit for duty draw-back on exports until goods leave Cochin port after trans-shipment, instead of when they leave the initial port of origin. Further, lack of smooth implementation of cabotage relaxation led to initial service disruptions and cargo shutout.

As a result, Cochin has evolved to a gateway port, but requires additional imperatives to consolidate its position as a gateway port and further evolve into becoming a viable trans-shipment hub.

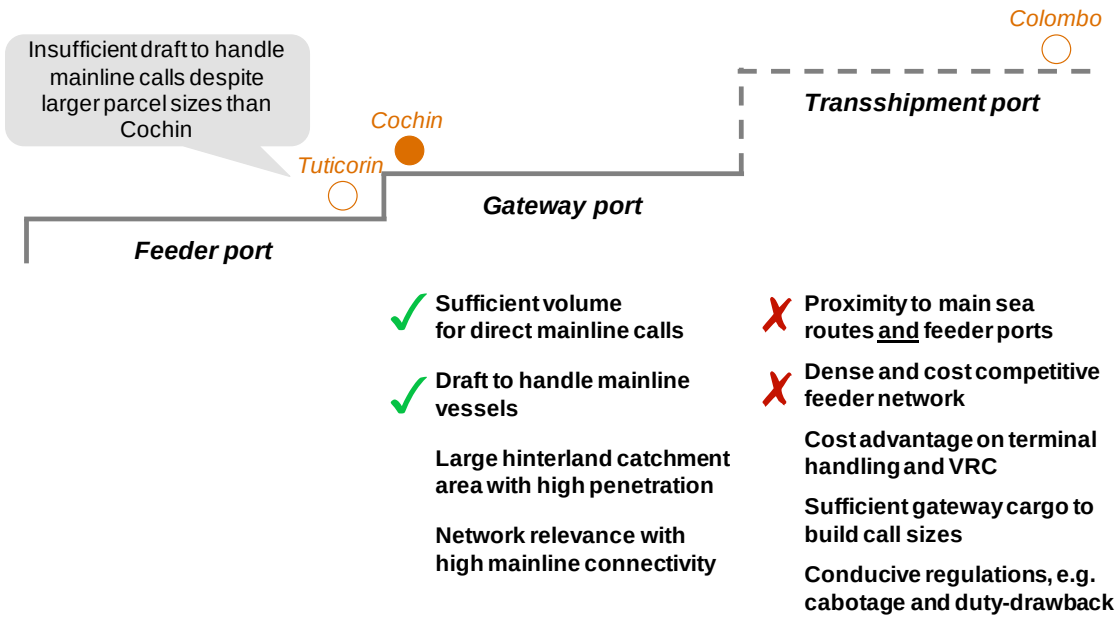


Figure 107: Cochin has room to further develop as a gateway port

Two strategic options are available to Cochin Port today:

A. Develop further as a gateway port

- The value proposition of Cochin Port vis-à-vis other ports in South India is in providing specific logistics cost advantage to trade with direct mainline connections. It helps eliminate the trans-shipment leg for cargo flowing out of feeder ports from South India by providing access to main line services. Further, cost efficiencies on account of lower sailing days, and economies of large vessels would accrue to the shipper.
- Potential to grow volumes further by attracting cargo from secondary and tertiary hinterland based on cost efficiency of mainline services.

B. Revert to being a feeder port

- Focus of port value proposition on timely and cost-efficient feeder services to trans-shipment hubs.
- Existing hinterland cargo to be maintained by being cost-competitive vs. neighbouring ports.
- Growth from beyond existing markets can also be driven primarily by cost advantage.
- Proximity advantage currently limited to Kerala.
- Limited scope of growing cargo from beyond Kerala (e.g., Coimbatore) as transport to Tuticorin remains advantageous for shippers.

A. Develop further as a gateway port

In order to develop further as a gateway port, it is imperative to increase the parcel size on mainline calls to make them viable. The average parcel size today is ~450 TEUs on mainline calls and ~800 TEUs on feeder services. The minimum viable parcel size for a service is ~600-1,000 TEUs. At Colombo, liners are able to get a minimum parcel size of ~1,200 TEUs while the average parcel size is approximately 2,200 TEUs. This makes Colombo a more viable option for liners to call at.

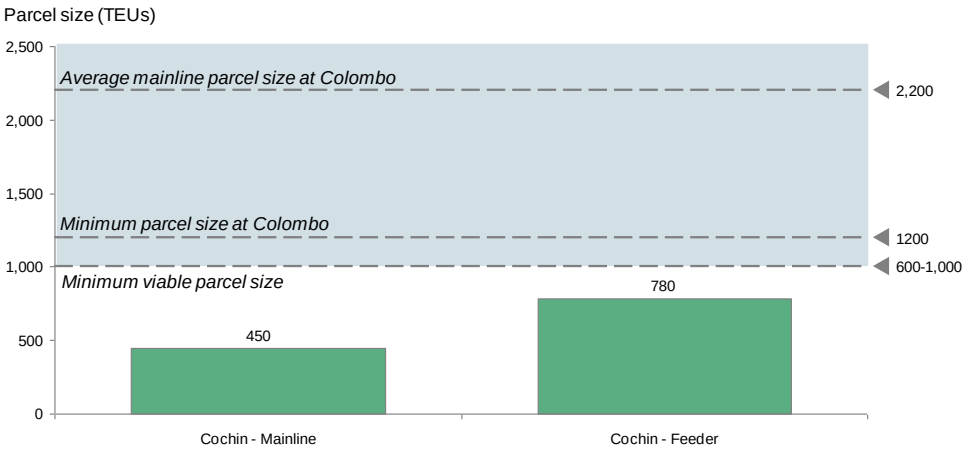


Figure 108: Need to attract additional volumes for mainline call sizes to be viable

In order to increase the parcel size of the services at Cochin Port, it is imperative to attract cargo from a wide hinterland. Currently, the port taps a very small hinterland limited to Kerala.

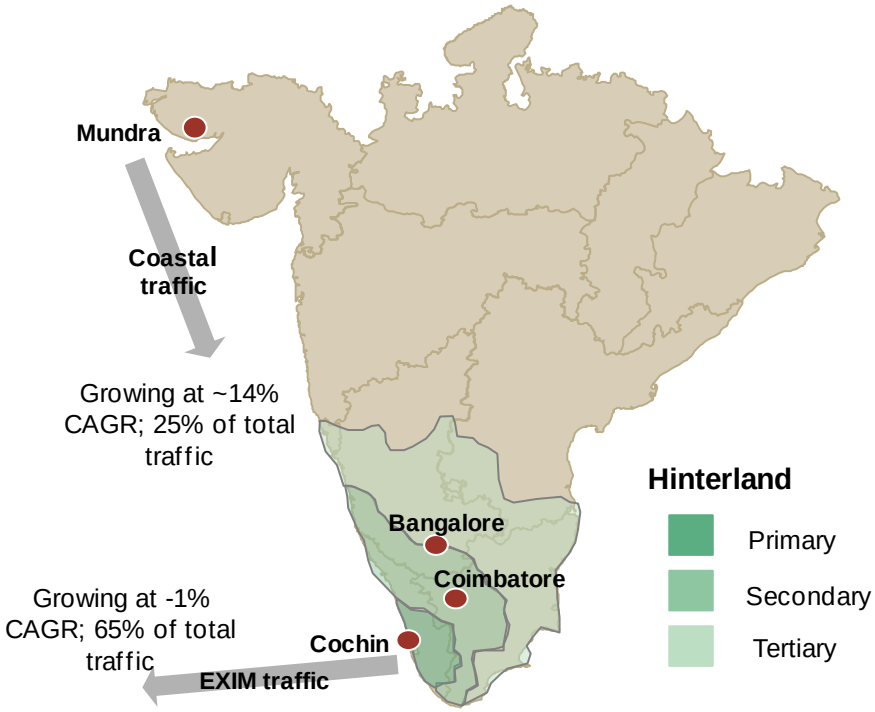


Figure 109: Potential to grow volume through higher penetration of secondary and tertiary hinterland

Cargo centers exist in West Tamil Nadu, at Coimbatore, Salem, Karur, etc., which on average are ~180km away from Cochin Port. However, the cargo is sent to Tuticorin Port instead, which is ~390km away. Shippers prefer using neighboring ports due to inland transport challenges and costs to reach Cochin.

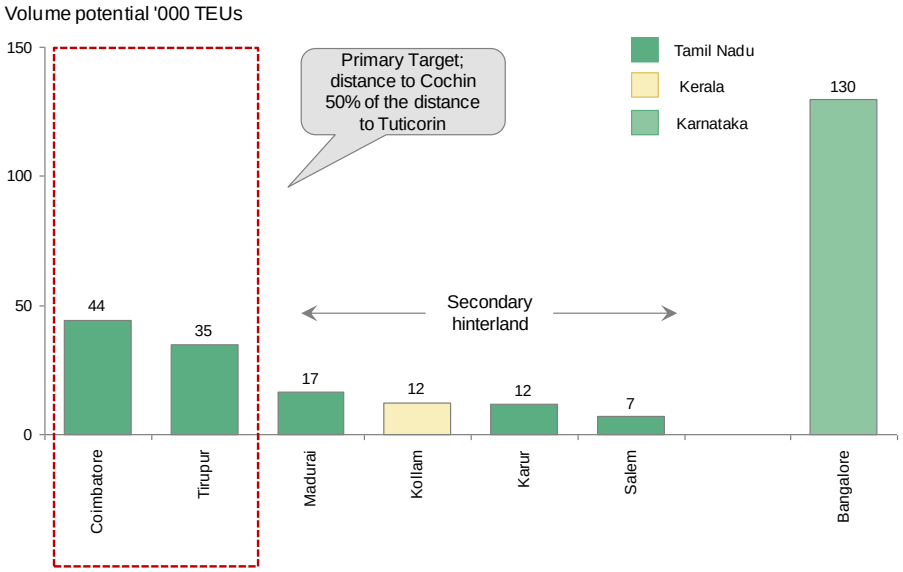
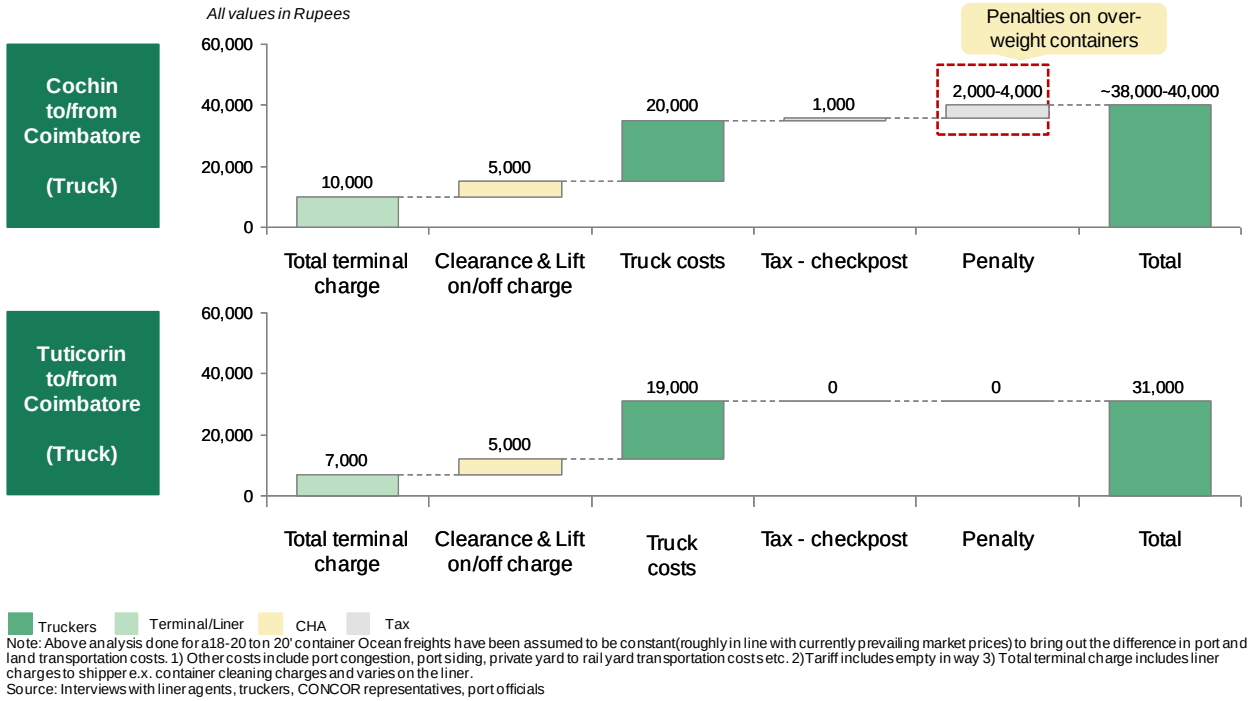


Figure 110: Shippers prefer neighboring ports due to inland transport challenges and costs to reach Cochin

Traffic from Coimbatore-Tirupur region currently moves to Tuticorin by road. The total delivered cost of export containers from Coimbatore being shipped from Tuticorin is lower than the cost at Cochin. The primary drivers of higher total cost at Cochin are higher terminal handling charges and higher inland haulage costs despite smaller distance.



