

# 4. PORTS AND SHIPPING







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# 4.

# PORTS AND SHIPPING

India's current transport modal mix is dominated by road and rail that account for nearly 94 per cent of freight transport; the share of water is about 6 per cent<sup>1</sup>. This is low when compared to other large economies such as China (47 per cent), US (12.4 per cent) and Japan (34 per cent)<sup>2</sup>.

The most important reason why development of ports is critical to India's economy is that Indian ports handle over 95 per cent of the country's total international trade volume and around 70 per cent of total trade value. India's 7,517-km coastline has 212 ports, and the quality of our ports has a significant influence on the cost structure of India's exports and defines its competitiveness in the global market.

Best-in-class ports can also help India emerge as a transshipment hub, and superior port infrastructure ensures quicker and more reliable coastal shipping. Shipping is also necessary to keep supply lines open for essential commodities both during peacetime and emergencies such as war and famine. The existence of a strong and viable national fleet serves as balancing factor in the freight market. Inland Water Transport (IWT) is one of the most environment-friendly modes with its excellent fuel efficiency and lower emission levels. IWT has the potential to serve as an important economic lifeline for the integral socio-economic development of the region adjoining the waterway network.

Increasing the share of water in freight transport is key to achieving a more balanced modal mix, since it is a cheaper mode of transport as well as more environmental-friendly as compared to road. Balancing the modal mix will also significantly contribute to reducing the waste caused by poor logistics infrastructure, estimated to be as high as \$45 billion annually<sup>3</sup>.

## CURRENT STATUS

### PORTS

India's 12 Major Ports are administered by the Union Government, while the 200 notified Non-Major Ports are under the state governments and union territories.

In 2011-12, total cargo handled by Indian ports was 913.9 million tonnes. The CAGR since 2006-07 had been 7.1 per cent, down from 11.1 per cent between 2001-02 and 2006-07. The drop reflects the effects of the global economic crisis and consequent slowdown in global and domestic growth.

During the 10<sup>th</sup> Plan, growth in cargo handled by Major and Non-Major Ports was 10 per cent and 14.1 per cent per annum respectively. In the 11<sup>th</sup> Plan, however, Major ports grew very slowly, at 3.8 per cent a year, while Non-Major ports grew at about 14 per cent. The year 2011-12 was challenging for Major Ports.

Growth in major industrial countries which are significant markets for Indian merchandise decelerated from 3 per cent in 2010 to 1.6 per cent in 2011. India's own GDP growth slowed from 8.4 per cent in 2010-11 to 6.2 per cent in 2011-12. While growth in manufacturing slowed from 7.6 per cent in 2010-11 to 2.5 per cent in 2011-12, the mining sector did a U-turn, from 5 per cent in 2010-11 to -0.9 per cent in 2011-12. Figure 4.1 shows the growth in traffic at Indian ports between 2001-02 and 2011-12.

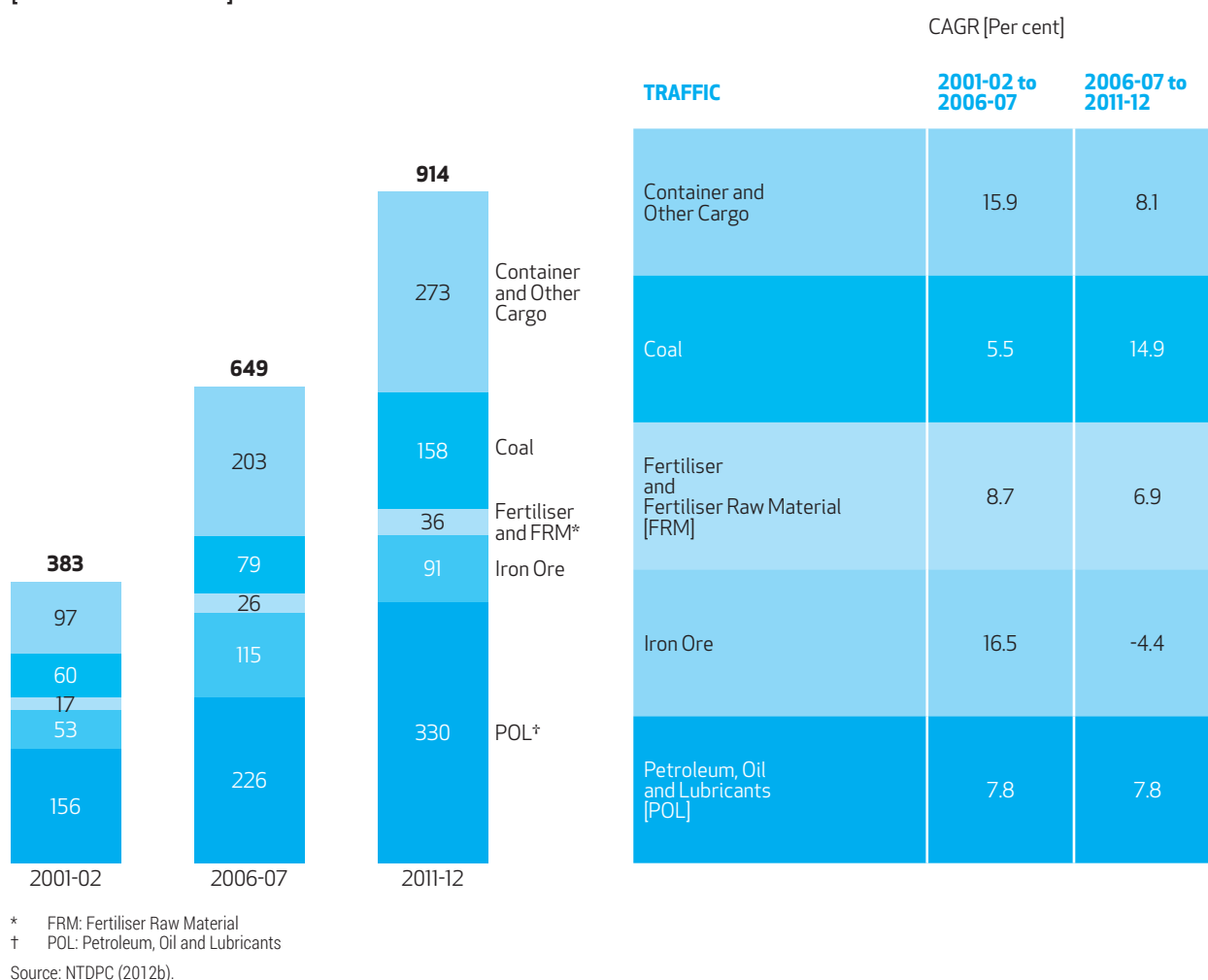
1. NTDP Research.

2. Note: The share of different countries pertains to different years: US – 2008, Japan – 2010, China 2009. Source: EU (2012).

3. For details, see McKinsey report (2010).



Figure 4.1  
**Commodity-wise Overall Port Traffic, 2001-02 to 2011-12**  
 [Million Tonnes]



## MAJOR PORTS

India's Major Ports, with the exception of Ennore, are structured as trust ports under the Major Port Trusts Act, 1963, functioning as semi-autonomous bodies under the administrative wing of the Ministry of Shipping. These are Kandla, Mumbai, Jawaharlal Nehru Port Trust (JNPT), Mormugao, New Mangalore, Kochi and Port Blair on the west coast; and Kolkata, Paradip, Vishakhapatnam, Ennore, Chennai and Tuticorin on the east. Ennore, a satellite port of Chennai, has been corporatised with the Government of India holding a two-third stake, and the Chennai Port Trust the rest.

## TRAFFIC TRENDS

The 12 Major Ports handled 560 million tonnes of cargo traffic during 2011-12, more than 60 per cent of the country's total seaborne cargo. This figure comprises cargo loaded, cargo unloaded and transhipped to the tune of 194 million tonnes, 341 million tonnes and 25 million tonnes respectively. The capacity utilisation—560 million tonnes against 697 million tonnes—was approximately 80 per cent.

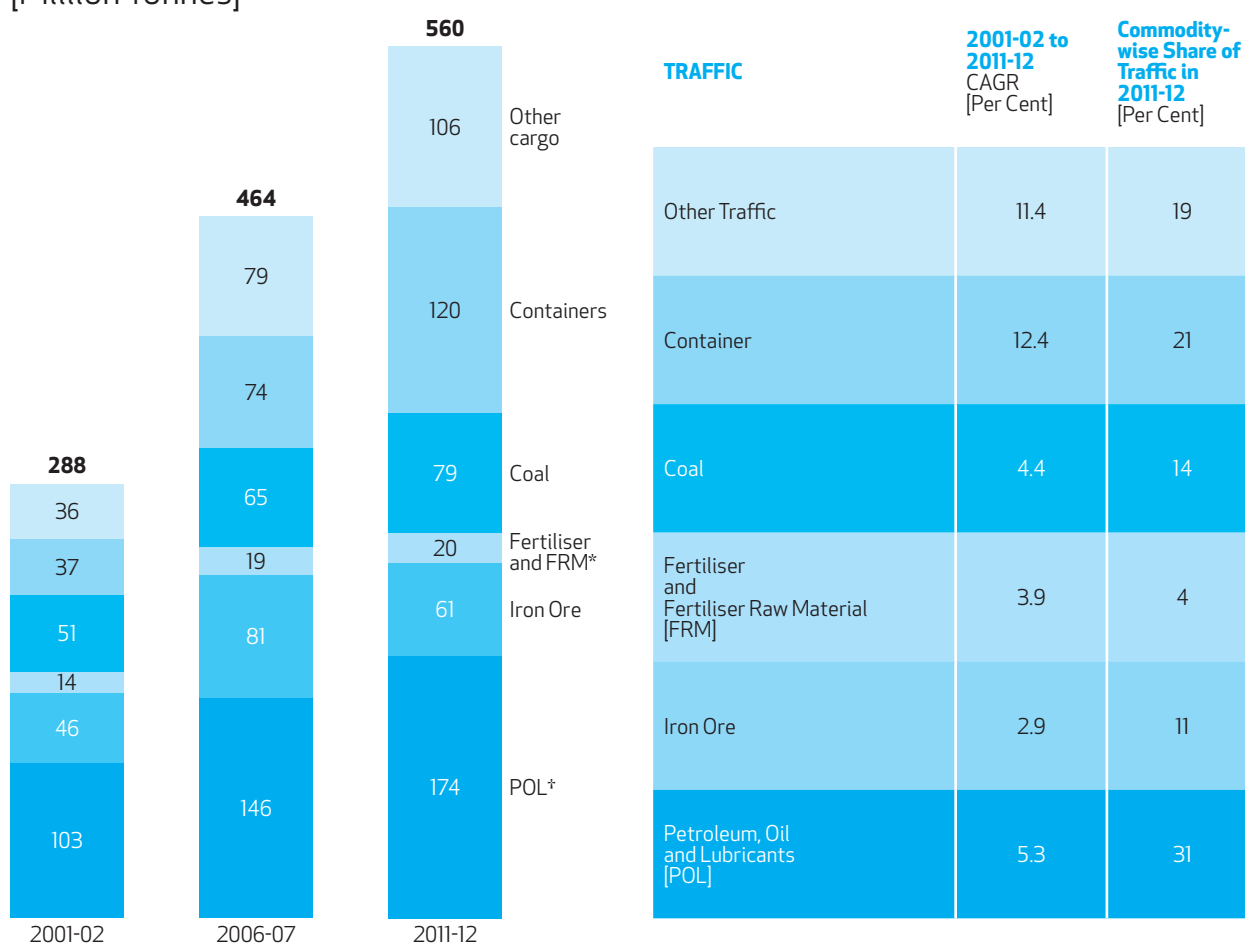
The CAGR of traffic at Major Ports for the period 1950-51 to 2011-12 has been 5.7 per cent, whereas during the post-liberalisation period—from 1990-91 to 2011-12, it was 6.4 per cent. During the 11<sup>th</sup> Plan, the CAGR has been 3.8 per cent, sharply lower than the 10 per cent seen during the 10<sup>th</sup> Plan.

In the last 10 years (see Figure 4.2), the highest CAGR—12.4 per cent—has been noticed in container cargo, followed by other cargo traffic (11.4 per cent), POL (5.3 per cent), coal (4.4 per cent), fertiliser and fertiliser raw material (3.9 per cent) and iron ore (2.9 per cent). During 2011-12, POL maintained a predominant share of 31 per cent in total cargo traffic followed by container cargo (21 per cent), other cargo (19 per cent), coal (14 per cent), iron ore (11 per cent) and fertiliser and FRM (4 per cent).

## DRAFTS

The very low draft at Indian ports does not match international standards as per the Maritime Agenda 2010-20. This is a major constraint in traffic handling. Most Major Ports in India have a minimum draft

Figure 4.2  
**Commodity-wise Traffic for Major Ports, 2001-02 to 2011-12**  
 [Million Tonnes]



\* FRM: Fertiliser Raw Material  
 † POL: Petroleum, Oil and Lubricants

Note: Iron ore handled by major ports in the last 5 years (2006-07 to 2011-12) grew at a CAGR of -5.5 per cent.  
 Source: NTDP (2012b).

under 10 m, except for a few newer ports which have drafts of more than 14 m (Annex 4.1). The world's top 20 container ports have drafts exceeding 15 m. Some ports in China and other countries have enhanced drafts still further to accommodate Super Post Panamax and larger vessels.