Note: Above analysis done for a18-20 ton 20' container Ocean freights have been assumed to be constant(roughly in line with currently prevailing market prices) to bring out the difference in port and land transportation costs. 1) Other costs include port congestion, port siding, private yard to rail yard transportation costs etc. 2)Tariff includes empty in way 3) Total terminal charge includes liner charges to shipper e.x. container cleaning charges and varies on the liner.
Source: Interviews with liner agents, truckers, CONCOR representatives, port officials

Figure 111: Traffic lost to Tuticorin due to lower total delivered cost

Challenges in inland haulage include delays and penalties levied at the inter-state check post at Walayar, which needs to be crossed for transporting goods from Coimbatore (in TN) to Kerala. The delays cause uncertainty in the sailing schedule for the cargo—with a possibility of missing the vessel it was bound for. Additionally, penalties are levied on over-weight containers based on weight limits per axle set out in the Rules under the Motor Vehicles Act, 1988.

4.2.1.1 Initiative: CoPT 1.1 Improve rail connectivity from Coimbatore to ICTT

Initiative Overview

Road transport from Coimbatore to Cochin has challenges of cost and delays, which make Cochin Port uncompetitive. A railway line operated by CONCOR exists between an ICD at Irugur, near Coimbatore, which connects it to the ICTT at Cochin. CONCOR operates one rake per week between Coimbatore and Cochin, with a capacity of 80 TEUS. However, the rail line is under-utilized with an average utilization of ~50%, and is currently not a preferred option for shippers.

Key Findings

The cost of rail transport to Cochin is currently ~5% higher than the cost of road transport to Tuticorin. The rail freight is ~11,000 per TEU. Additional costs of loading/unloading, stuffing, and transporting from warehouse to ICD add up to ~Rs. 32,500 per TEU of total inland haulage cost. As opposed to this, the cost of trucking a container from Coimbatore to Tuticorin is ~Rs. 31,000 per TEU.

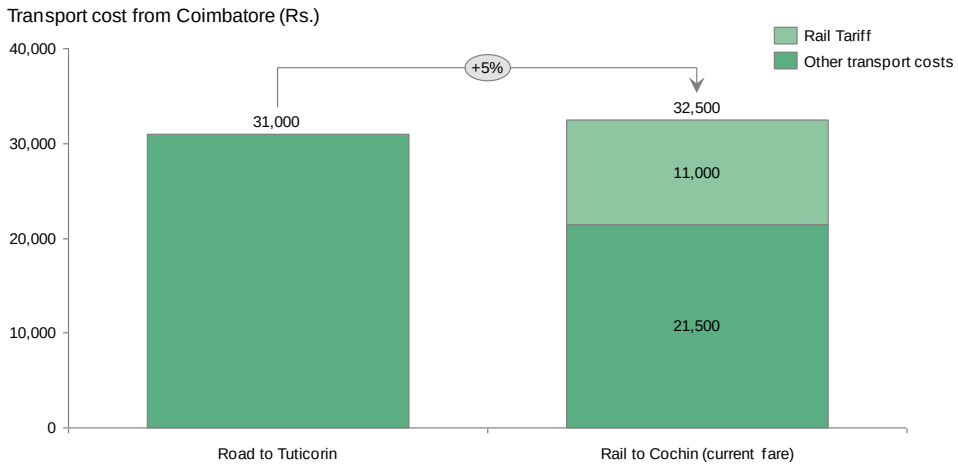


Figure 112: Rail transport cost to Cochin marginally higher than road cost to Tuticorin

Additionally, shippers are unwilling to use the rake because of low frequency and lack of reliability in schedule. The connections are infrequent—operated only once a week—which requires shippers to send export containers 2-4 days in advance of vessel arrival based on rail schedule. Road connectivity to Tuticorin is quicker; containers can be sent ~2 hours in advance.

There are instances of frequent cancellation of rakes due to under-utilization. As a result, shippers potentially miss the vessel the container is bound for, or need to change over to Tuticorin Port at short notice.

Addressing cost and reliability challenges can potentially attract additional cargo of ~80,000 TEUs from Coimbatore. Shippers in Coimbatore were surveyed during the study to understand challenges faced in using the rail connection to Cochin for exports—lower costs and a reliable, predictable connection is the requirement of shippers in order to consider using Cochin as their preferred port.

Incentives on rail fare and THC can make rail movement competitive. CONCOR can be incentivized to provide an incentive of ~2,500 per TEU in order to attract higher volumes and increase their total profit pool. Additionally, an incentive on THC may be offered to the extent of ~Rs. 1,500 per TEU. As a result, the total cost of rail movement would be ~Rs.28,500 per TEU—lower than the competing cost of moving by road to Tuticorin.

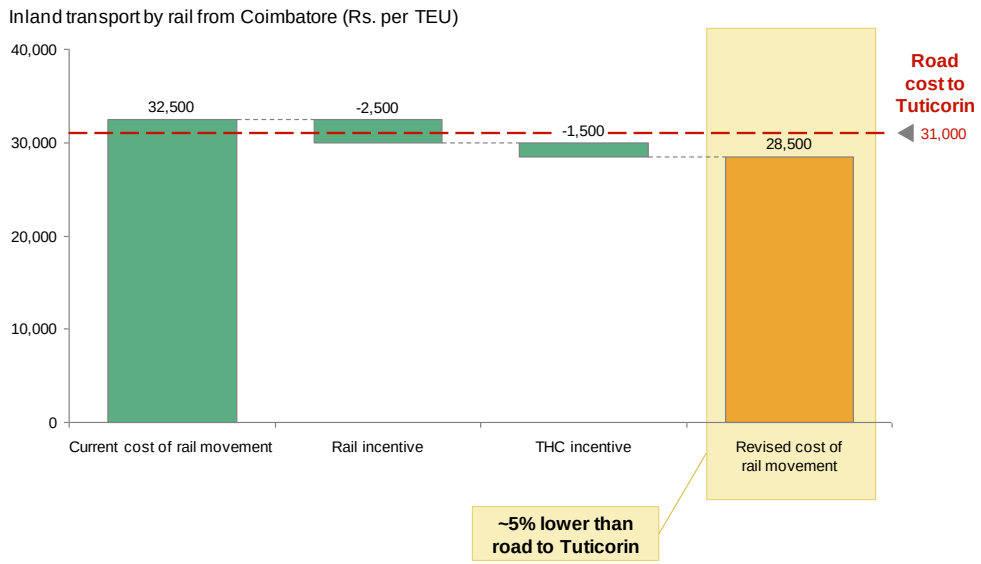


Figure 113: Costs can be matched with incentives on port charges and rail tariff

Reliability of the service also needs to be demonstrated in order to shift cargo to Cochin Port. A higher number of rail connections per week are required. A minimum of four connections are necessary, the schedule of which is to be aligned with sailing schedule of key services. It is essential to provide rail connectivity for the CMA-CGM and ZIM mainline services and two Colombo feeder services.

Additionally, rail service needs to be guaranteed to the shipper, regardless of utilization of the rake. Cancellation of the rake causes disruption to shipper's schedule and results in a loss of shipper's confidence. In order to ensure that reliability is demonstrated, a 6-month pilot initiative needs to be conducted.

Recommendations

Pilot initiative needs to be designed with two key principles:

- Introduction of incentives on THC and rail freight required to be put in place for cargo from Coimbatore
- Operation of a rake four times a week, with guaranteed service as per the fixed schedule. (For the purpose of the pilot, the rake frequency would need to be 2 rakes a week for the initial two months, subsequently increased to 3 rakes a week for the next two months and further increased to four rakes a week for the fifth and sixth month of the pilot. Accordingly, the average number of rakes would be three per week for the duration of the pilot.) During the pilot or post completion of the pilot, based on the growth in demand seen, the rake frequency may be further increased in order to march demand.

Rake schedules and operation are currently controlled by CONCOR. While the reduction of tariff can lead to increase in traffic, which in turn leads to an increase in absolute profits, CONCOR would need to be incentivized in the short term to participate in the pilot initiative. CONCOR can be reimbursed to the extent of current operating surplus earned from operating one rake per week.

The shortfall reduces with higher utilization of rakes, until there is no difference in surplus vs. current position. In the worst case scenario, where traffic from Coimbatore maintains status quo, i.e., 40 containers per week, despite running 4 rakes a week, the shortfall to be reimbursed to CONCOR on account of additional costs incurred to lease the rake amounts to ~Rs. 1.3 crore over 6 months. At a rake utilization of 60%, which results in 144 TEUs shipped per week, CONCOR would make a shortfall of ~40 lakhs vs. their current surplus over a period of

6 months. Against this shortfall, incremental revenue of ~Rs. 1.5 crore would accrue to the Port and to DP World (~Rs. 1 crore to DP World, ~50 lakhs to the Port) from the additional traffic attracted. Hence, the shortfall to CONCOR can be funded through this additional revenue to assure their participation in the pilot.

Target utilization of 80% across 4 rake movements a week would result in zero shortfall to CONCOR. Any additional utilization would be an incremental profit to CONCOR. In order to achieve the target rake utilization, only 192 TEUs a week are required to be attracted from Coimbatore.

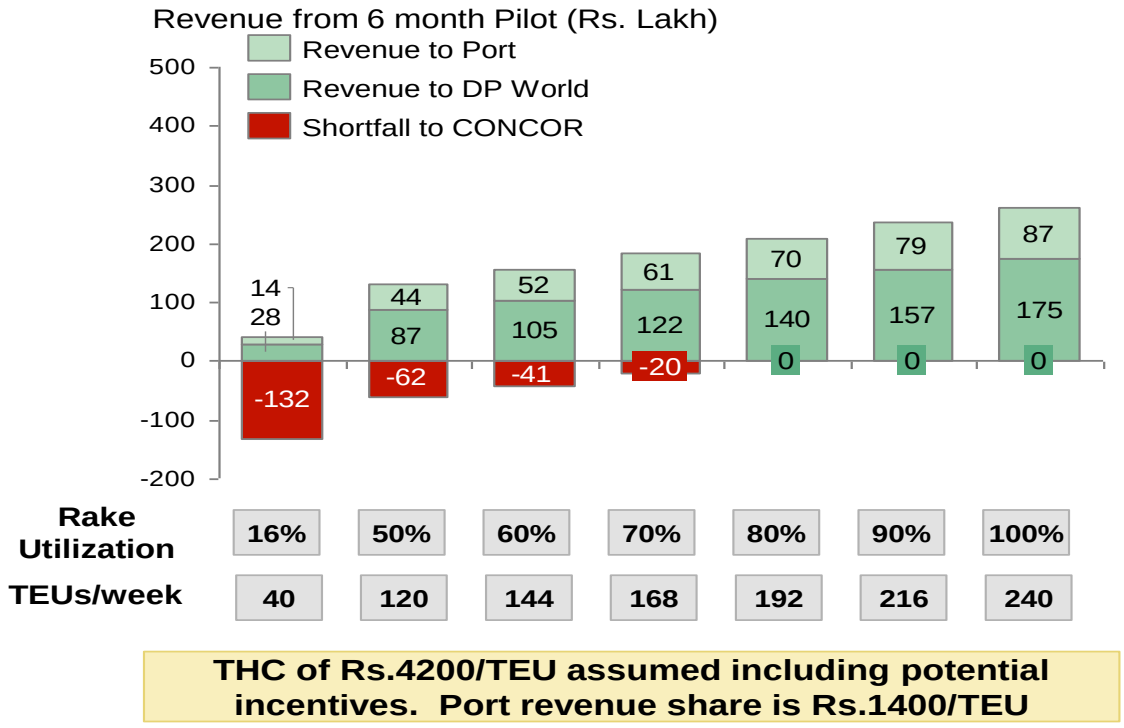


Figure 114: 6-month pilot can be taken to demonstrate reliability and cost effectiveness of ICTT rail connectivity

Expected Impact

The tariff reduction, as well as reliability of inland haulage demonstrated in the pilot initiative, would make Cochin more competitive than Tuticorin Port. Total volume potential of ~80,000 TEUs annually existing for export from Coimbatore can thus be tapped— resulting in incremental surplus of ~Rs. 5 crore, considering 50% penetration.