Dredging plays an important role in facing the challenges of increased vessel sizes and handling port operations. Total volume of capital and maintenance dredging for all ports during the 11<sup>th</sup> Plan was projected at of 675.25 million cubic metres (mcm) and 429 mcm respectively. Against these targets, only 278.93 mcm (41.31 per cent) and 291.63 mcm (67.82 per cent) were achieved. In Major Ports, the actual capital dredging was only 32 per cent of target. The shortfall was mainly due to delay or failure in implementing port development projects, financial and environmental constraints, paucity of engineering studies to assess the quantum and type of dredging to be performed, and poor response from bidders to undertake the work. Overall, the ports had done bet-

ter in achieving the targets relating to maintenance dredging as opposed to capital dredging.

Inadequate draft at Indian ports entails extra time and costs as cargo originating from and bound to India is routed through transshipment ports like Colombo and Singapore. As vessels keep getting bigger, Indian ports need much deeper drafts, which calls for increased investments on capital dredging.

#### RAIL/ROAD CONNECTIVITY

Ports are nodes for interchange amongst various modes of transport and a vital element in the global logistics chain. It is thus critical to provide connectivity and other infrastructure for enabling quick evacuation within the ports as well as to the external hinterland, and to also enable the commodity to reach the consumer from the source of production in the shortest possible time and in the most cost-effective way.

Connectivity to a port can be through all three modes—rail, road and inland waterways. To a limited



extent, inland waterway connectivity exists in Kolkata, Mormugao and Kochi. As far as rail and road connectivity are concerned, a Committee of Secretaries (CoS) under the chairmanship of Member Secretary (Planning Commission) recommended that each Major Port should have minimum four-lane road and double-line rail connectivity within a fixed timeframe.

Four-lane road connectivity has already been achieved or is in an advanced stage of completion at JNPT, Paradip, Tuticorin, Kochi, New Mangalore, Kandla and Haldia. At Mumbai, Vishakapatnam, Chennai and Ennore, four-laning is in progress. At Mormugao, certain sections of the planned stretch remain to be four-laned, but work has been stuck since 2004. Kolkata is the only port where four-lane connectivity has not been provided. Overall, all Major Ports have reasonable road connectivity linking various highways. But special focus is needed on the reorganisation/overhauling of approach roads of Mumbai and Kolkata ports and their linkage with the national highway network.

The JNPT, Vishakapatnam, Tuticorin, Haldia, Chennai and Paradip are connected to double-line rail tracks, whereas at Kandla and Cochin, the connectivity work is on. Although Mumbai, Ennore and Kolkata ports are linked by double-line rail tracks, the lines require doubling. New Mangalore and Mormugao are connected only to single-line rail tracks. A serious effort is needed to improve hinterland connectivity, especially by rail.

#### NON-MAJOR PORTS

The 200 Non-Major Ports are located in the maritime states of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal and union territories of Puducherry, Daman and Diu and Lakshadweep. Out of these, only a few ports are well-developed and provide all-weather berthing facilities. In 2011-12, only 61 ports—including ports at the Andaman and Nicobar Islands—were reported to have handled cargo traffic.

#### TRAFFIC TRENDS

Non-Major Ports in India collectively handled 354 million tonnes of traffic in 2011-12; up from 96 million tonnes in 2001-02. The CAGR in traffic during the decade was 14 per cent; double that for Major Ports.

The Non-Major Ports' share of the total cargo traffic handled by all ports increased from 25 per cent in 2001-02 to 39 per cent in 2011-12. This has largely been due to lower levels of regulatory and financial control compared with Major Ports. Non-Major Ports have been more successful in attracting higher private investment, because they are perceived to be more business-oriented, customer-friendly, cheaper and in general, more efficient.

POL and its products (44 per cent) was the single largest commodity handled at Non-Major Ports in 2011-12 and its share has ranged up to 55 per cent (in 2001-02). In the last 10 years, the relative shares of commodities in the cargo basket have not shown any pronounced shift (see Figure 4.3).

#### DRAFTS

Non-Major Ports achieved only 47 per cent of their capital dredging targets during the 11<sup>th</sup> Plan; 177 mcm against 377 mcm. This was however much better than that of the Major Ports (32 per cent).

#### RAIL/ROAD CONNECTIVITY

Of the 200 Non-Major Ports, 61 handle export-import cargo and the others are mainly fishing harbours. Even out of these 61, only six enjoy rail connectivity up to the port. Another eight to 10 need last mile connectivity. There is an urgent need to improve rail connectivity. Even road connectivity is a serious bottleneck. This is bit one illustration of the necessity for integrated planning of port location along with rail and road investments.

The existing projects and those in the pipeline will provide reasonable road connectivity to ports like Mundra, Hazira, Machilipatnam, Dighi and Jaygad. The others may have only skeletal kachcha (unpaved) road networks; they are not connected through two-lane highway-quality roads to the nearest national highway. As for rail connectivity, a few projects have been launched and are in the pipeline for Dehaj, Gangavaram, Dhamra, Mundra, Krishanapatnam, Rewas, Dighi and Jaygad.

#### CURRENT REGULATORY SCENARIO

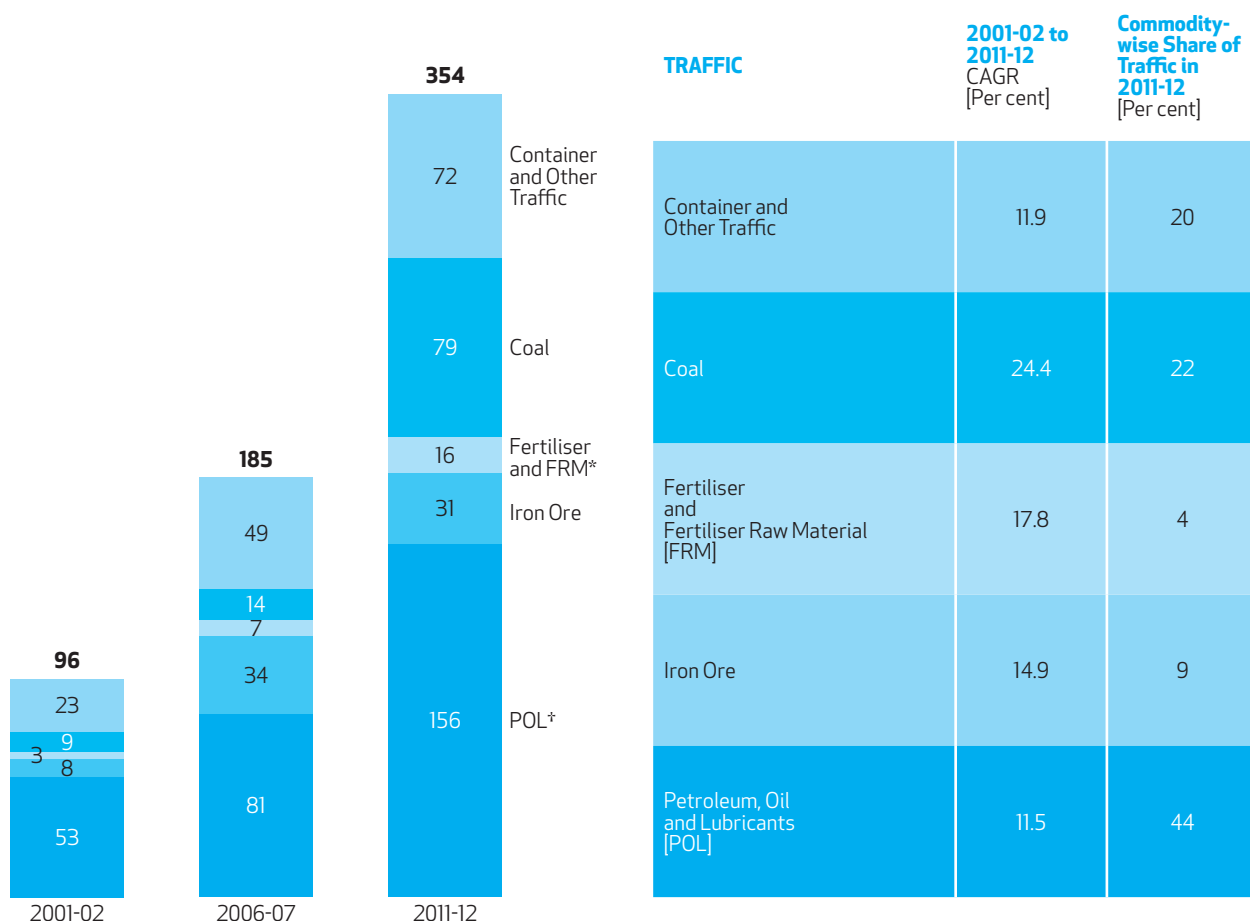
All Indian ports are regulated under the Indian Ports Act, 1908. This Act defines the jurisdiction of central and state governments over ports, and lays down general rules for safety of shipping and conservation of port facilities. It regulates matters pertaining to the administration of port dues, pilotage fees and other charges.

#### KEY AGENCIES

The Ministry of Shipping Ports Wing under the Department of Shipping covers all development and management aspects of Major Ports. Its key powers and responsibilities are:

- Administration of the Indian Ports Act, 1908, and the Major Port Trusts Act, 1963
- Formulation of infrastructure policy for ports, shipping and inland waterways
- Shipping policy and legislation, implementation of various international conventions relating to safety, prevention of pollution and other mandatory requirements as laid down by the International Maritime Organisation (IMO), promotion of maritime education and training
- Planning, development and regulation of inland waterways

Figure 4.3  
**Commodity-wise Traffic for Non-Major Ports, 2001-02 to 2011-12**  
 [Million Tonnes]



\* FRM: Fertiliser Raw Material  
 † POL: Petroleum, Oil and Lubricants

Note: Iron ore handled by Non-Major Ports in the last five years (2006-07 to 2011-12) grew at a CAGR of about -2.0 per cent.  
 Source: NTDP (2012b).

Ministry of Finance mainly handled by the Infrastructure and Investment Division of the Department of Economic Affairs, the key port-related functions are:

- Examination of investment proposals which require approval of the Public Investment Board and the Cabinet Committee for Economic Affairs
- Matters related to infrastructure financing and promotion
- Policy matters related to public-private partnerships (PPP)
- All proposals for foreign direct investment (FDI) to be approved by the Foreign Investment Promotion Board (FIPB)

Maritime States Development Council (MSDC)  
 MSDC was constituted in 1997 to have an integrated approach for development of both Major and Non-Major Ports. MSDC consists of ministers in charge of ports in all maritime states and union territo-

ries. MSDC functions as a policy coordinating body between the central government and the maritime states.

Tariff Authority for the Major Ports (TAMP) TAMP is the economic regulator for the Major Ports and is charged with fixing and revising tariffs, including tariffs of privately owned terminals. Guidelines issued in 2008 comprise a tariff cap, which is set upfront, prior to inviting bids for a PPP project. With respect to tariff increases of existing terminals, a cost-plus approach is applied as per 2005 guidelines.

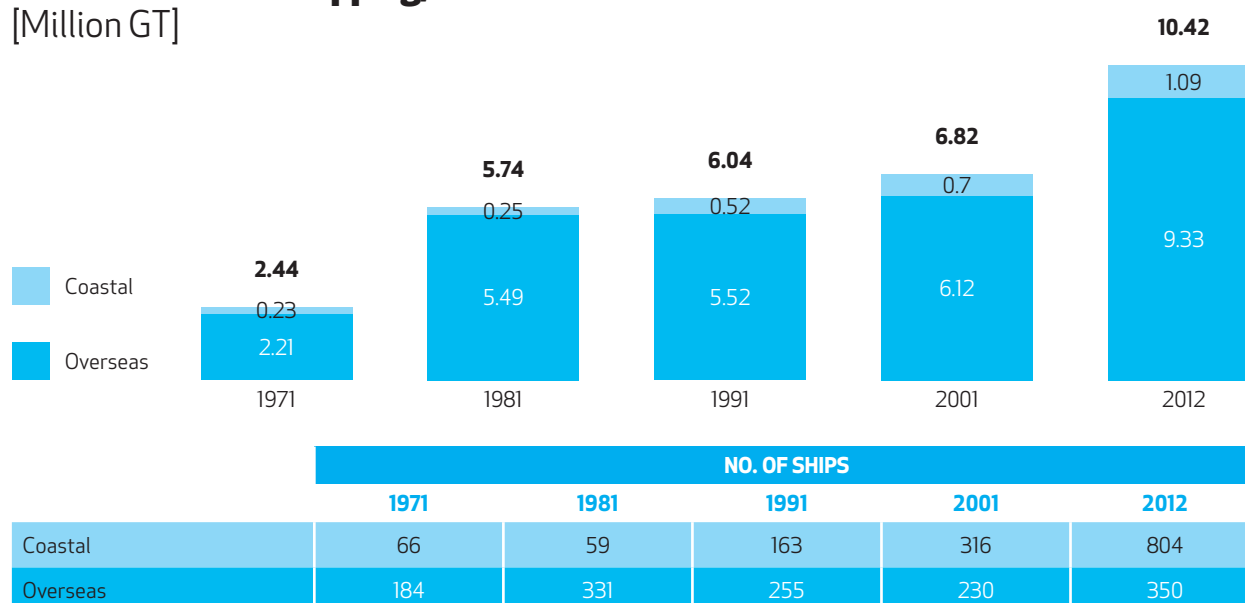
#### MANAGEMENT OF MAJOR PORTS

Every Major Port is governed by a Board of Trustees constituted by the central government.

The members of the trust are in principle selected to represent various interests. The Trustees follow the government's policy decisions within their delegated financial powers. Port dues and port and terminal



Figure 4.4  
**Growth of Indian Shipping, 1971 to 2012**  
 [Million GT]



Source: GoI (2012).

services rates are externally fixed by TAMP. There is a ceiling for capital expenditures; amounts above such ceiling have to be approved by the government.

#### MANAGEMENT OF NON-MAJOR PORTS

The responsibility for the development of Non-Major Ports vests with the concerned state government. No permission is required from the central government to establish a Minor Port. They are placed in the Concurrent List of the Constitution and are administered under the Indian Ports Act, 1908.

The department in charge of ports or the State Maritime Board is responsible for formulation of waterfront development policies and plans, regulating and overseeing the management of state ports, attracting private investment in the development of state ports, enforcing environmental protection standards and so on. Maritime boards have so far been constituted in Gujarat, Maharashtra and Tamil Nadu.

#### KEY POLICY DEVELOPMENTS

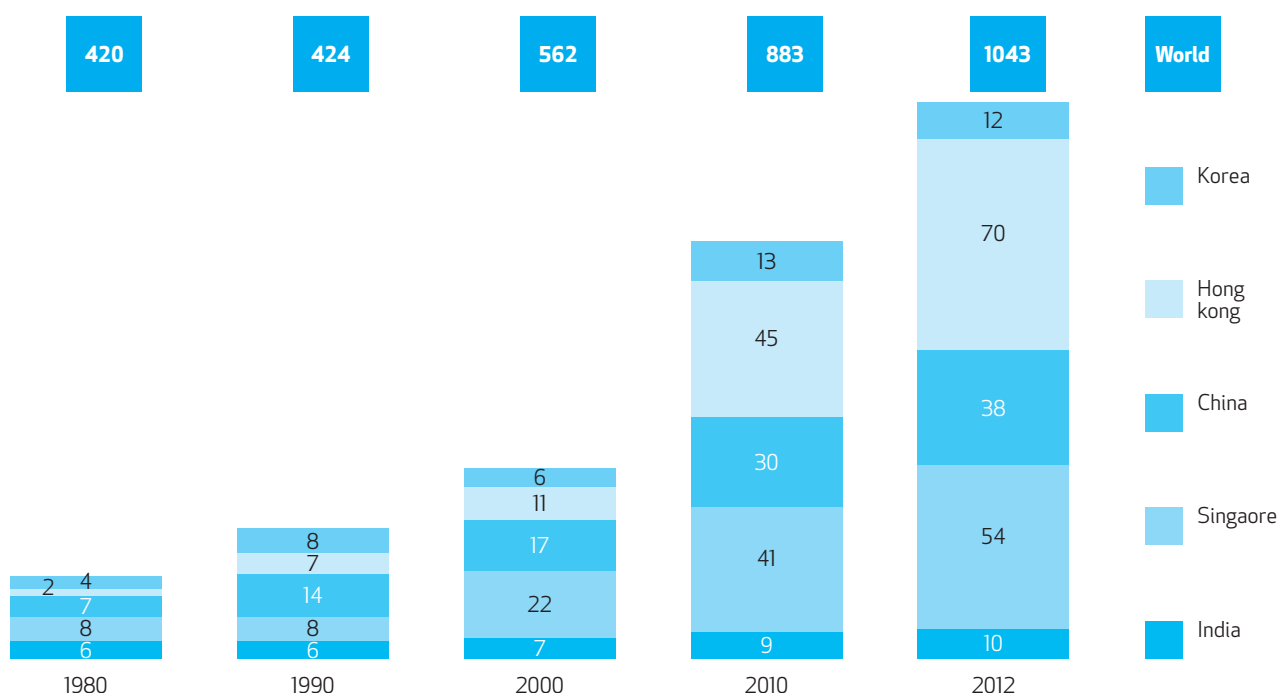
The Indian government has long recognised the need to operate ports on commercial lines. In 1996, the sector was opened for private participation in select areas based on the expectation of improved service delivery for users and commercial viability for the private investor. The government decided to move towards the Landlord Port concept, where new ports would be established as companies under the Companies Act, and existing port trusts would be corporatised. However, this plan has not been implemented, with the exception of Ennore Ltd (2001). However, many isolated initiatives have been taken by the central government and the maritime states since then.

**National Maritime Development Programme (NMDP):** Formulated in 2005 by the Ministry of Shipping to provide guidelines for capacity augmentation and hinterland connectivity improvements at Major Ports, the programme mandates that over 60 per cent of the required funds be raised from private sector. The government has also shown intentions of delegating powers to port trusts for speedier decision making and implementation. In addition, a series of measures have been announced recently to promote foreign investment in the sector:

- No approval required for foreign equity up to 51 per cent in projects providing supporting services to water transport
- Automatic approval of foreign equity up to 100 per cent in construction and maintenance of ports and harbours. However, the proposal needs to be referred to FIPB for investments exceeding Rs 15 billion.
- Open tenders to be invited for private sector participation on build-operate-transfer (BOT) basis
- Permission granted for formation of joint ventures between Major Ports and foreign ports, Major Ports and Non-Major Ports, and Major Ports and companies

**Model Concession Agreement (MCA):** Approved in 2008, MCA governs the functioning of Major Ports with respect to PPP projects. It consists of all the elements and issues that usually form part of an international terminal concession. The tariffs cannot be adjusted by the concessionaire but are dependent on the decisions of TAMP. The new MCA approved by the government in 2009 allows a port trust to directly

Figure 4.5  
**Gross Tonnage for Select Countries, 1980 to 2012\***  
 [Million GT]



\* As of January, 2012.  
 Source: UNCTAD (2012).

approach the inter-ministerial PPP Appraisal Committee for final project approval without having to first acquire in-principle approval.

**B. K. Chaturvedi Committee Report:** The Committee observed that the tariff fixing process by TAMP sometimes led to delays that slowed down the entire procurement process of PPP projects, and that performance standards as used by TAMP for tariff fixing and those agreed between the parties in concession agreements could differ. The Committee proposed the following policy changes regarding TAMP:

- Short term: Expanding tariff setting capabilities through in-house capacity building and streamlining of procedures
- Medium term (1-2 years): Delegation of tariff setting to the Major Port Trusts while TAMP acts as the appellate authority
- Long term (2 years): Leave tariff setting to market forces. Port terminals where competition already exists may be left to market forces immediately.

## SHIPPING

India has a fleet strength of 1,154 vessels with gross tonnage (GT) of 10.42 million tonnes. Of these vessels, 804 (70 per cent) with 1.09 million GT (10 per cent) were engaged in coastal trade and the remaining 350 vessels with 9.33 million GT were deployed

for overseas trade. Indian shipping tonnage, which had been stagnating at 6-7 million GT till June 2004, increased to 10.42 million GT by December 2012. One of the reasons attributed for the upswing was the introduction of tonnage tax in 2004. The major share of Indian tonnage belongs to Shipping Corporation of India, a public sector undertaking whose share is 32.5 per cent (3.39 million GT with 86 vessels). Figure 4.4 provides an overview of the growth in Indian shipping between 1971 and 2012.

### INDIAN TONNAGE: GROWTH, AGE STRUCTURE, COMPOSITION

The maximum number of vessels (635) in the Indian fleet are dry cargo liners<sup>4</sup> followed by oil tankers (139), dry cargo bulk carriers (128) and off-shore supply vessels (117). In terms of GT, 53 per cent of the Indian tonnage (5.54 million GT) was in the oil tanker<sup>5</sup> category, followed by dry cargo bulk carriers (32 per cent). Dry cargo liners which accounted for highest number of vessels in Indian fleet (55 per cent) contributed a mere 11 per cent (1.2 million GT).

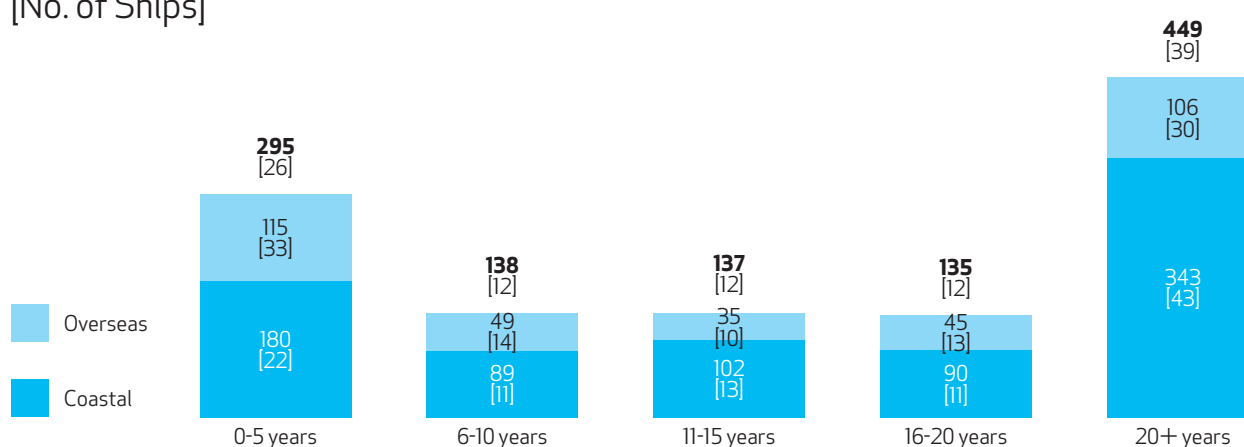
India's CAGR in shipping as per the national flag registrations (in terms of GT) from 1980 to January, 2012 has been much lower than growth in tonnage at the global level, for Asia and particularly competitors like Korea and China (see Figure 4.5).

The Indian fleet is clearly over-aged; more than 39 per cent of the fleet is above 20 years old, and about

4. Includes cellular containers, tugs, ro-ro vessels, dredgers, barges, motor launch and supply vessels.  
 5. Includes acid, LPG and gas carriers.

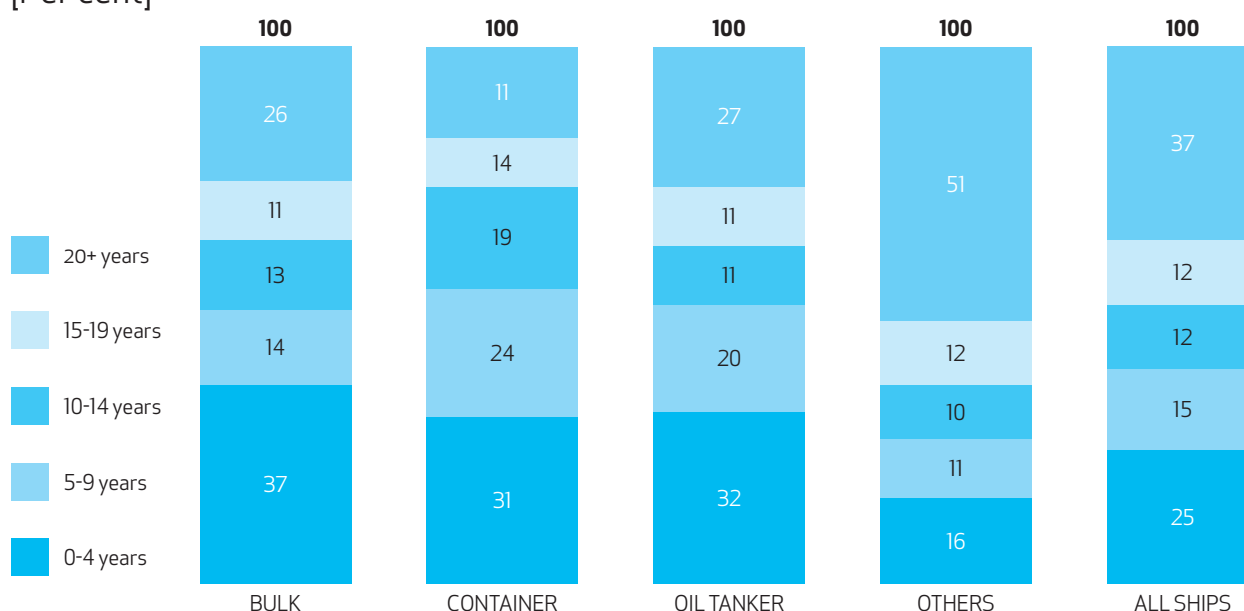


Figure 4.6  
**Age Composition of Indian Fleet, December 2012**  
 [No. of Ships]



Note: Figures in parentheses indicate percentage shares.  
 Source: Indian National Ship Owners Association.

Figure 4.7  
**Age Composition of World Shipping Fleet, January 2012**  
 [Per cent]



Source: ISL (2012).

26 per cent in the age group of below five years (Figure 4.6). In contrast, age profile of the world fleet reflects that 40 per cent of global tonnage was less than nine years of age (Figure 4.7). The share of vessels in the age group 20 years and above was around 37 per cent. A younger age profile leads to higher efficiency and productivity of the tonnage.