4.2.1.2 Initiative: CoPT 1.2 Easing the delays and costs for road transport to ICTT

Initiative Overview

Stakeholder interviews have highlighted various challenges to serve Coimbatore cargo by road. 35 interviews were conducted across various stakeholder categories:

Vessel Agents and Liners	CHA	CONCOR
• Maersk • MSC • NYK • APL • ZIM	• President, Secretary CHA association • CHA firms in Ernakulam	• Terminal manager, Cochin
Shippers	**Terminal Operator**	**Trucker's association**
Various shippers in Kerala and TN	• CEO • Commercial Head • Finance manager	• President, Truck Owners Association • Various truck drivers

Figure 115: Stakeholder categories for interview

Key Findings

Two key themes emerge, which make road transport to Tuticorin more viable than to Cochin:

1. Delays and uncertainty at Walayar check-post:

"Waiting time at Walayar can be as high as 18-24 hours, increasing cost and uncertainty; we miss vessels sometimes."

~Shipper in TN

"Round-the-clock functioning of check-post and increasing parking space for us would help."

~Truck driver

"We have to go to the check-post to pay the penalty in cash if our truck driver is not carrying it, increasing total time for our shippers."

~CHA agent in Cochin

2. Costs arising from penalties and delays

"Flash strikes in Kerala can lead to goods getting stuck on the way, increasing costs for me."

~Shipper in TN on reasons for preferring VOC

"Penalties can get as high as 4000-6000 per TEU in Kerala due to overweight containers changing by logistic economics."

~Shipper in TN on reasons for choosing VOC

Recommendations

The challenges cited by stakeholders pertain to operations of third parties, regulatory bodies and enforcement agents. Various regulatory amendments are required for easing the delays and costs for road transport to ICTT.

i. Regulatory amendments:

The maximum load per axle of trucks defined by rules under the Motor Vehicles Act, 1988 is lower than standard container loads that can be loaded on vessels today. The limit defined under the Act limits the weight of a truck to 20MT for dual-axle and 23 MT for triple-axle trucks based on road conditions and truck design from inception of the act. Containers carrying heavy commodities weigh >25MT on average, attracting penalties at Walayar check-post for over-weight cargo.

Amendment of the rules to align with container loads for export cargo can be recommended to facilitate cargo movement by road from factories to ports.

ii. Measures to reduce TAT at check-posts:

Various automation initiatives can reduce turn-around-time at Walayar check-post, such as:

- In-line weighbridge to avoid diversion of trucks
- Automated scanning of registration details with OCR and RFID installed on trucks
- Prepaid credit system for payment of taxes and penalties
- Operation of check-post 24 hours a day

iii. Reduction in truck costs

Higher trucking costs per kilometer prevail in Kerala vs. neighboring states, driven by high labor costs in Kerala. This results in a limited payout for truck-owners. Reducing turn-around time per trip can potentially improve costs for trade by reduction in trucking costs.

Expected Impact

Potential to attract additional export traffic from Coimbatore which has a total market potential of ~80,000 TEUs.; incremental surplus of ~Rs. 5 crore, considering 50% penetration, (jointly with initiative on rail pilot).

4.2.1.3 Initiative: CoPT 1.3 Proposal for extended cabotage relaxation for coastal cargo

Initiative Overview

Cochin is served by only two mainline services today, making the connectivity sparse in relation to a strong gateway port. The mainline services connect Cochin directly to the Middle East, East Mediterranean and Europe. All other locations are served by using feeder services to Colombo and trans-shipment onto mainline vessels.

Key Findings

Multiple services already pass Cochin on the way to/from ports in Gujarat and Maharashtra. 8 Far East services and 3 South East Asia services are connected to India on its West Coast Ports.

Figure 116: Potential to attract additional mainline connections

. Total coastal cargo handled at Cochin currently amounts to ~120k TEU per annum. Cochin receives containerized coastal imports from Gujarat, primarily building materials and tiles. This cargo can be transported on the backhaul of a Far East or South East Asia service, bringing imports to JNPT or Mundra. Allowing the coastal cargo on mainline vessels can incentivise liners to call at Cochin. In order to facilitate this, extension of cabotage relaxation to coastal containers is necessary to open up coastal volumes for mainline vessels. Critical mass required per call by mainline services can be achieved through this additional source of volume The potential volumes for coastal imports from Gujarat is ~60,000 TEUs.

Recommendations

Three action steps are required to potentially attract Far East mainline services:

i. **Cabotage waiver on coastal containers**

It is necessary to extend cabotage relaxation to all containers at Cochin. Further, clear rules are required for customs authorities at Cochin as well as feeder ports sending cargo to/from Cochin.

ii. **Longer period of cabotage waiver**

A longer duration of certainty for cabotage relaxation gives confidence to liners adding a call at Cochin. Liners take into consideration a longer term view while determining service routes, hence longer term certainty is essential.

iii. **Identify liners**

Identify liners that currently operate services along Far East and South East Asia routes with calls at Gujarat.

Draft of 13 m is adequate for vessels on the Far East/India and SE Asia/India routes. Primarily 4,000 to 6,500 TEU capacity vessels operate the Far East/India route, and vessels with lower capacity of 2,000–4,500 TEUs operate the SE Asia/India service.

Expected Impact

Potential to attract two more mainline services, resulting in additional operating surplus of ~Rs. 2 crore per year.

4.2.1.4 Initiative: CoPT 1.4 Reduction in dredging costs through limited draft

Initiative Overview

Maintenance dredging cost of ~Rs. 120 crore per annum is spent by the Port to maintain a draft of 14.5 m. The high draft is maintained along the entrance channel and up to the container terminal. Other berths and terminals utilize a maximum draft of 12.5 m. Despite the high dredging cost incurred by the Port, the container terminal has been unable to attract vessels that require a draft higher than 13.5 m. The extent of dredging cost may be re-evaluated in line with the vessel profiles at the container terminal.

Key Findings

Limiting draft to 13.5 m can help reduce dredging cost, provided mainline calls do not increase. Over a period of three years since the ICTT has been fully operational, only 5 vessels have utilized a draft higher than 13m at Cochin, and 92% of vessel calls have required a draft lesser than 12m.

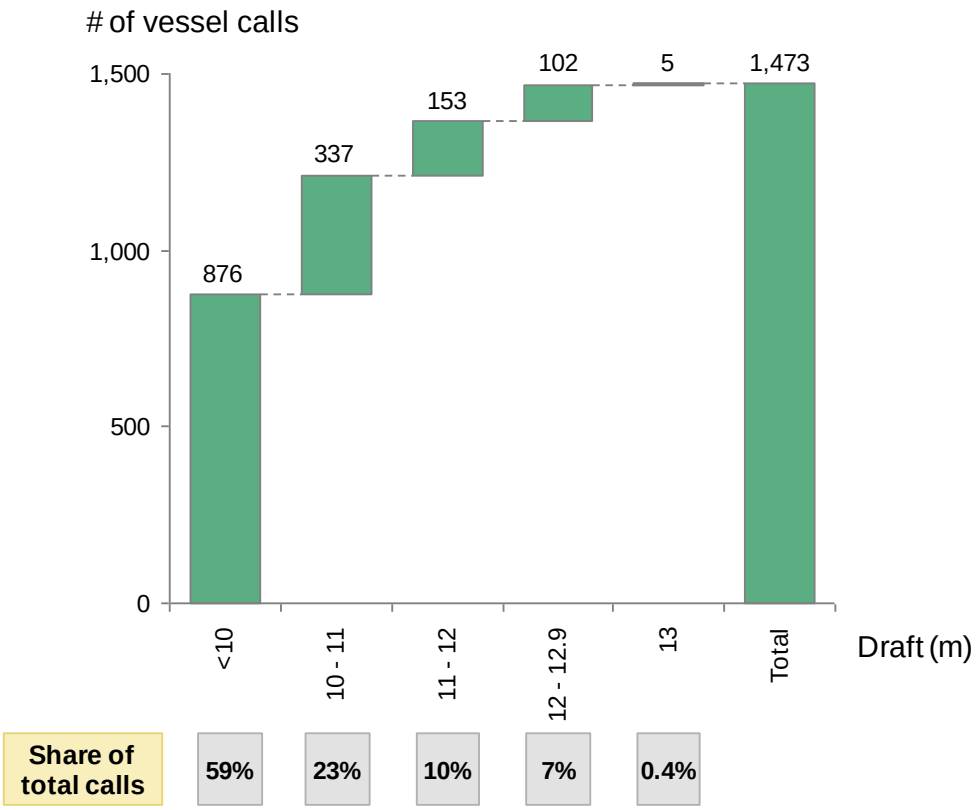


Figure 117: If mainline calls do not increase, limiting draft to 13.5m can help reduce dredging cost

Recommendations

Currently, a fixed price contract exists with the Dredging Corporation of India for maintenance dredging with two trailer-suction dredgers deployed round the year at Cochin Port. The two dredgers have hopper capacity of 7,400 cbm and 6,500 cbm respectively. The contract with DCI can be re-negotiated for deployment of a dredger of lower capacity instead of 7,400 cbm, which will enable a reduction in the contract amount of ~Rs. 20 crore.

Expected Impact

A saving of a maximum of ~Rs. 20 crore in dredging costs is possible through reduction in draft requirements across the entrance channel and container basin. However, the same is conditional on ICTT's ability to attract additional mainline vessels with higher draft requirement. In case services with higher draft are calling at Cochin Port, the reduction in depth and savings therefrom may not be feasible.

Other Analysis

i. Pricing levers to drive value

There is little room to increase pricing without losing volumes to Tuticorin Port. Currently, incentives on VRC provided at Cochin Port make mainline calls marginally more attractive than feeder routes to Colombo for shippers. The mainline services are also able to make a viable call at Cochin despite low parcel sizes due to high discounts offered by the Port on VRC. For a shipper, the cost of handling TEU for loading on a mainline vessel at Cochin is ~Rs. 7,000 per TEU, while the total port handling charges for a container loaded onto a feeder at Tuticorin and trans-shipped at Colombo is ~Rs.7,500 per TEU (including the handling charges at Colombo). The cost of using a feeder service at Cochin to Colombo for trans-shipment is significantly higher, hence unlikely to be able to compete with the rates at Tuticorin Port.

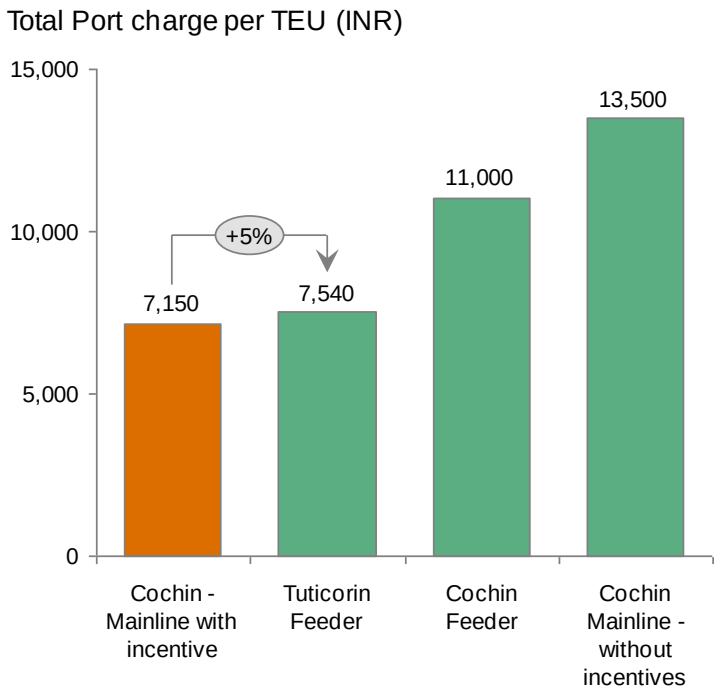


Figure 118: Little room to grow revenue through pricing without losing volumes to Tuticorin

Incentives currently offered on vessel related charges can be reduced by only ~100 bps without losing volumes to Tuticorin. Eliminating the VRC incentive entirely can result in loss of mainline cargo to two sources:

- Feeder routes carrying cargo to Colombo for transshipment
- Feeder routes from Tuticorin carrying cargo to Colombo for transshipment

The difference between Cochin's mainline services and a feeder from Tuticorin is only USD7 per TEU, hence an incentive of ~84% is still needed to ensure that Cochin mainline rates are at par with the Tuticorin feeder route. Accordingly, there would be no additional growth potential from existing hinterland cargo that is currently served in Tuticorin.

ii. Potential for Cochin Port to revert to being a feeder port

An alternate growth strategy for Cochin Port would be to revert to being a feeder port and discontinue the VRC incentives currently provided to retain the mainline vessels. As the feeder option to Colombo from Tuticorin is the second best option available to shippers from the point of view of port handling costs, the Port will need to compete with Tuticorin on tariff to attract cargo from the hinterland.

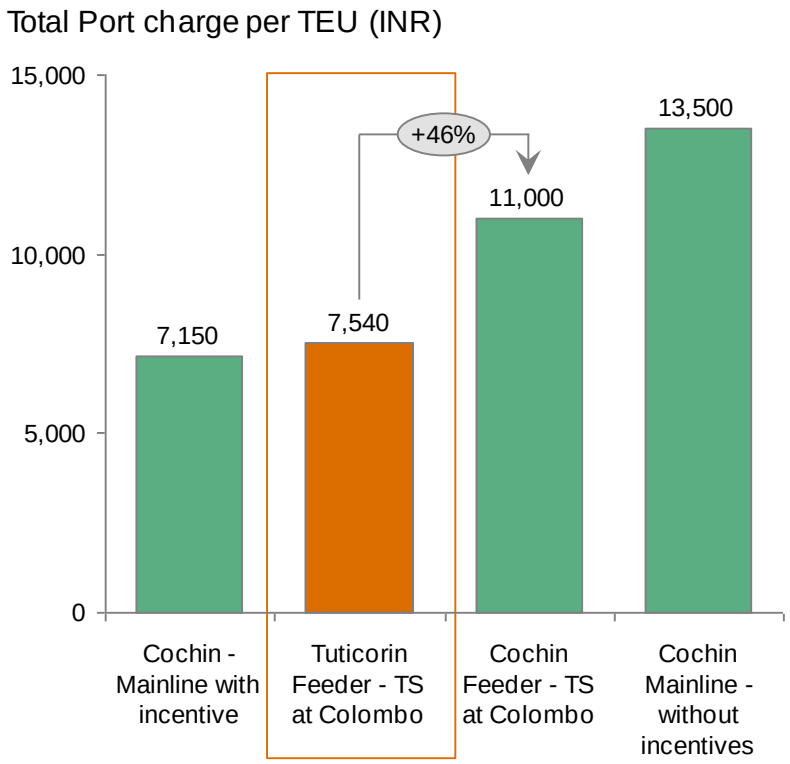


Figure 119: Tuticorin Feeder to Colombo next-best option for Cochin's mainline customers

Increasing the hinterland penetration beyond existing penetration, without the benefit of mainline connections, would be a challenge for Cochin Port. The trucking costs to Cochin are higher for cargo coming from any hinterland outside Kerala, and those volumes will continue to flow to Tuticorin/Chennai.

Competing for cargo from the same hinterland, being sent to Colombo, would require competitiveness of price. ~30% incentive on port charges would be required to maintain price parity with Tuticorin Port to retain the traffic that currently uses mainline vessels on new feeder services. The rebate is required to match the total handling cost for the shipper. The cost to shipper is a total cost inclusive of freight paid to the liner and/or his agents. A reduction is required in total handling costs and can be given in the form of THC or VRC.

Revenues to the port from marine charges are driven by the GRT of the vessels using the Port. The GRT of mainline vessels is ~4x the GRT of feeder vessels, which brings in higher VRC revenues to the port.

Further, the two mainline service calls can be replaced by a single feeder service as all the cargo would move to the same destination, i.e., Colombo. Only ~450 TEUs are handled per service per call on mainline vessels today, while the capacity of a regular feeder vessel is ~1,200 TEUs. The current feeder services are all running at higher than 90% utilization, hence an additional service would be required.

Given the change in vessel profile of calls at the Port, there would be a net reduction in VRC revenue for the port to the tune of ~Rs. 3 crore per annum.

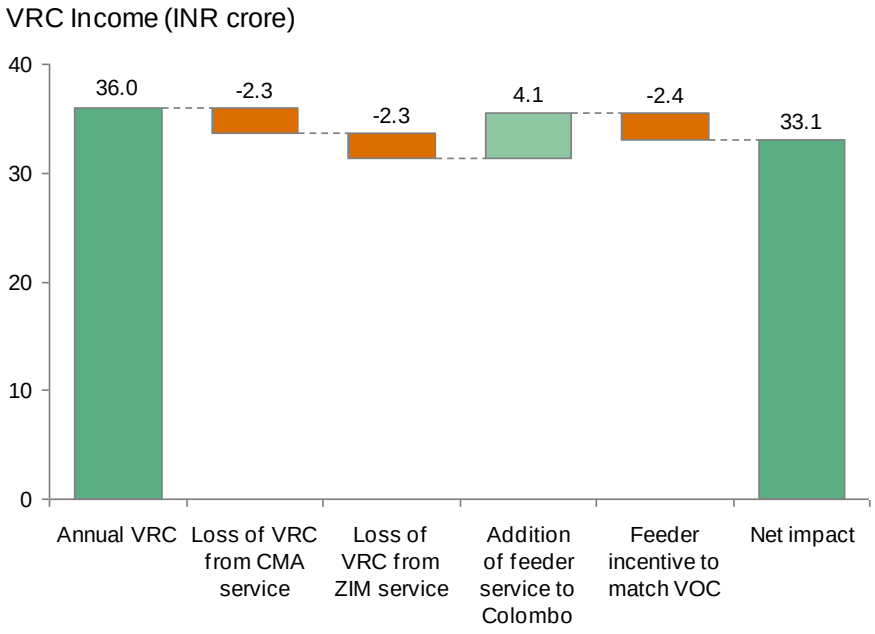


Figure 120: Net reduction of revenue on account of smaller vessels handled

The port currently earns ~Rs. 36 crore on account of VRC annually. The two mainline services, which call on vessels of ~40,000 GRT, account for a total of ~Rs. 5 crore of this VRC revenue, which will be terminated. These would be replaced by one feeder service to Colombo on a vessel of ~17,000 GRT, which would accrue VRC revenue of ~4 crore per annum at standard rates. However, if the feeder rates are kept competitive with Tuticorin Port, an incentive to the extent of ~Rs. 2 crore per annum is required to be provided to the feeder service operators. Accordingly, the net projected VRC for the Port under the feeder port strategy is ~Rs. 33 Crore, being ~Rs. 3 crore lower than with the current vessel profiles.

Hence, the option of reverting to being a feeder port is less attractive than consolidating position as a gateway port.

4.2.2 Dry Bulk

4.2.2.1 Initiative: CoPT 2.1 Mechanization to attract FCI food-grain traffic

Currently, ~1.6 million tons of rice and wheat are transported into Kerala by rail from North India and Andhra Pradesh. The volume is primarily movement by the FCI from producer states of Punjab, Haryana, Rajasthan, Madhya Pradesh and Andhra Pradesh, for storage and public distribution in Kerala.

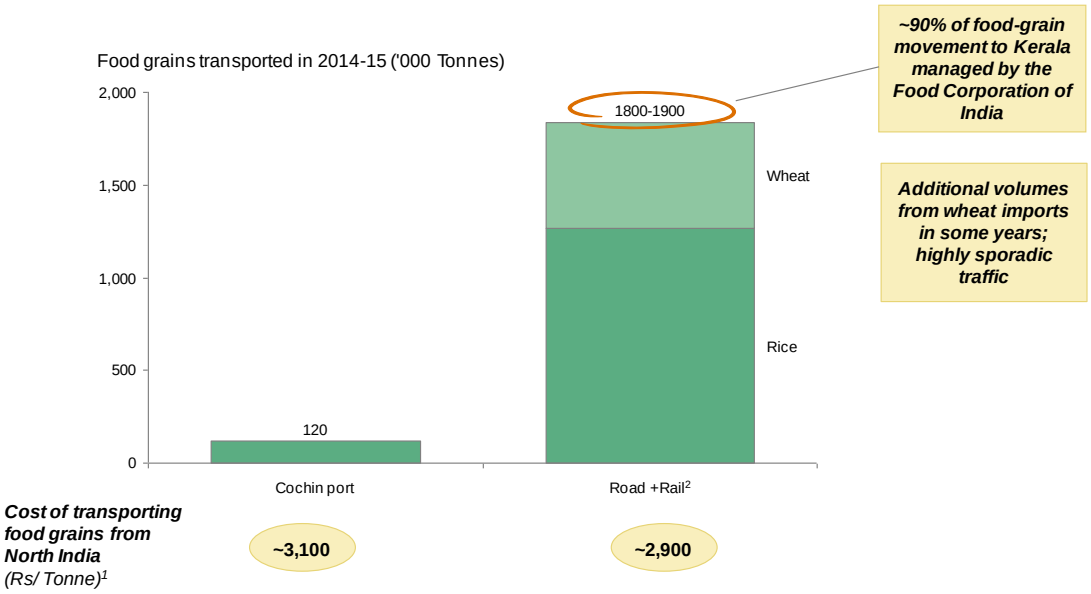


Figure 121: ~1.6 million tons of rice and wheat moving into Kerala by rail from North India and Andhra Pradesh

Key Findings

Rail transport from North India to Cochin is currently more economical than a multi-modal option involving transport by rail from Punjab/Haryana to Kandla, followed by coastal movement to Cochin Port. Under the multi-modal transport model, food-grain can be transported by rail from the origin state i.e. Punjab/Haryana for wheat and Andhra Pradesh/Madhya Pradesh for rice, to the port of origin in bagged form, At the port of origin the bags are cut open and the food-grain is loaded in bulk onto the vessel. This practice is followed for food-grain exports and would remain the same for coastal movement, At the receiving port, the food-grain would be unloaded and subsequently bagged. Higher cost on the coastal route is primarily on account of high labor handling and bagging costs at Cochin Port. These constitute ~80% of the Rs. 900/ton port handling costs.