Figure 4.8 is a comparison of the composition of tonnage of fleets of various countries, plus global tonnage.

In India, 'flagging out' or migration to flags of convenience or open registries has been rather limited. The share of vessels under foreign flags in the Indian

fleet as of January 2012 was around 19 per cent compared to 85 per cent for Taiwan, 82 per cent for Japan, 45 per cent for China, and 40 per cent for Korea<sup>6</sup>.

#### COASTAL SHIPPING

Despite a 7,517-km-long coastline, coastal shipping is still in its infancy in India, with 804 ships accounting for just over 10 per cent of the total Indian tonnage. The average age of the coastal fleet is much higher than that of the overseas fleet (Figure 4.6). Coastal cargo was about 159 million tonnes or about one-fifth of the export-import cargo in 2011-12. Figure 4.9 provides an overview of the tonnage and composition of coastal vessels.

6. UNCTAD (2012).

Figure 4.8  
**Composition of Merchant Fleet, January 2012**  
 [Thousand GT]

COUNTRY	BULK CARRIER	CONTAINER	GENERAL CARGO	OIL TANKERS	OTHERS	GT
INDIA	2,952	224	342	5,016	1,228	9,762
China	18,435	5,268	3,941	7,389	2,890	37,924
Hong Kong	38,712	12,827	3,370	14,061	1,236	70,206
Korea	7,337	779	1,487	846	1,635	12,084
Malaysia	212	65	431	3,465	3,439	8,197
Developing Countries of Asia	92,144	34,755	25,263	62,900	21,571	236,633
Developing Countries	34,350	40,264	24,117	51,816	39,090	189,638
Open Register	209,586	95,586	48,236	155,541	61,731	570,680
World	343,524	171,741	109,685	281,950	136,132	1,043,033

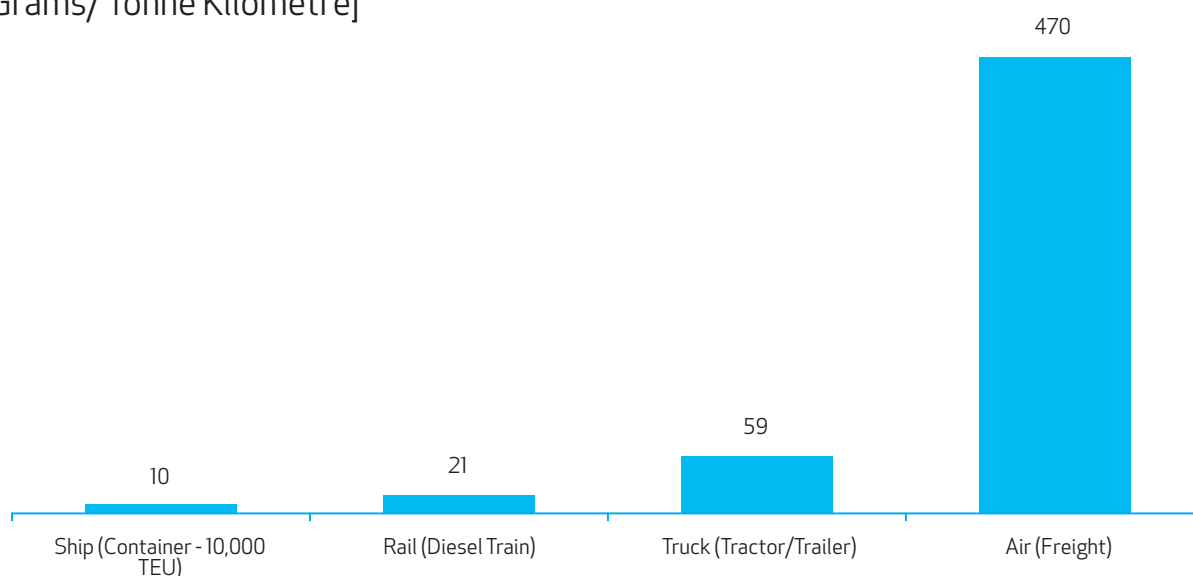
Source: UNCTAD (2012).

Figure 4.9  
**Tonnage and Composition of Indian Coastal Vessels, December 2012**  
 [No. of Ships]

TYPE OF VESSELS	NO. OF VESSELS	G.T. (THOUSANDS)
Tug	277	92
Offshore Supply Vessels	111	121
Port Trusts & Maritime Boards	95	46
Dry Cargo Liners	74	120
Passenger Services	59	22
Specialised Vessels for Offshore Services	38	88
Passenger-cum-Cargo	33	90
Dredgers	30	128
Dry cargo Bulk Carriers	26	240
Tankers (Product Carriers)	13	40
Ethylene Gas Carriers	3	9
Tankers (Crude Oil Carriers)	2	50
Ro-Ro	1	1
<b>Grand Total (Vessels) Coastal Trade</b>	<b>804</b>	<b>1,087</b>

Source: Gol (2012).

Figure 4.10  
**Carbon Dioxide Emission**  
 [Grams/Tonne Kilometre]



Source: World Shipping Council (2009).

The need to promote coastal shipping has been increasingly deliberated within government and policy makers. The National Action Plan of the Prime Minister's Council on Climate Change identified promotion and use of coastal shipping and inland waterways as the first action point for the transport sector. Some of the key reasons as to why coastal shipping in India needs to be promoted are:

- Cost of transportation significantly lower than conventional modes by 25 per cent, according to some studies
- Lower carbon emissions vis-à-vis other modes of transport
- Coastal shipping can help reduce concentration of traffic on the already strained road network
- It can lead to optimal use of India's natural advantage and resource a long coastline.

The interim Planning Commission report on low carbon strategies for inclusive growth, while discussing possible interventions in the transport sector that would lead to increased efficiency accompanied by lower emissions, specifically made a mention of the usage of smarter options such as inland and coastal waterways as alternative modes of transport. Figure 4.10 is a comparison of CO<sub>2</sub> emissions across transport modes with ships being the lowest. Figure 4.11 is a summary of emission data for various types of ships compared with a truck.

India needs a viable scheme to incentivise and support a modal shift of cargo to water transportation from road and rail. The European Union has set a target of moving more than 50 per cent of its road and rail transport to short sea shipping by 2030.

For any policy intervention to be effective, a careful assessment and cognisance of several issues specific to the sector are required.

#### INADEQUATE INFRASTRUCTURE AT NON-MAJOR PORTS

**Draft:** Presently, most coastal shipping operations in India are centred around a Major Port as the Non-Major Ports suffer from inadequate draft and large inventories of dysfunctional equipment. Ship owners currently prefer to operate coastal vessels having a draft of 7-9.5 m due to their economic feasibility. Adequate depth for such vessels is not available at the Non-Major Ports. Even a river-sea vessel would require a draft of around 3.5 m to carry out coastal operations economically.

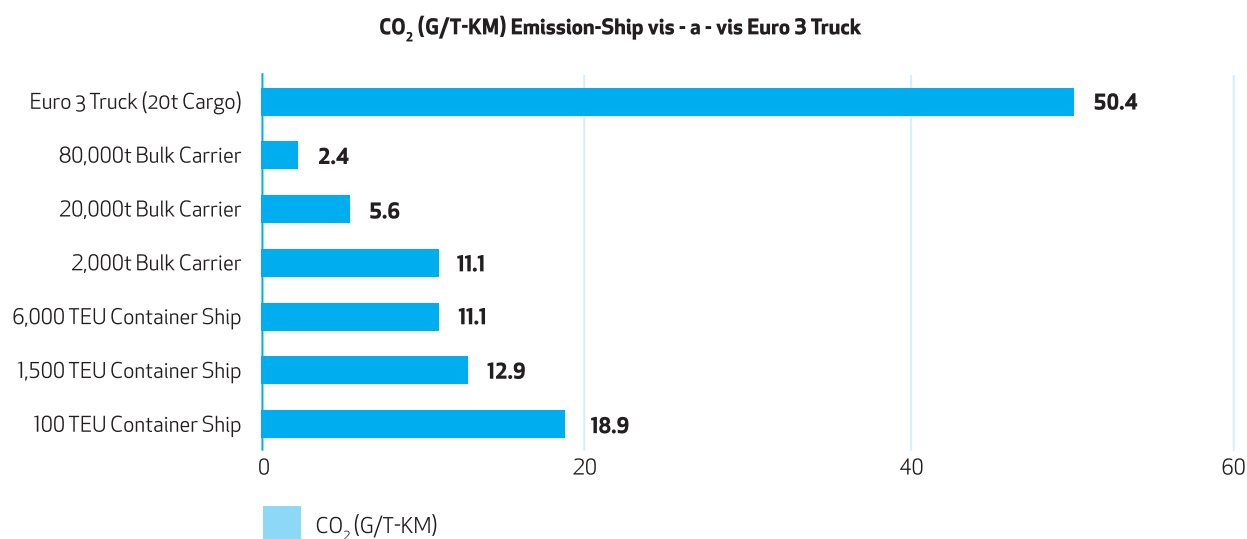
**Berthing:** Lack of adequate berthing facility, number of berths, sufficient length for proper berthing of the vessels at the Non-Major Ports is another problem, which forces incoming vessels to keep waiting idly. Further, Major Ports usually provide priority to foreign-going vessels, as they operate in a competitive environment and would want to project a better revenue and cargo performance. Therefore, coastal vessels end up with step-motherly treatment.

**Cargo handling equipment:** Most Non-Major Ports do not have proper material handling equipment in place which could facilitate a quick turnaround. This discourages coastal vessels.

**Space for infrastructure development:** Availability of space for infrastructure development is a huge concern at most Non-Major Port locations,



Figure 4.11  
**Carbon Dioxide Emission: Ships vs Euro 3 Truck**  
 [Grams/T-Km]



Source: Ebert (2005).

**Last mile connectivity:** This is indispensable for attracting cargo traffic at any port. National Highways Authority of India (NHAI) has the mandate to provide road connectivity to Major Ports while Rail Vikas Nigam Limited (RVNL) is the nodal agency to increase rail connectivity to ports and development of corridors to the hinterland including multi-modal corridors for movement of containers. However, Non-Major Ports do not have the requisite hinterland connectivity. Roads leading to ports are too narrow for containers/cargo movement. The inefficient and underdeveloped supply chain is a bottleneck in the development of coastal shipping and renders the end-to-end logistics costs uneconomical while also increasing total transportation time.

Several small players currently dominate coastal shipping, and the resultant divided capacity hampers economies of scale. Further, most players operate on wafer-thin margins which are not commensurate with the risks and capital involved.

## INLAND WATER TRANSPORT

Till the first half of the 20<sup>th</sup> century, inland water transport (IWT) played a significant role in trade and commerce. The Inland Waterways Authority of India (IWAI) was constituted for development and regulation of the sector. However, IWT has remained underdeveloped; in part because public investment has been very low compared to other modes of transport.

### NATIONAL WATERWAYS

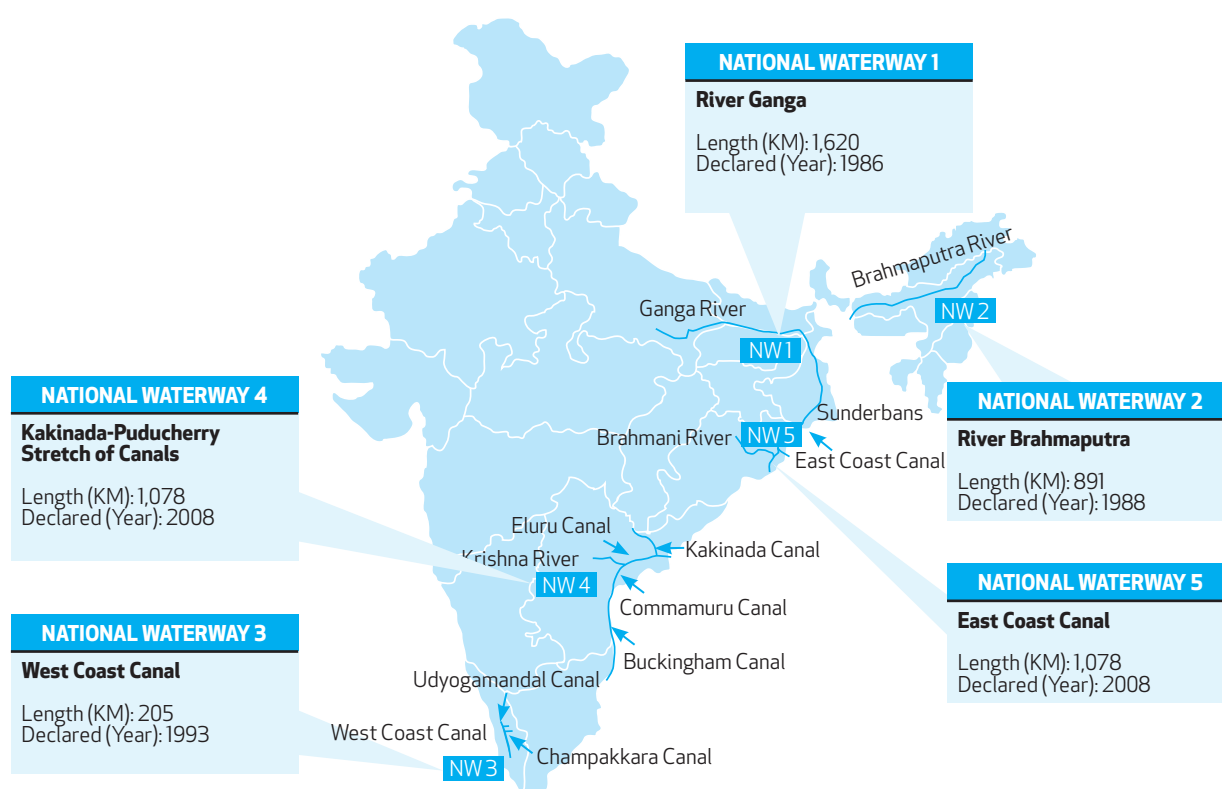
India has five National Waterways (NW): the River Ganga (NW-1), River Brahmaputra (NW-2), West

Coast Canal (NW-3), Kakinada to Puducherry Canal System along with River Godavari and River Krishna (NW-4); and the Brahmani and Mahanadi delta along with East Coast Canal (NW-5). Figure 4.12 provides basic details. River Barak is likely to be declared as the sixth NW. Development and regulation of NWs is in the purview of the central government while the rest of the waterways come under respective state governments.