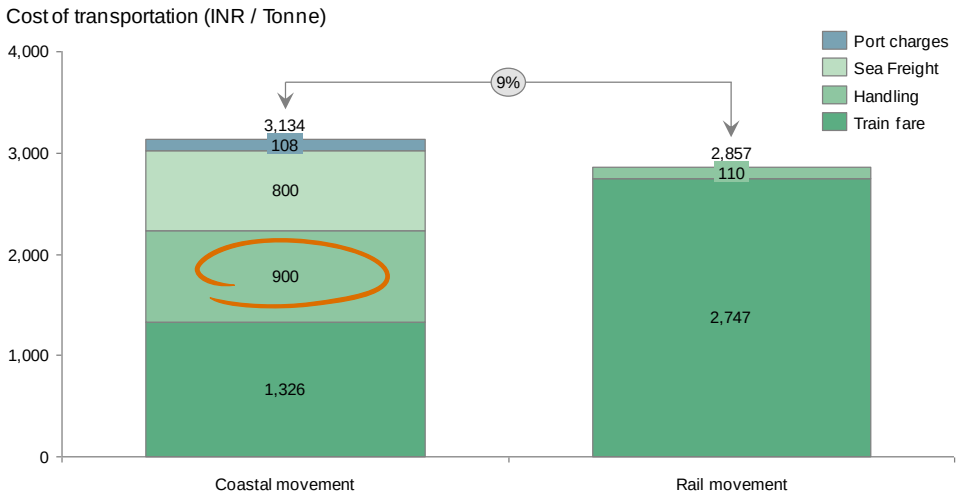


Figure 122: High port handling costs (~25% of total cost) makes rail more attractive for transport of food-grain

Strong labor unions exist in Kerala, driving handling costs higher than neighboring states. Kerala Head-load Workers Welfare Association governs wages payable to laborers for bagging operations. The labor unions also prevent stevedoring agencies from hiring private, non-unionized laborers for bagging operations.

The costs maintained at Kerala are ~2x the bagging costs at neighboring ports.

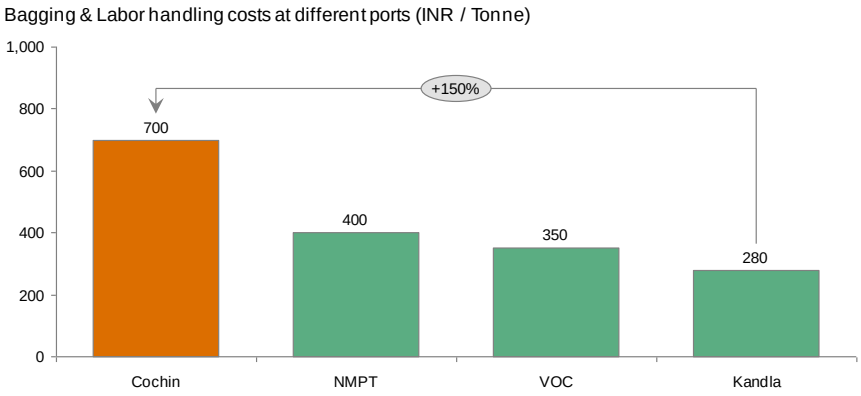


Figure 123: Bagging and handling costs at Cochin 150% higher than Kandla

Recommendations

Two potential solutions exist to stimulate a modal shift to coastal movement for food-grains:

i. Mechanization of berth for bulk handling:

This is a more capital intensive option, requiring investment in infrastructure at the port. However, the resultant cost of handling for the shipper would be ~10% lower than current rail movement costs, making it a beneficial option for trade.

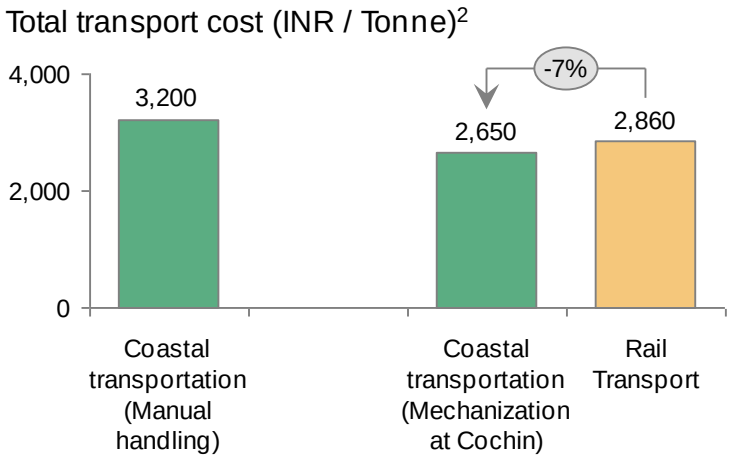


Figure 124: Mechanized handling of food-grain in bulk can be ~7% cheaper than rail movement

ii. Containerization

This option requires no further investment as existing container handling infrastructure can be utilized. However, the resultant cost to the shipper is ~6% higher than current rail costs, and additional incentives on THC and VRC would be required to incentivize shippers to initiate a modal shift.

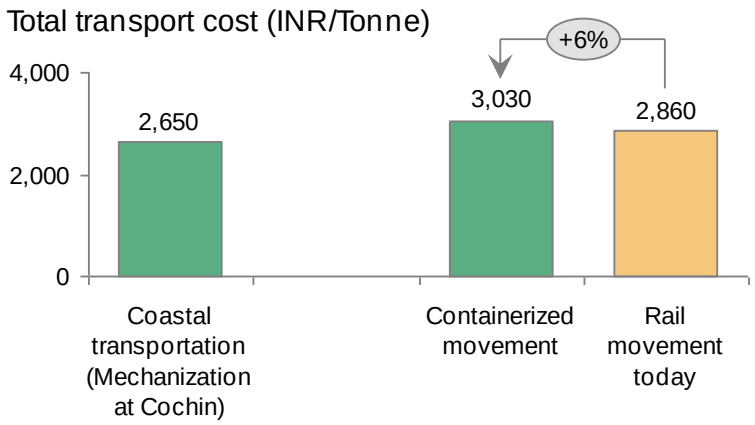


Figure 125: Cost of containerized coastal movement of food grain is ~6% higher than rail

iii. Mechanized handling:

Three stakeholders are essential to successfully construct a mechanized berth and bagging plant with economic benefit to the port as well as to trade:

a. Source of steady food-grain traffic

Steady traffic is essential for achieving necessary returns to warrant a viable investment in mechanization. FCI is currently the only player with steady and certain volumes of movement each year with ~1.6 million tons. This comprises ~90% of food-grain movement into Kerala. Other sources of food-grain traffic include imports, however, these are sporadic in nature and dependent on local production levels. For example, India imported wheat in 2015 after five years without any imports.

b. Coastal vessel operators

Currently, there are no vessels deployed for bulk movement of food grain by sea, though large foreign-going vessels handle food-grain exports at Mundra and Kandla. Based on existing cabotage restrictions, chartered vessels are required to bear an Indian flag to handle coastal movement. The Port can facilitate discussions with prospective vessel operators, though 'Partnership' is not imperative.

c. Logistics player for inland haulage and storage

Inland movement is required from procurement states to the loading port. This would be rail movement in bulk or bags from Punjab/Haryana to ports in Gujarat. Additionally, a logistics player is required for setting up warehousing facilities at Cochin to benefit shippers. Potential use of silos can manage demand to FCI warehouses, flour mills, breweries and other end consumers.

Investment in mechanization by the Port can generate returns of ~18-20% based on additional revenue stream from food-grain cargo. Capex requirement of ~Rs. 100 crore required for equipment for mechanized discharge from vessels, bagging plant and mechanized loading to rakes. Against this investment, a revenue stream of ~Rs. 175/MT is expected to accrue to the port. The revenue stream comprises VRC and wharfage levy of ~Rs. 73/MT and ~Rs. 100/MT for berth operation, which represents part of the savings accruing per ton to the shipper on account of mechanized handling. The IRR accruing to the port on this investment is ~18%, assuming 1 million tons of food grain is handled at the port, representing 56% of the market potential.

There is higher value unlocked for the shipper through the modal shift, a logistics cost saving of ~Rs. 250/MT. This revenue stream results in an IRR of ~20% on an investment of Rs. 100 crore.

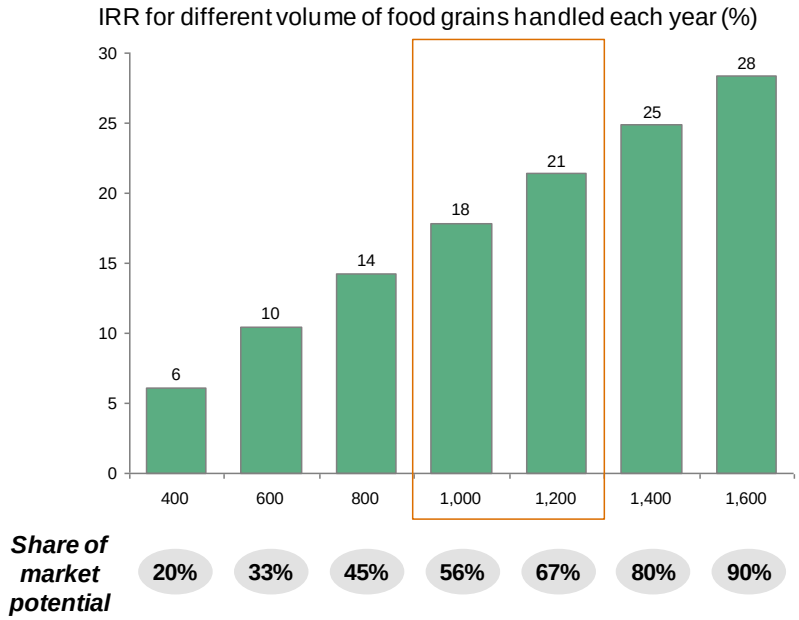


Figure 126: IRR for port investment in mechanized berth for food-grain

iv. Containerization

Containerized movement of food-grain is currently higher than direct transport by rail. Cost of moving a container by rail from northern states to Kandla, loading onto a vessel, unloading at Cochin amounts to ~Rs. 3,030 vs. current cost of ~Rs.2,860.

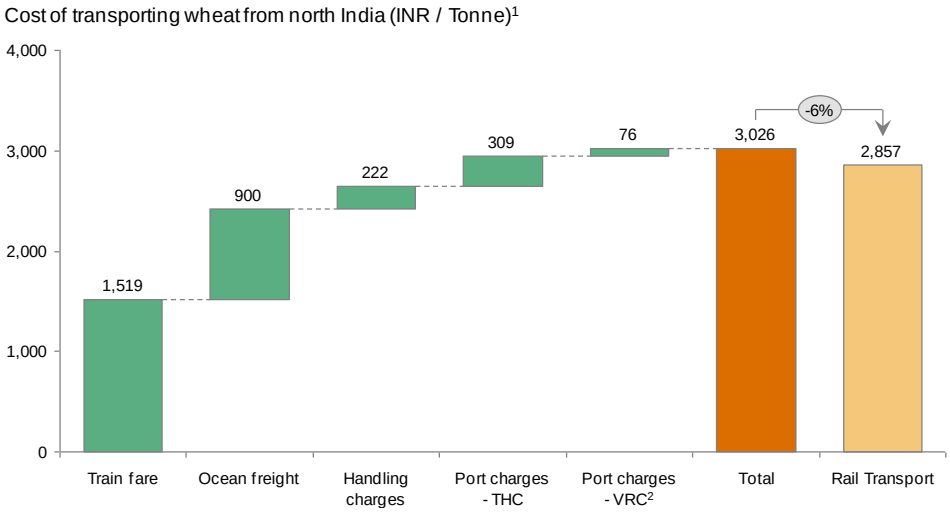


Figure 127: Containerization is potentially a less capital-intensive solution

Three initiatives can potentially bridge the cost gap and make containerized movement more economical for the shipper:

1. Incentives on port charges: Incentives provided by loading port and destination port on THC and vessel related charges can reduce the cost difference between rail and sea.
2. Regulatory incentives to coastal vessels: Income tax incentives to liners carrying food-grain can result in ~30% reduction in sea freight, i.e., ~Rs. 300 per TEU.
3. Potential for cabotage relaxation to reduce ocean freight: Lower cost of operations of foreign vessels would result in lower sea freight.

Containerization can be explored in the absence of interest from investors for mechanization.

Expected Impact

Potential to attract ~1 Mn MT of food-grain traffic, resulting in incremental operating surplus of ~Rs. 8 crore per annum.

4.2.2.2 Initiative: CoPT 2.2 Mechanized bagging plant to attract fertilizer imports

Initiative Overview

Fertilizer imports of ~0.5 million tons per annum are consumed in Kerala, however, these are not imported at Cochin Port today. Neighboring ports at Tuticorin and Mangalore account for ~90% of the imports consumed in Kerala. The fertilizer products primarily imported are Urea, DAP and MOP. The cost of handling imports at Cochin Port is ~Rs. 200/MT whereas the average cost at New Mangalore Port Trust and VOC Port Tuticorin is ~Rs. 110/MT.

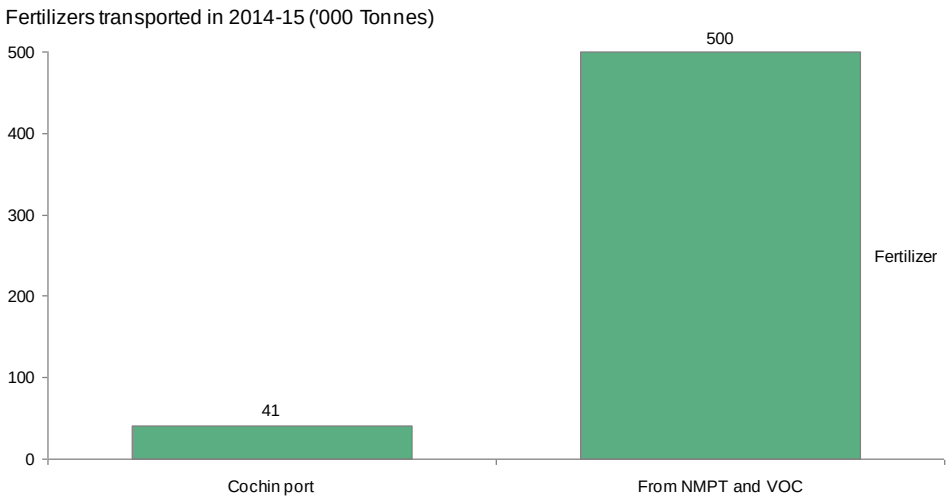


Figure 128: Cochin losing ~0.5 Mn tons of fertilizer traffic to neighboring ports

Key Findings

Four key reasons drive fertilizer imports to other ports:

1. **Tariff at Cochin Port ~2x neighbouring ports**

The Vessel Related Charges at Cochin Port amounts to ~Rs.132 per ton vs. ~Rs.66 at NMPT and VOC. The wharfage levied at Cochin is also ~2x the amount at NMPT and VOC.

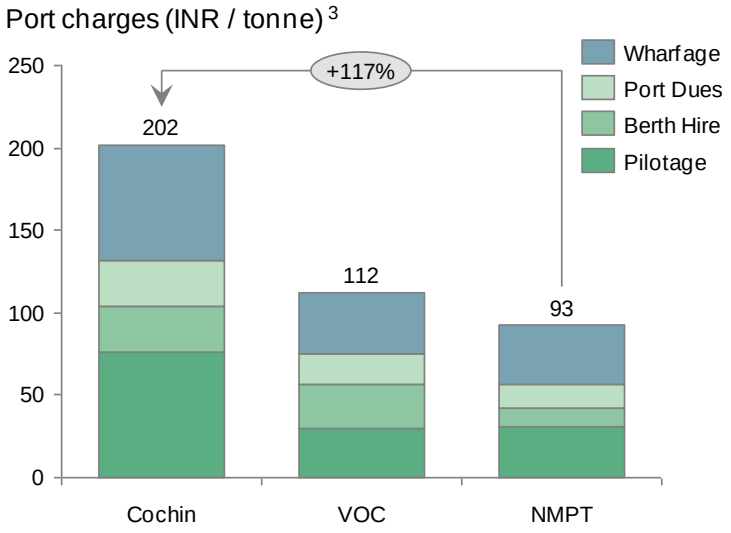


Figure 129: Cost of fertilizer import at Cochin is 2x higher due to low productivity

2. Low productivity increasing berth hire charges

Productivity at Cochin is ~4,500 MT per day, while the productivity is ~7,000 MT per day at VOC and NMPT. This increases the turn-around time at the port and increases the berth hire charges and demurrage charges payable on the vessel.

3. High bagging costs at Cochin driven by unionised labourers in Kerala.

Similar to the costs described for food-grain bagging, fertilizer handling costs are driven up by the labour cost involved in manual bagging. The bagging costs at Cochin are ~2x of NMPT and VOC.

4. Uncertainty of evacuation for a time-sensitive product

Frequent strikes by unionized labor delay bagging and evacuation. If fertilizers are late to the market by a few days or a week, the market share is lost to competitors who are able to supply the products at the right time to farmers. As a result of this uncertainty, importers prefer to avoid Cochin port.

Recommendations

It is necessary to address the above four challenges in order to attract fertilizer cargo to Cochin. Three levers can potentially make Cochin port competitive again:

1. Tariff incentives to match neighboring ports:

The current port charges, including VRC and wharfage, are ~200/MT at Cochin and need to be reduced by ~50% in order to compete with NMPT and VOC.

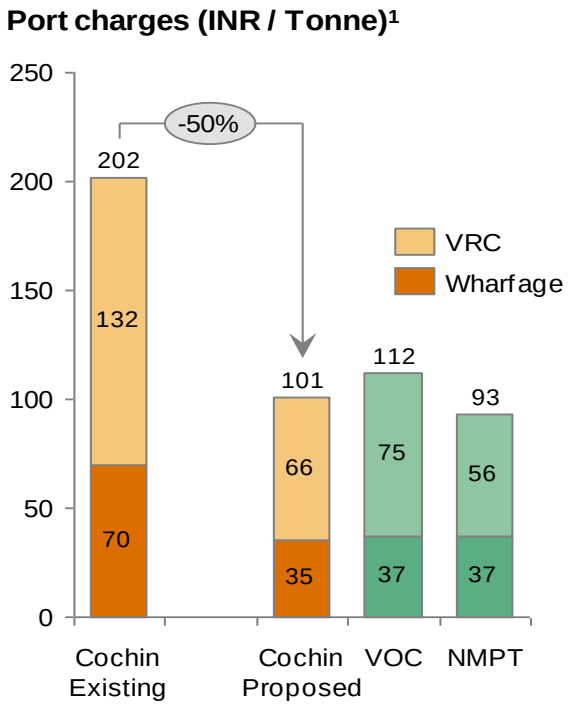


Figure 130: Tariff incentives to match neighboring ports

2. Mechanized discharge operations to improve productivity

With mechanized unloading, berth productivity can potentially increase to ~8,000 MT/day from the current productivity of ~4,500 per day. FACT has a dedicated berth for unloading of fertilizer raw materials through conveyors. The same can potentially be used to discharge fertilizer finished products as well. The mechanized berth, however, does not include mechanized bagging. Currently, the fertilizer raw materials are transported by barge to the FACT plant near the port and bagging is not a necessary step.

3. Mechanized bagging to improve evacuation

In order to eliminate the high costs and unreliability of manual bagging, labor costs can be by-passed entirely by mechanizing the bagging process. This requires investment in a mechanized bagging plant with a capacity of ~0.5 million tons per annum. The capacity of the bagging plant may be limited to the current market potential of imported fertilizer consumption in India. Fertilizer consumption, being driven by agricultural activity, is not expected to grow at a significantly high pace and, therefore, would not require additional bagging capacity. A total investment of ~Rs. 30 crores is required for the bagging plant—comprising ~Rs. 20 crore for mechanized bagging, and ~Rs. 10 crore for equipment to mechanize loading of bagged cargo onto rakes.

Joint investment by port and importer can make the project economically viable. The investment is unattractive for a single player due to the limited revenue stream accruing to each stakeholder.

In case the Port invests the entire amount, the resultant project IRR will be ~8% with volumes of ~50% of the market potential. The revenue stream to the port is ~Rs. 112/MT on account of discounted VRC and charged wharfage.

In case an importer makes the entire investment, the projected IRR on investment would be ~12% considering 50% market penetration. The value accruing to the importer is a saving of ~Rs. 150/ton on cargo handled vs. the current costs.

However, in case each stakeholder invests half the total sum required, the individual revenue streams are sufficient to drive healthy project IRRs of 18-20% at varying levels of market penetration.

IRR for the port is in the range of ~18-21% for 50-60% market penetration, i.e., 250,000–300,000 MT handled per annum at the mechanized berth.

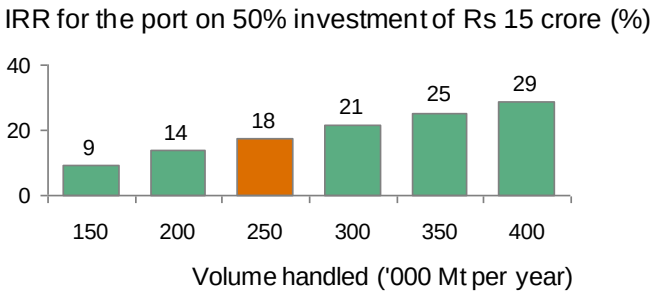


Figure 131: IRR for the port for mechanized fertilizer bagging plant

IRR for the importer is in the range of ~22-27% for 50-60% market penetration. The investment is assumed to have a life of 30 years.

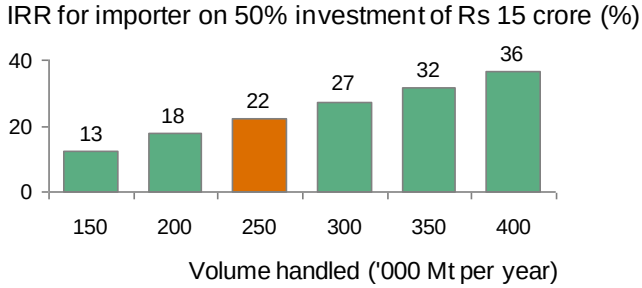


Figure 132: IRR for the fertilizer importer for a mechanized bagging plant at the port

It is further estimated that the area allocated by the port for setting up of a bagging plant may limit the availability of storage space for the fertilizer prior to bagging. The port has a storage capacity of ~50,000 MT, and an average parcel size for a fertilizer vessel would be ~25,000-35,000 MT. The sheds available at the port may be in unsuitable condition for storage of such a quantity. Storage in silos would be necessary to overcome the shortage of storage space caused by allocating area to a bagging plant, at an additional capital expenditure of ~Rs. 60 crore. As the investment of Rs. 30 crore in a mechanised bagging plant is not viable for a single private player or the port to make alone given the volume potential of only 0.5 Mn MT, setting up of a silo at a higher investment is not economically viable for the port to invest. It is also unlikely to receive interest from players for funding under PPP model. Alternate sources of funding for example Sagarmala budget may be evaluated for funding of a silo and bagging plant. Detailed Project Report is necessary for the evaluation.

Expected Impact

Potential to attract ~0.4 Mn MT of fertilizer traffic, resulting in incremental operating surplus of ~Rs. 2 crore per annum.

4.2.3 POL

By volume, POL is the largest cargo handled at Cochin Port. The cargo is captive to the BPCL refinery adjacent to the port which imports crude oil and exports refined products from the Cochin Port. The BPCL refinery is undergoing expansion of capacity, expected to be commissioned during the year 2016-17. The current refinery capacity is 10MMTPA, which is planned to increase to 16 MMTPA under the refinery expansion plan.

Crude oil imports are handled at the SPM (Single Point Mooring) with current berth occupancy of 43%. After the addition of incremental crude oil volumes, berth occupancy is projected to remain within acceptable norms at the SPM, reaching ~69% occupancy.

However, given the increase in exports of POL products, additional capacity is required at the POL berths NTB and SCB. The current occupancy of the POL berth is ~48%. With additional demand, berth occupancy is expected to reach ~88% if the productivity remains constant. This is higher than recommended berth occupancy norms of 75%. The volumes handled are expected to increase from the current 3.7 MMTPA to ~5.9 MMTPA.