IWAI has been mandated to develop and maintain infrastructure for fairway, navigational aids and terminals to develop an enabling environment for private investment in cargo vessels and operational services. It has been successful on NW-1, NW-2 and NW-3 to a reasonable extent. It has developed systems and procedures for regular operation and maintenance (O&M) of the critical infrastructure and also strived to ensure dissemination of information. Since its inception in October 1986, IWAI spent about Rs 10.36 billion till 2010-11, which included about Rs 8.86 billion on NW-1, 2 and 3, and the balance amount on subsidies, training, technical studies and so on.

The average yearly expenditure of IWAI has gone up substantially from Rs 70 million during the 8<sup>th</sup> Plan to Rs 1.08 billion during the 11<sup>th</sup> Plan. However, the total expenditure on infrastructure in 25 years (1986 to 2011) is only Rs 10.36 billion, which, though dependent on demand, is insignificant compared to what has been invested in the road and rail sectors. In fact, with respect to NW-4 and 5, which were

Figure 4.12  
**National Waterways in India**



Source: NTDP (2012b).

declared as NWs in 2008, the Planning Commission could not allocate any funds; so development works on these waterways could not commence.

#### OTHER IMPORTANT WATERWAYS

Besides NWs, other waterways extensively used for IWT includes Goa Waterways for transportation of iron ore for export, and Mumbai Waterways for coal, steel and so on.

**Goa Waterways:** These comprise 50 km stretches each of river Mandovi and Zuari, and a 20 Km stretch of the Cambarjua canal. These waterways provide connectivity to Mormugao Port and Panaji Port and carry 50 MMT of iron ore for exports. The cargo movement on Goa Waterways increased from 36 MMT in 2005-06 to 43 MMT in FY 2011-12, an overall growth of around 19 per cent. Cargo movement has increased from 1.8 btkm in 2005-06 to 2.2 btkm in 2011-12.

**Mumbai Waterways:** The tidal inland waterways of Mumbai, such as River Amba, River Ulhas and Dharamtar creek carry mainly coal and steel. The cargo increased from 11.2 MMT in the FY 2005-06 to 20 MMT in FY 2011-12, a strong growth of almost 79 per cent. In terms of btkm, cargo movement rose from 0.603 btkm to 1.1 btkm.

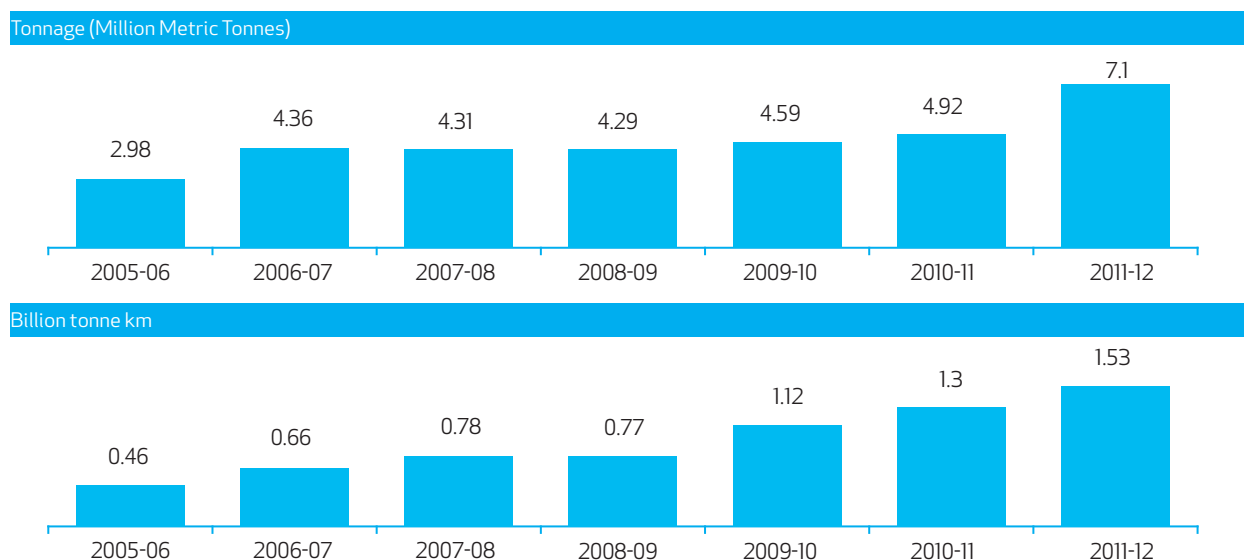
**Indo-Bangladesh protocol on IWT:** An Inland Water Transit and Trade Protocol exists between India and Bangladesh, under which inland vessels of

one country can transit through specified routes of the other. The existing protocol routes are: Kolkata-Silghat-Kolkata, Kolkata-Karimganj-Kolkata, Rajshahi-Dhulian-Rajshahi, Silghat-Karimganj-Silghat.

The protocol also allows trade through IWT. Five ports of call have been designated in each country. These are: Haldia, Kolkata, Pandu, Karimganj and Silghat in India, and Narayanganj, Khulna, Mongla, Sirajganj and Ashuganj in Bangladesh. More than 1.5 million tonnes of fly ash is transported between Kolkata/Haldia and Bangladesh every year under the protocol. Recently, more than 90 consignments of project material for the Palatana power plant of ONGC, being constructed near Agartala in Tripura, have been transported from Kolkata/Haldia through the protocol route up to Ashuganj in Bangladesh, and thereafter by road to Palatana, 40 km away.

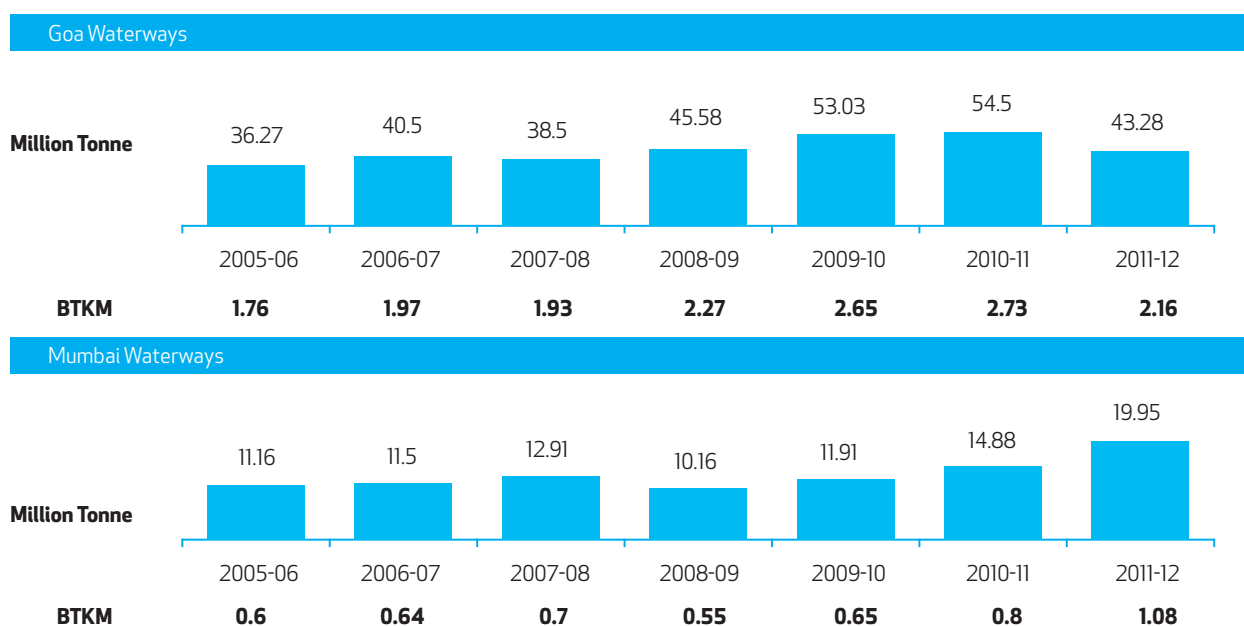
**Kaladan Multimodal Transport Project:** The project, conceptualised by the Ministry of External Affairs (MEA) to provide alternative connectivity of Mizoram with Kolkata/Haldia ports through River Kaladan in Myanmar, envisages coastal shipping/maritime shipping from Haldia to Sittwe, IWT from Sittwe to Paletwa in Myanmar, and thereafter by road from Paletwa to Mizoram. The project is piloted and funded by the Ministry of External Affairs (MEA) which appointed IWAI as the project development consultant (PDC). Construction of Sittwe port is in progress.

Figure 4.13  
**Cargo Movement on National Waterways**



Source: NTDP (2012a).

Figure 4.14  
**Cargo Movement on Goa and Mumbai Waterways**



Source: NTDP (2012a).

#### TRAFFIC TRENDS

Cargo transportation by IWT has been steadily increasing. Movement on NWs 1, 2 and 3 has increased from 3 MMT in 2005-06 to 7.1 MMT in FY 2011-12, an overall growth of around 137 per cent. In btkm terms, it has risen from 0.46 btkm to 1.53 btkm.

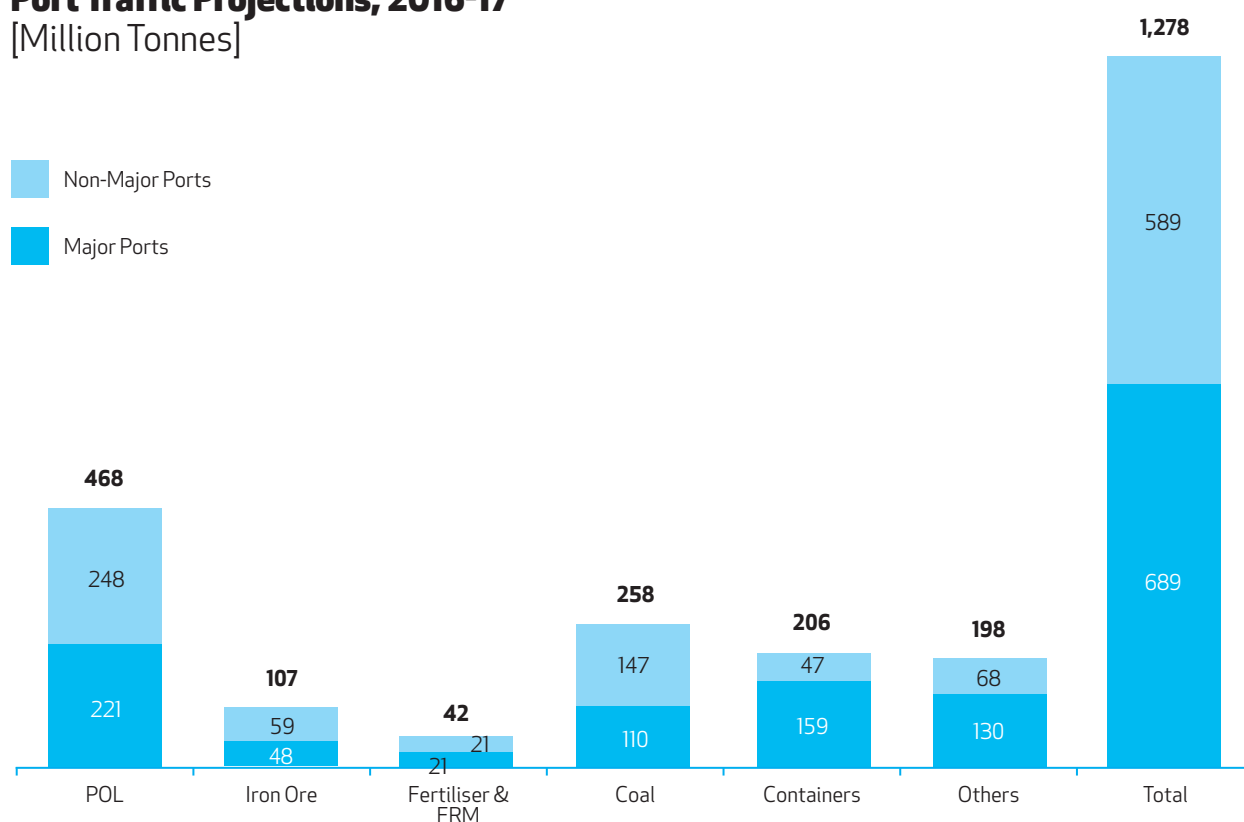
Tables 4.13 and 4.14 provide growth in traffic on National Waterways and Goa/Mumbai Waterways respectively.