Productivity at POL berths is lower than peers, driven by high idle time:

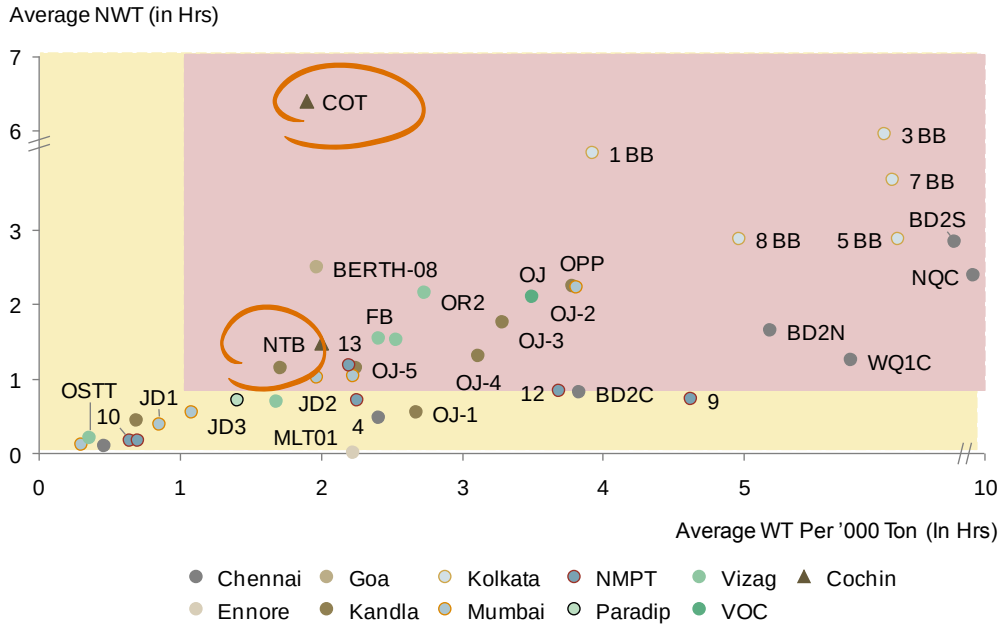


Figure 133: Low POL productivity driven by high non-working time at berth

~90% of idle time at POL berths is driven by 3 activities:

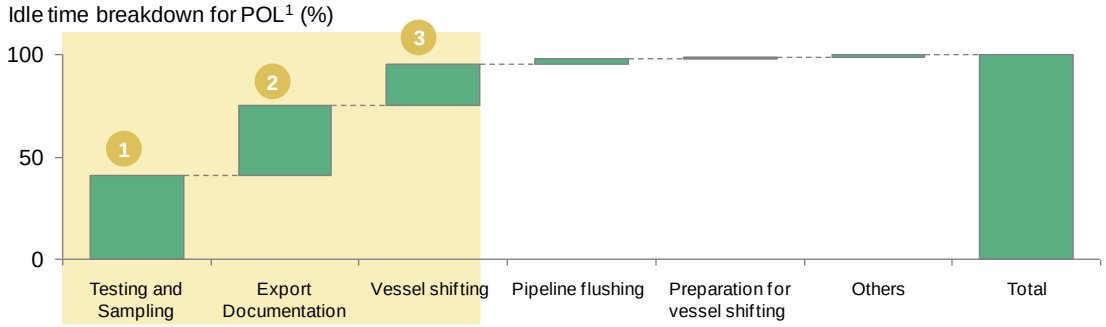


Figure 134: Testing and sampling, Export documentation and Vessel shifting account for ~90% of idle time at POL

Testing and sampling:

Quality testing of import cargo is required to be done before discharge operations can commence. It can take 5-8 hours as the sample needs to be sent to the refinery (~17km) for testing.

Export documentation:

Documents such as bill of lading, cargo manifest need to be signed off between vessel, refinery, etc. This process can take up to 4 hours for coastal vessels and 5.5 hours for foreign vessels.

Vessel shifting:

Vessels shift between berths owing to different products handled by berths and draft difference (e.g., between COT and NTB).

Observations of berthing and un-berthing activities at POL berths COT and NTB have also shown that primary delays are on account of quality testing for imports, and documentation for exports.

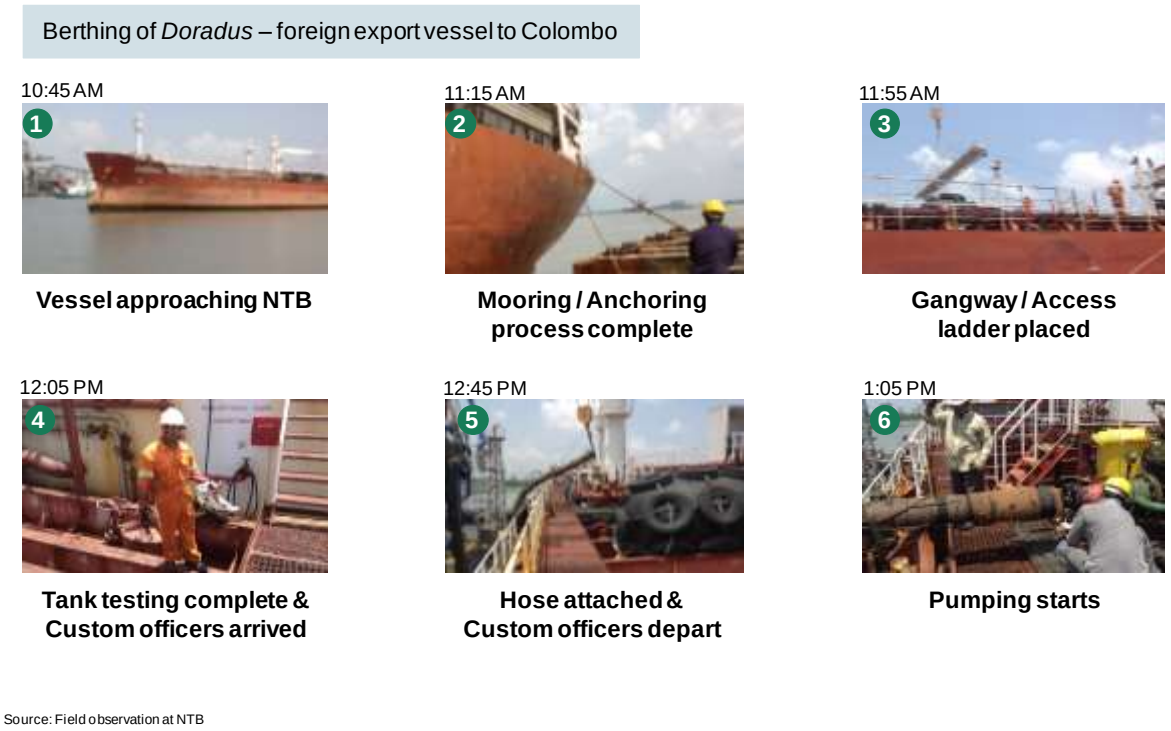


Figure 135: Step by step process of berthing studied at NTB to identify any excess delay

Based on observations, documentation takes up to 4 hours for a vessel carrying coastal exports bound for Mumbai. It was observed that though loading operations were completed by 7:25 am, the documentation and customs clearance process lasted till 10:30 am, i.e., 3 hours after the vessel was ready to sail.

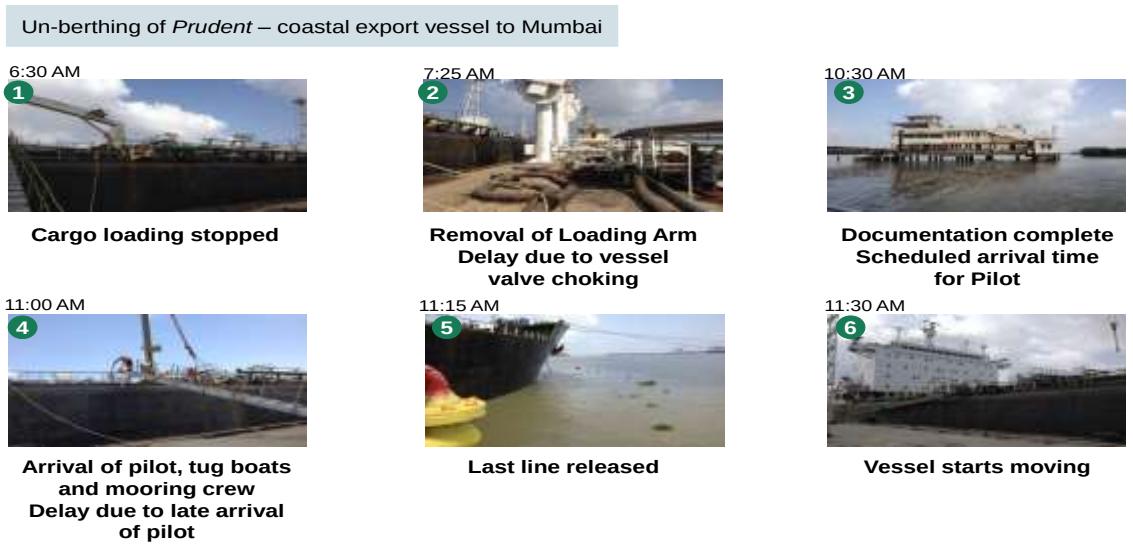


Figure 136: Documentation taking ~4 hours as observed from unberthing process at COT

4.2.3.1 Initiative: CoPT 3.1 Set up POL quality testing facility within port premises

Initiative Overview

~60% of idle time recorded at POL berths is on account of waiting for quality tests to be completed, which involves carrying a sample to the BPCL testing lab located on the mainland, ~17 km away from the berth.

Key Findings

The actual testing time for import samples is ~2 hours, while another ~2 hours are lost in transit time from the berth to the laboratory. A potential savings of 2 hours at the berth is possible if the transit time is to be collapsed.

Recommendations

An area at the berth has been identified for BPCL to set up a testing facility, which will result in reduction of transit time to reduce idle time at the berth. The quality testing lab can also be used for testing the import samples for other players, i.e., IOCL and HPCL.

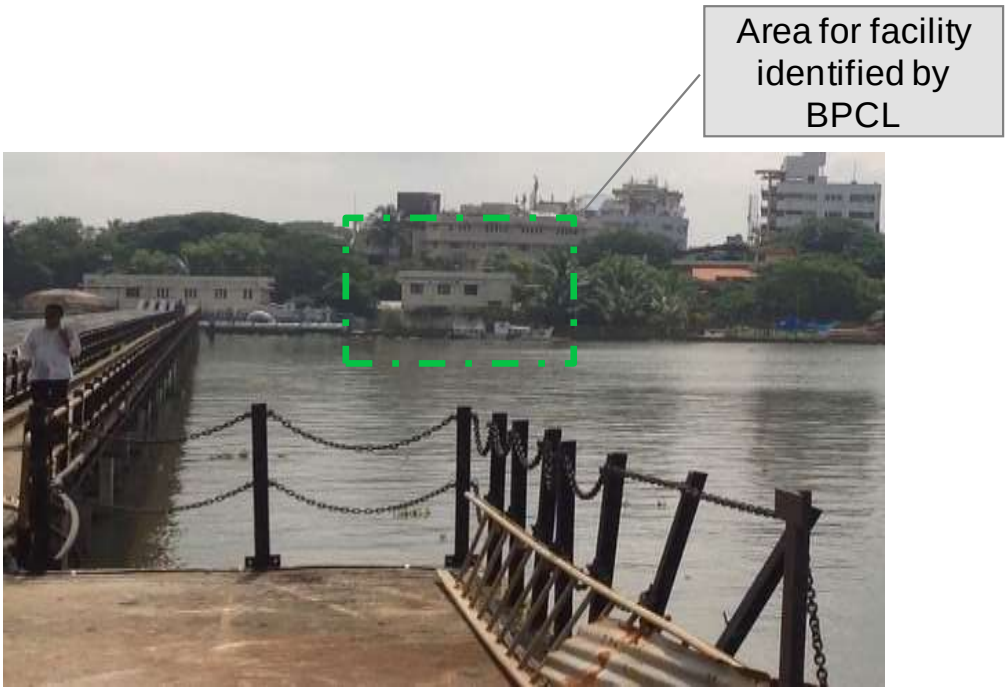


Figure 137: Quality testing facility for POL imports can be set up close to the berth

Expected Impact

As a result of reduction in idle time, with the same pumping rate maintained, the productivity of POL discharge operations is projected to increase by ~600 MT per day. On an annual basis, the reduction in idle time results in a reduction in berth occupancy from the present level of ~88% to 84%.