#### FUTURE OUTLOOK

##### PORTS

As stated earlier, Indian ports handle over 95 per cent of the country's total trade volume and around 70 per cent of total trade value. It is thus imperative to build adequate capacity at our ports over the next two decades.

Figure 4.15  
**Port Traffic Projections, 2016-17**  
 [Million Tonnes]



Source: NTDP (2012b).

#### TRAFFIC PROJECTIONS

A sharp slowdown in world trade and domestic growth hit cargo traffic handled by Major Ports in 2012-13; growth was -2.6 per cent. Considering weak global growth prospects and weakening of domestic growth dynamics, this is expected to grow at about 6 per cent for the remaining four years of the 12<sup>th</sup> Plan. For Non-Major Ports, the annual growth in cargo traffic is assumed at about 11 per cent. Keeping in view the trends in the share of commodities, total cargo traffic at Indian ports is estimated to increase from 914 million tonnes in 2011-12 to 1,278 million tonnes by 2016-17 (Figure 4.15).

Cargo traffic for subsequent years upto 2031-32 (Figure 4.16) has been projected using expected growth rates for various commodity groups, based on perceptions of user Industries and long-term growth rate trends.

#### CAPACITY REQUIREMENTS

The international practice for ports is to plan for cargo handling capacity of 30 per cent more than the projected traffic so that pre-berthing detention of ships is minimised. Capacity needs to be planned separately for each commodity group as each requires different facilities. The total capacity required at Major and Non-Major Ports at the end of the 12<sup>th</sup> Plan period is estimated at 1,662 million tonnes (Figure 4.17).

#### MAJOR PORTS

The capacity at the end of the 11<sup>th</sup> Plan period at Major Ports was 697 million tonnes, while traffic handled was 560 million tonnes. The Major Ports plan to increase capacity to 896 million tonnes during the 12<sup>th</sup> Plan to meet traffic demand of 689 million tonnes.

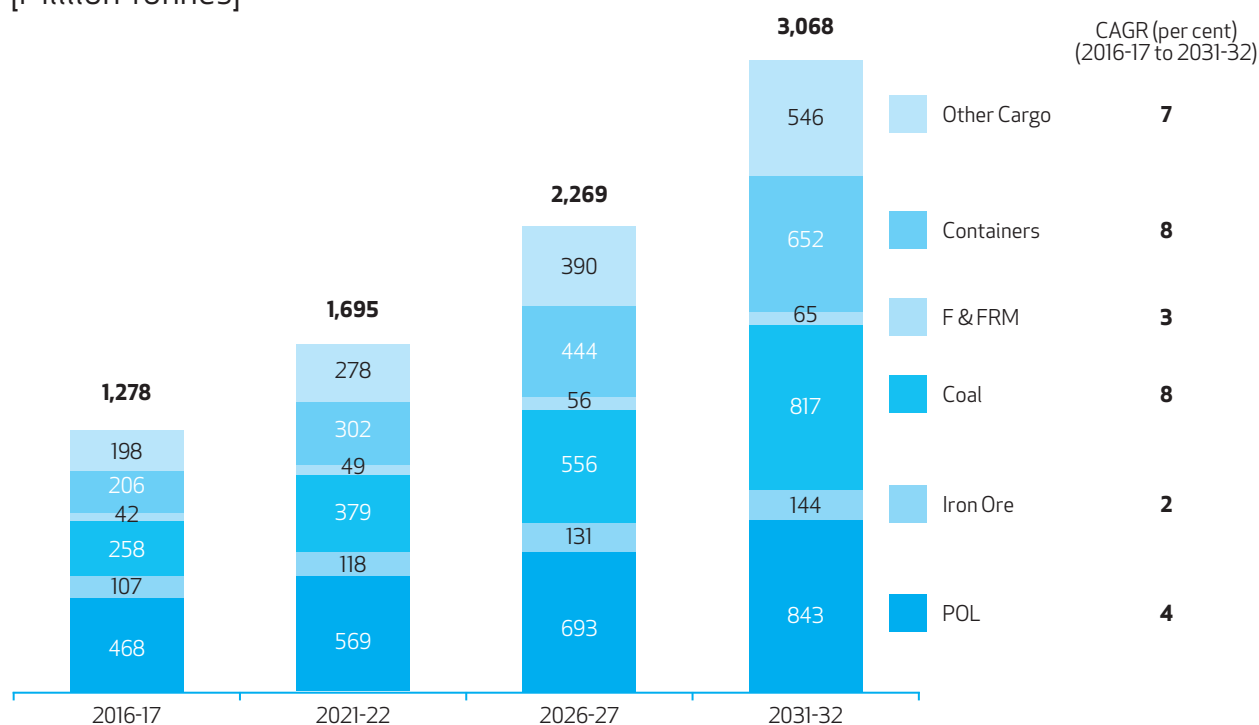
It is envisaged that ports in India should achieve draft of at least 14 m by the end of the 12<sup>th</sup> Plan and 17 m in the first half of the 13<sup>th</sup> Plan for some ports. Presently, 14 m drafts are available at four ports: Paradip, Kochi, New Mangalore and Mormugao. Efforts are being made to increase the draft to 14 m at Vishakapatnam, Ennore, Chennai, Tuticorin, JNPT and Kandla. At present, only Paradip Port has a draft of 17 m available in the inner channels/berths. While for some ports such as Tuticorin, JNPT and Kandla, the feasibility to increase the draft to 17 m is still to be studied, there is no 17-m plan at Mumbai port. It is a very difficult and impractical proposition to increase the draft to 17 m or even 14, at both Kolkata and Haldia.

#### NON-MAJOR PORTS

The maritime states plan to increase the capacity of Non-Major Ports from 445 million tonnes in the 12<sup>th</sup> Plan period to 766 million tonnes to meet the traffic demand of 589 million tonnes.

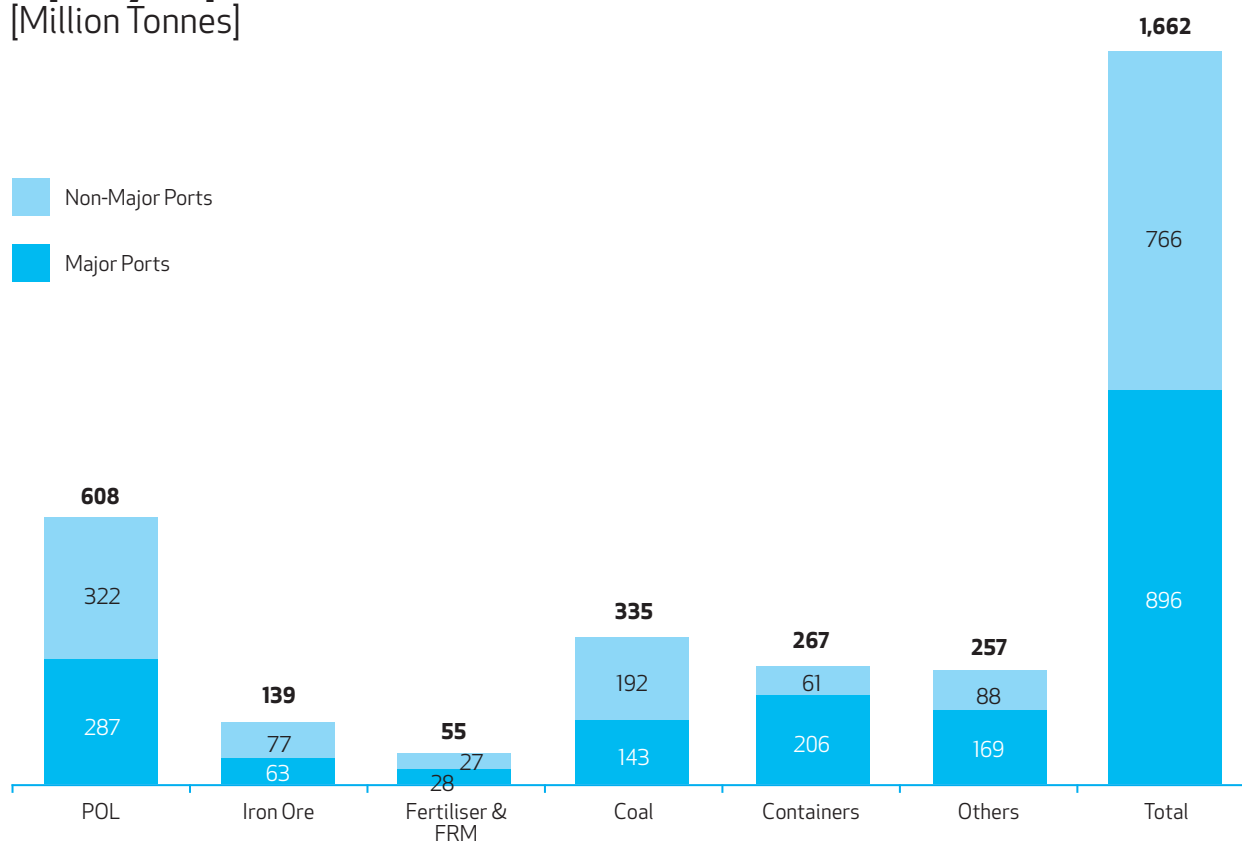


Figure 4.16  
**Commodity-wise Traffic Projections, 2016-17 to 2031-32**  
 [Million Tonnes]



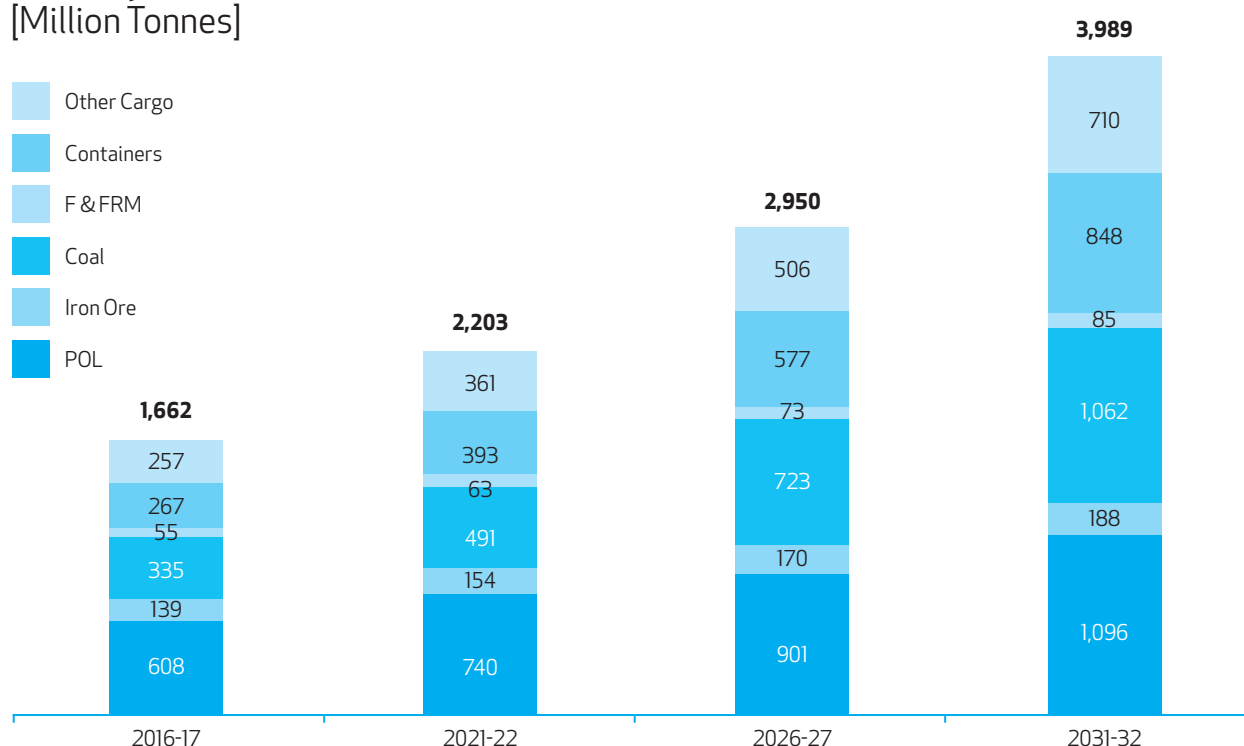
Source: NTDP (2012b).

Figure 4.17  
**Capacity Required at Indian Ports, 2016-17**  
 [Million Tonnes]



Source: NTDP (2012b).

Figure 4.18  
**Commodity-wise Cargo Capacity Projections, Major and Non-Major Ports, 2016-17 to 2031-32**  
 [Million Tonnes]



Source: NTDPCC (2012b).

Non-Major Ports have projected a total requirement of 544 mcm during the 12<sup>th</sup> Plan, of which 418 mcm is capital dredging and 129 mcm is maintenance. The requirements of the states of Odisha, Andhra Pradesh and Gujarat constitute 58 per cent of total capital dredging due to development of Gopalpur and Dhamra ports in Odisha, development of Machilipatnam, Krishnapatnam, Kakinada and Gangavaram ports in Andhra Pradesh, and Hazira in Gujarat.

#### INVESTMENT REQUIREMENTS AND SOURCES OF FUNDING

The investments required to create capacity for cargo handling in a port depends on several factors such as type of cargo, port topography, channel depth and width, and type of equipment. The cost of creating additional capacity also depends on the commodity or group of commodities to be handled. Moreover, investment required to create additional capacity through brownfield expansion at an existing port is markedly different from greenfield capacity creation through new ports. Thus, it is a challenging task to arrive at exact investment figures corresponding to projected capacity requirements. This report attempts to arrive at broad estimates through aggregation of investment estimates received from various port trusts and maritime boards.

A number of development projects have been identified by Major Ports and states to be taken up by the

final year of the 12<sup>th</sup> Plan (2016-17). Most of these projects have been conceptualised as public-private partnerships.

#### THE 12<sup>TH</sup> PLAN

Estimated investments and sources needed to increase capacity of Major and Non-Major Ports are shown in Figures 4.19 and 4.20.

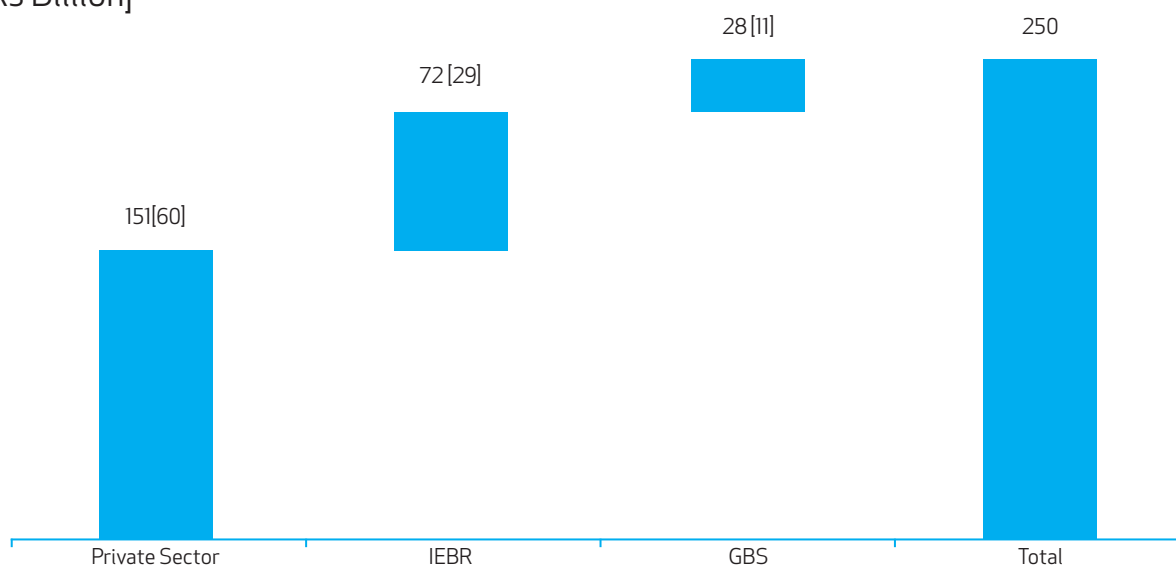
#### BEYOND THE 12<sup>TH</sup> PLAN

Considering the constraints in estimating investment required during 2017-18 to 2031-32 to create capacity at ports for handling the projected cargo, the following methodology has been adopted.

The projected cargo for 2017-18 to 2031-32 has been estimated separately for different commodities or groups. Here, it is pertinent to note that investment required to create one million tonnes of capacity varies from commodity to commodity. And as stated previously, the investment necessary to create capacity in an existing port is different from what is needed for greenfield capacity expansion.

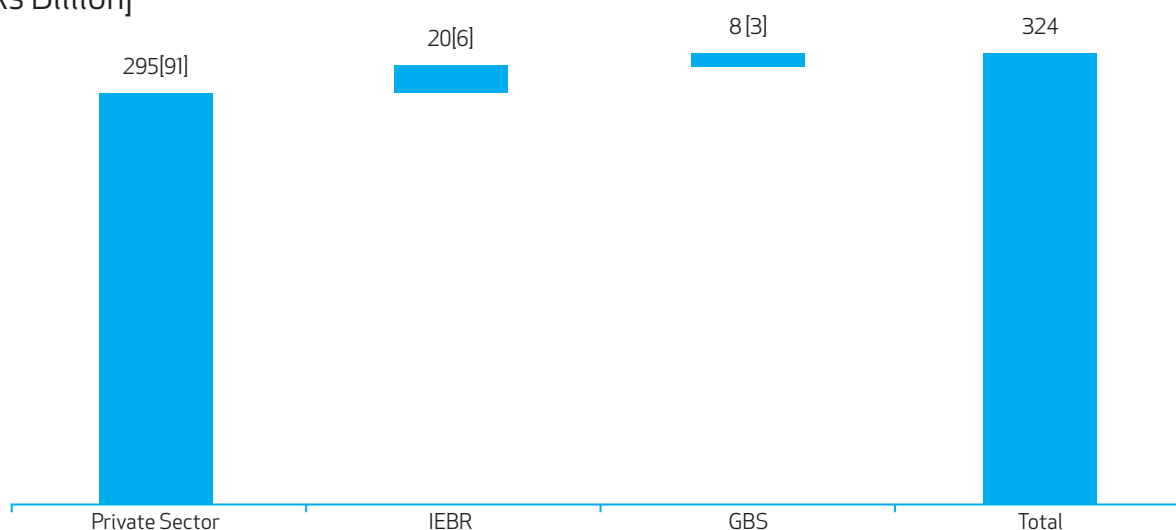
TAMP decides upfront tariffs based on capital cost to be incurred for creating capacity at an existing Major Port. Based on TAMP-approved tariffs for projects from 2011-12 onwards, the average capital cost to be incurred by Major Ports for handling one tonne of cargo for different commodity groups at

Figure 4.19  
**Investment in Major Ports during the 12<sup>th</sup> Plan**  
 [Rs Billion]



Note: The figures in parentheses are percentage shares.  
 Source: NTDP (2012b).

Figure 4.20  
**Investment in Non-Major Ports during the 12<sup>th</sup> Plan**  
 [Rs Billion]



Note: The figures in parentheses are percentage shares.  
 Source: NTDP (2012b).

2011-12 prices have been calculated and listed in Figure 4.21.

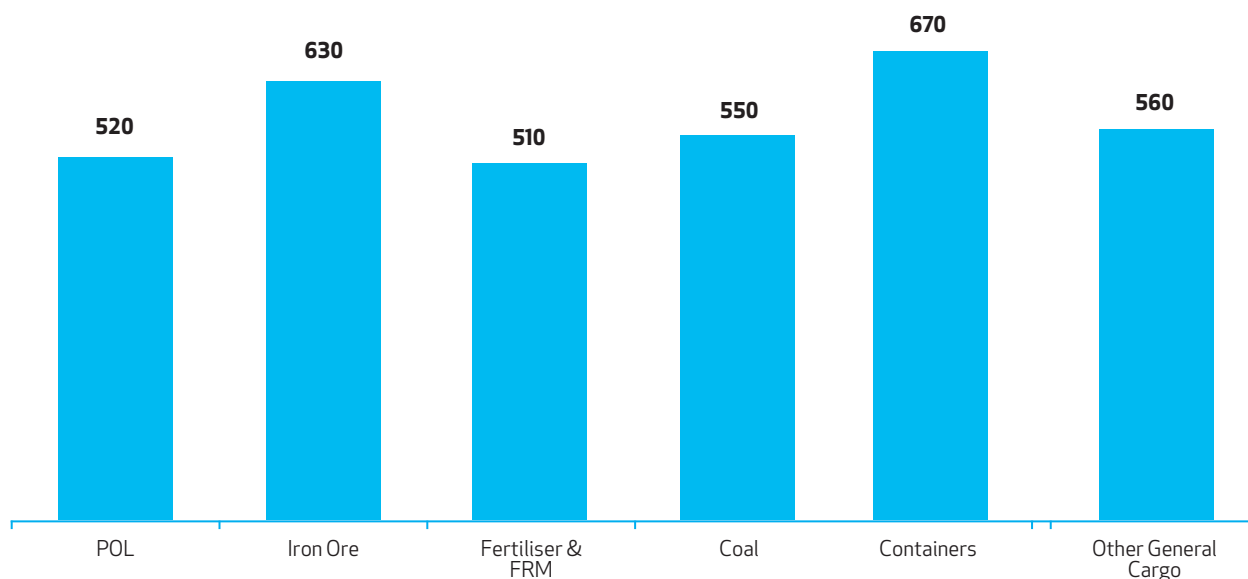
Ports also require investment for creating facilities like deepening and maintaining of channels, rail and road connectivity and other infrastructure. Figure 4.22 outlines Investment needs during various plans. The assumption is that capacity expansion is achieved through brown field expansion at existing ports. In case capacity addition is done through

greenfield projects, investment requirement could be higher by 40-50 per cent.

## SHIPPING

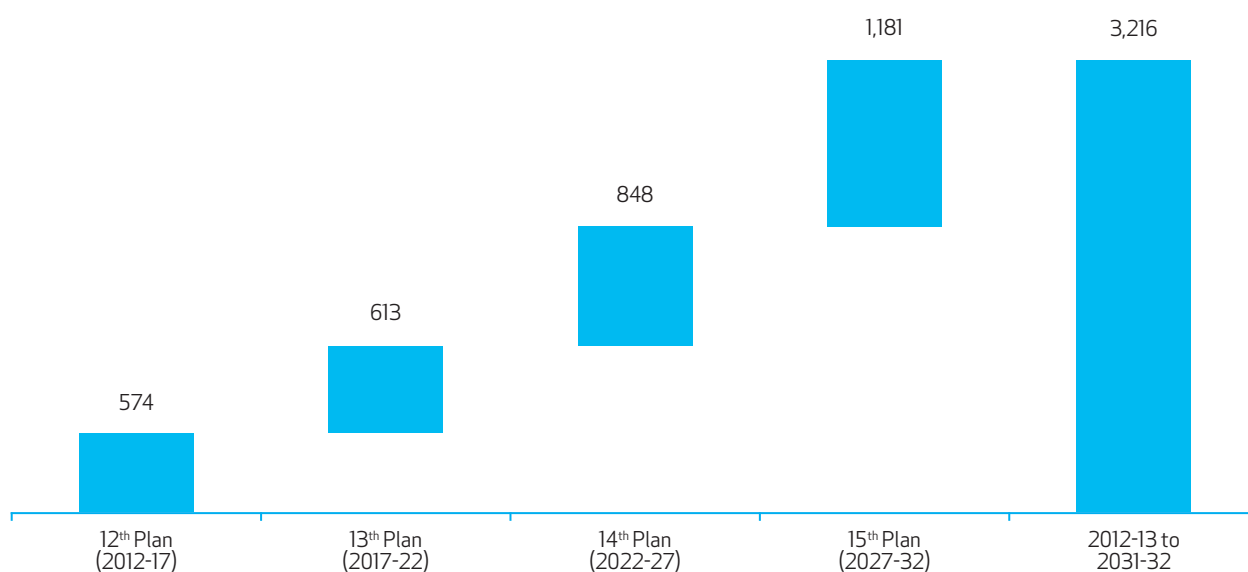
The potential for the shipping industry to cater to India's import-export trade is phenomenal. In this context, there is a great need to increase the Indian fleet strength.

Figure 4.21  
**Commodity-wise Capital Cost Incurred for Capacity Addition**  
 [Rs Million Per Tonne]



Source: NTDP (2012b).

Figure 4.22  
**Investment Requirements in Ports, 2012-13 to 2031-32**  
 [Rs Billion]



Source: NTDP (2012b).

Further, India has an ageing fleet: around 39 per cent of vessels are already above 20 years old. This calls for early replacement of ships. The fund requirement for acquisition of new tonnage has been estimated by the Sub-group (Finance) of the Working Group on Shipping and IWT (Ministry of Shipping) for the preparation of 12<sup>th</sup> Plan under two scenarios Business as Usual and Accelerated Growth (Table 4.1)

#### INVESTMENT REQUIREMENT

The two growth scenarios assumed (Table 4.1) would require major changes in the fiscal environment. The Indian shipping industry needs cheaper funding avenues to boost acquisition of tonnage. However, the government is pressed to curtail or optimally allocate additional expenditure, considering India's fiscal pressures. Therefore, possible mechanisms



Table 4.1  
**Investment Requirements in Shipping during the 12<sup>th</sup> Plan**  
 [Rs Billion]

PARTICULARS	EQUITY	DEBT	TOTAL	TOTAL GT
<b>Business as Usual</b>				
Tonnage remains at the existing percentage, i.e., 1.1 per cent of the world tonnage	7.5	17.5	25.0	12.4M*
<b>Accelerated Growth Scenarios</b>				
Indian tonnage expands to 2.5 per cent of world tonnage	96	224	320	26.6M
Indian tonnage expands to 5 per cent of world tonnage	240	560	800	53.3M

Source: 12<sup>th</sup> Plan.