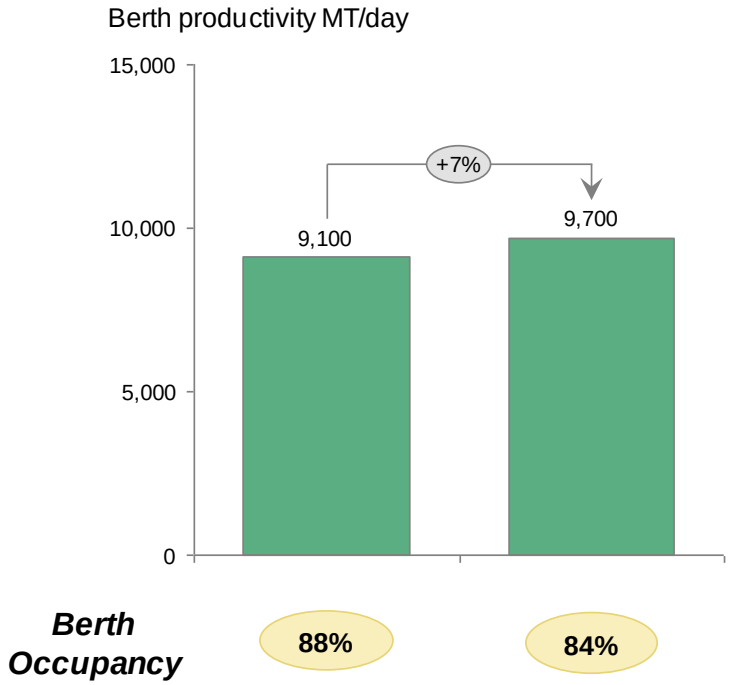


Figure 138: Reducing idle time on account of quality testing can increase productivity by 600MT/day and lower occupancy by 4 pp

4.2.3.2 Initiative: CoPT 3.2 Reduce documentation time through Early Departure Procedure (EDP)

Key Findings

Bill of lading and cargo manifest are required to be signed by the shipper and the customs clearance agents before a vessel is allowed to depart with export cargo. Currently, the authority from BPCL travels from the office to the berth (~17km) to witness the weighing of the cargo and then signs off on the documents for each shipment. Idle time on account of processing export documentation accounts for ~40% of idle time at the berth.

Recommendations

The signing off on bill of lading and cargo manifest can be done by an authorized agent of the shipper in case of coastal exports through Early Departure Procedures (EDP). Under the early departure procedures, the un-berthing of the vessel is expedited after completion of loading operations. The vessel agent/other agent of the exporter present at the berth during operations are authorized to sign off on the necessary documents, instead of waiting for the exporter's officials to travel to the berth after completion of operations. The early departure procedure practice is currently being used by BPCL at Mumbai Port as well.

Expected Impact

The reduction in idle time on account of coastal export documentation can improve productivity by ~800 MT/Day. The resultant reduction in berth occupancy is ~5 percentage points.

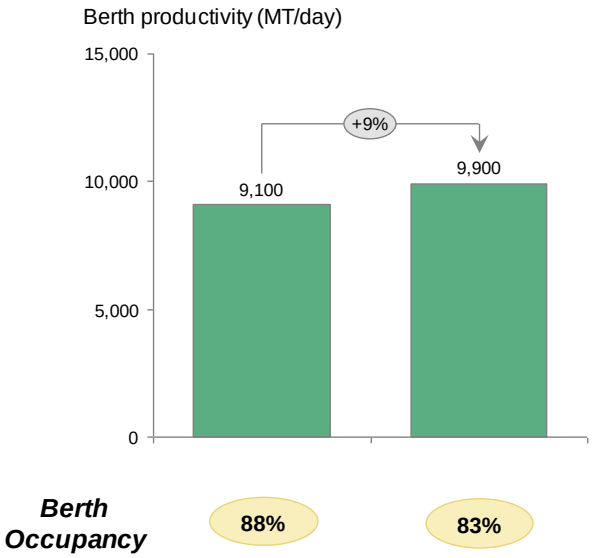


Figure 139: Early Departure Procedure (EDP) will reduce documentation time (~40% of idle time) for coastal export vessels, increasing productivity by 800MT/day and lowering occupancy by 5 pp

On a cumulative basis, reduction in idle time on account of quality testing of import samples, and documentation for coastal imports, will result in a reduction of berth occupancy from 88% to 79%.

Other Analysis

Re-deployment of marine loading arm to reduce idle time on account of shifting vessels

COT berth currently does not have a pipeline connected to the BPCL refinery for carrying Motor Spirit (MS). All MS shipments for BPCL are loaded and discharged at the NTB berth. Often, vessels are brought in with multiple products that are discharged one after another. In case MS is one of the products, the vessel is first berthed at COT to discharge other products and then shifted to NTB to discharge MS.

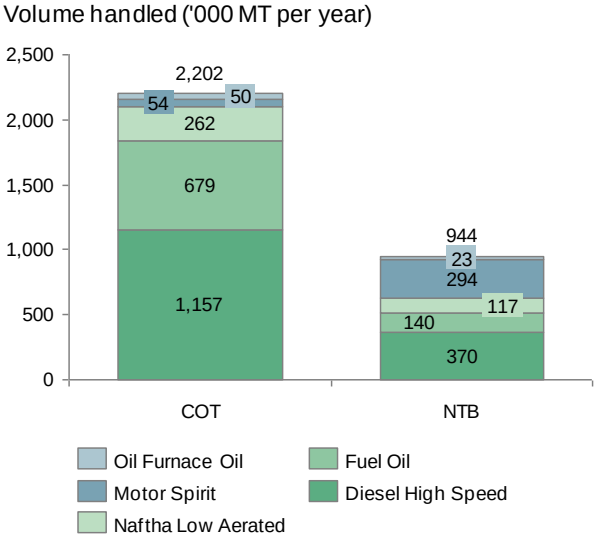


Figure 140: POL products handled at COT and NTB berths

BPCL has already initiated plans to increase infrastructure on COT to handle additional volumes projected to flow after completion of the refinery's expansion. One marine loading arm is planned to be shifted from the NTB berth to COT to be used for white oil discharge at COT. Additionally, extension of MS pipeline from NTB to COT berth to connect COT to the BPCL refinery is to be commenced. A total project cost of ~Rs. 20 crore is required to increase the length of the pipeline to COT, for which BPCL is in the process of floating tenders for the pipeline construction process.

As a result of enhanced infrastructure to handle MS at COT, vessel shifting for MS will reduce. Hence, there will be a reduction in non-working time at the berth. The resultant productivity improvement is projected to reduce berth occupancy by ~2 percentage points.

MULT Project proposed for handling LPG at Cochin Port

LPG is currently imported at NMPT by IOCL and transported by road to Kerala for local consumption. This poses a safety hazard as LPG is highly combustible and numerous accidents have taken place during transportation via road. Accordingly, there is immense pressure to move LPG transportation off the roads to avoid accidents.

Several options were explored for handling LPG per the existing port infrastructure, however, the combustible nature of the commodity poses a challenge in using the existing infrastructure. Existing POL berths—COT and NTB—are close to Ernakulam island where LPG is a safety concern. The existing LNG terminal set up by Petronet LNG is underutilized, however, the terminal has not granted permission to IOCL to handle LPG as handling LPG alongside LNG would prove to be a safety hazard.

Hence, a new facility would be required to handle LPG at Cochin Port. A new 0.7 Mn MT Multi-User Liquid Terminal ('MULT') is proposed by IOCL for LPG operations, along with the majority of the investment required. The berth will be dedicated to IOCL for 161 days a year and will be available to the Port for the remaining 204 days of the year. A total investment of ~Rs. 20 crore is required from the port to set up ancillary infrastructure, including fire-fighting equipment and barge loading facilities (total capex on the port's account is Rs. 35 crore, with support of Rs. 15 crore from the Centre). Additionally, ~Rs.3.5 crore is expected to be spent annually on maintenance dredging cost. This represents 55% of the total dredging cost, with the balance 45% being paid by IOCL.

Against the investment of the port, revenue accrues to the port authority on account of pilotage and port dues on cargo handled at MULT by IOCL. The port is dependent on IOCL achieving ~75% of the projected capacity of 0.68 MMTPA in order to accrue higher than a 10% IRR on the investment.

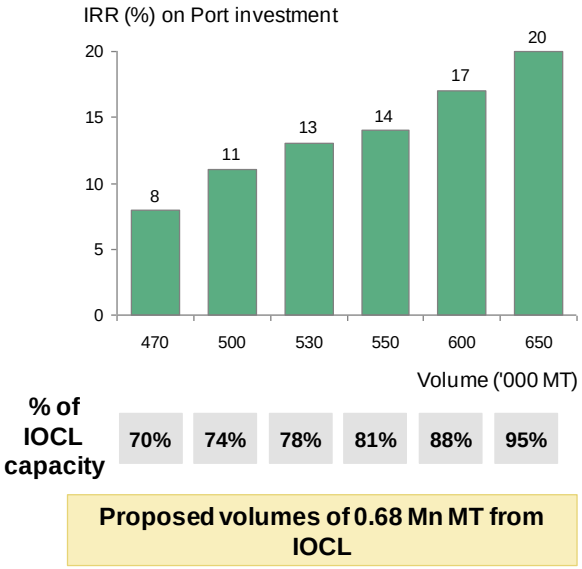


Figure 141: Additional sources of traffic required in case IOCL traffic is lower than projections at MULT

IOCL's projections are dependent on current domestic consumption as well as growth projections from neighboring areas. The current local consumption is ~0.7 Mn MT with ~70% supplied by BPCL's Kochi refinery. Further demand from Coimbatore and Salem is planned to be served, and a pipeline network for the same has been approved.

Further, there is potential to increase traffic through other commodities such as providing bunkering facilities for oil tankers using imported bunker fuel from Middle East. Cochin Port has high proximity to oil producing nations in the Middle East, which is projected to provide a cost advantage for bunker fuel.

Further, potential to use MULT as back-up infrastructure for SPM and POL berths will ease berth occupancy.

Summary: Productivity improvement of ~16% is projected from the two initiatives described, resulting in reduction of berth occupancy to ~76%—marginally higher than acceptable norms.

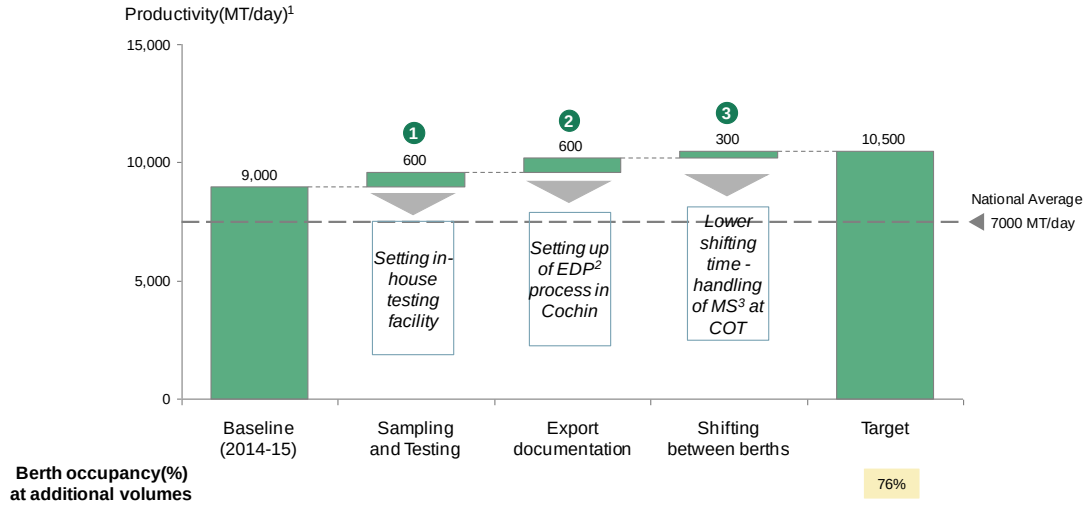


Figure 142: Summary of POL initiatives