Note: \*12.4 MGT is as per 12<sup>th</sup> Plan. However, based on Indian tonnage of 10.42 MGT as of 31 December 2012, the projected tonnage at the end of 12<sup>th</sup> Plan under Business as Usual (being the same percentage as at present, i.e., 1.1 per cent of the world tonnage) case would be 11.0 MGT.

to facilitate easier access to international funding sources may need to be considered.

The remittance of interest on external commercial borrowings (ECB) taken on or before 1 June 2001 did not suffer any withholding tax. However, this exemption has been withdrawn post this date. Currently, interest paid by Indian shipping companies to foreign lenders on acquisition of ships attracts a withholding tax of 20 per cent plus surcharge.

As observed in the 2002 report of the Expert Committee to Review Indian Shipping chaired by Dr Rakesh Mohan, Advisor to the then Finance Minister, ship acquisition costs to the tune of 60 to 80 per cent are financed through ECBs. As a rule, lenders require interest payment to be effected net of all Indian taxes. Subsequent to the withdrawal of exemption, interest costs have increased substantially, and this is passed on by the lenders to the borrowers. Accordingly, the Rakesh Mohan Committee recommended that it would be appropriate to restore the exemption.

## INLAND WATER TRANSPORT

Currently, the share of water in India's modal mix is a mere 6 per cent. Even though IWT is the most economical mode of transportation, especially for bulk cargo like coal, iron ore, cement, food grains and fertiliser, it remains severely underutilised in India.

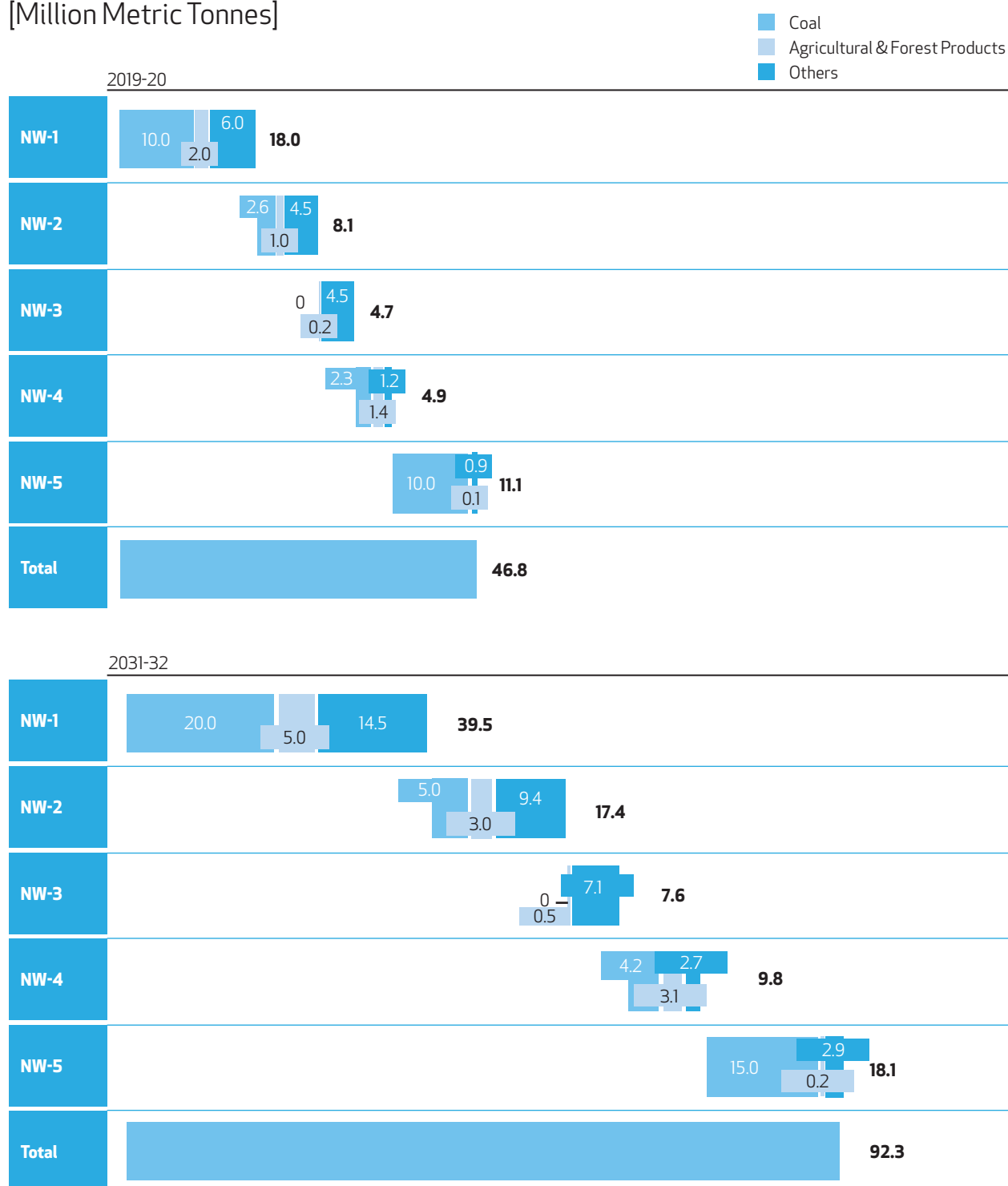
### TRAFFIC PROJECTIONS

The traffic projections for inland waterways are done from a commodity-wise demand standpoint and do not factor in any capacity constraints, as was done for ports and shipping:

**NW-1:** The main commodities that could potentially be moved on NW-1 are:

- **Coal:** A 1,000 MW thermal plant needs 5 MMTPA of coal and 100 cusecs water. Due to their high water requirement, they ought to be located along large water bodies. As of now, 10 thermal power stations are operational in proximity of NW-1. Further, 11 more stations are expected to come up in Bihar and Uttar Pradesh in the next five to eight years with a total installed capacity of over 15,000 MW. The total requirement of coal is estimated to be around 70 MMTPA. Around 14 MMT of imported coal would need to be carried to these power stations from Haldia. Hence all the existing and proposed thermal power plants along River Ganga are potential shippers for IWT if IWAI can provide assured channels of 2.5 m depth or more (a study to provide 3 m deep channel in the Allahabad-Ghazipur stretch of River Ganga by river training/barrage-cum-lock approach is already underway by IWAI). Up to 25 MMT of coal could be transported by IWT mode on NW-1 every year.
- **Over Dimensional Cargo (ODC):** With 11 more power plants scheduled to be commissioned in the next five to eight years, the requirement of ODC is expected to be around 2 MMT.
- **Fly Ash:** With average ash content of 25 per cent in coal, total production is estimated to be around 17.50 MMTPA. With the likely use of fly ash in the manufacturing of cement and in construction of road, waterways could be utilised for evacuation of fly ash from power plants on the banks of NW-1 and thereafter moved to respective destinations through multimodal transport systems.

Figure 4.23  
**Projected Cargo Potential on National Waterways**  
 [Million Metric Tonnes]



Source: NTDPCC (2012b).

- Fertiliser:** There is substantial potential to transport fertilisers from plants located near Allahabad (IFFCO at Phulpur and Indo Gulf at Jagdishpur) and Haldia (Tata Chemicals) to various locations in Uttar Pradesh, Bihar and West Bengal. The total consumption of fertiliser in India is estimated to be around 25 MMTPA, of which around 10 MMTPA are consumed in these three states. A part of this could be moved by inland waterways.
- Foodgrains:** The foodgrain surplus is mainly confined to the northern states; transportation involves long distances. There is a huge requirement of foodgrains in Uttar Pradesh, Bihar, West Bengal and the North Eastern states, which are transported by road/rail as of now.

Figure 4.24  
**Investment Requirements in IWT and Sources of Funding**  
 [Rs Billion]

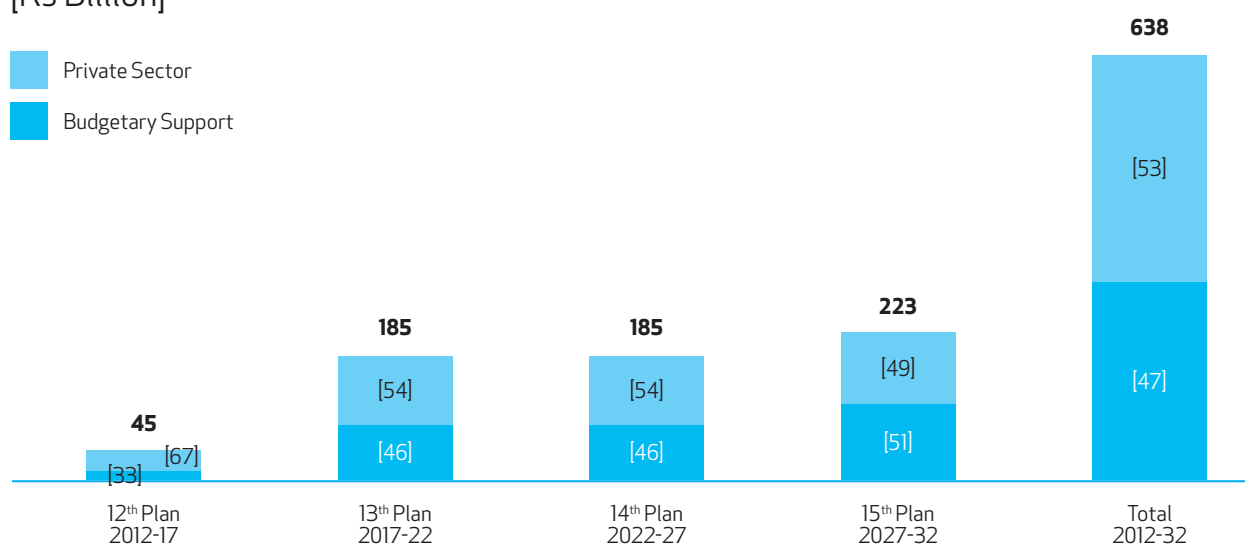
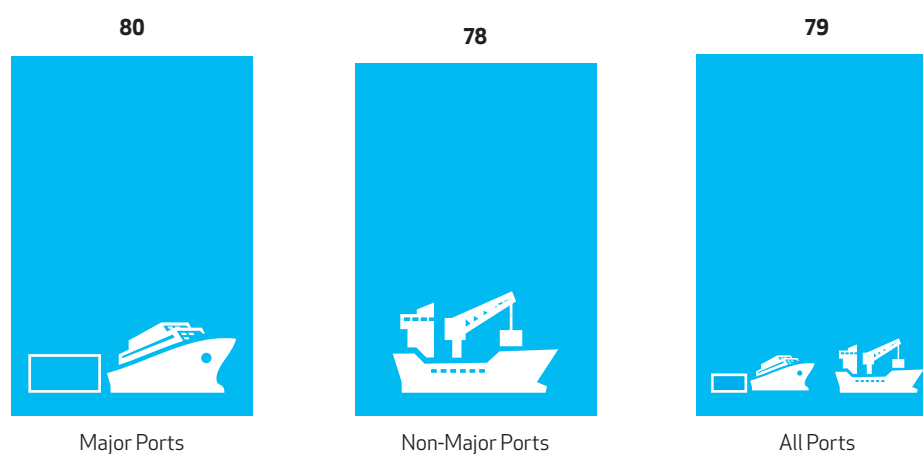


Figure 4.25  
**Capacity Utilisation at Ports, 2011-12**  
 [Per cent]

INDIAN PORTS ARE CAPACITY CONSTRAINED WITH HIGH UTILISATION AND REQUIRE ADDITIONAL INVESTMENTS



Source: Gol (2011-12).

However, as the IWT sector in India is still in an early stage of its development, it needs to gain the confidence of the user.

**NW-2:** The main cargo identified to be moved on this waterway include coal, limestone, cement, fertilisers, iron and steel and building materials.

**NW-3:** This could be an efficient channel to transport project cargo, foodgrains, bulk goods, ferti-

lisers and POL. Container traffic, which has commenced from February 2011 and is of the order of 200 containers per day, could also pick up substantially.

**NW-4:** The hinterland of NW-4 could be divided into four cargo belts—Kakinada, Krishna, South Andhra and Chennai. Coal, cement, fertiliser and foodgrains account for a majority of the total traffic in the hinterland. The main cargo identified to be

**ALMOST ALL MAJOR PORTS ARE CAPACITY CONSTRAINED WITH HIGH UTILISATION AND REQUIRE ADDITIONAL INVESTMENTS**

Source: Gol (2011-12).

usage was at an average of 80 per cent in 2011-12, despite slowdown following the global recession, and four of the 12 Major Ports had utilisation rates above 100 per cent (Figure 4.25 and 4.26).

Development of port infrastructure has traditionally been driven largely by public investment. The limited number of private investors that port development and expansion has attracted has been due to the unique economic characteristics of seaports.

- Provision of basic port infrastructure such as sea locks, breakwaters, port basins, common areas, and main hinterland connectivity entails large fixed costs. Such infrastructure is common to all port terminal operations and is typically funded through public investment.
- Relatively large minimum initial capacity of port infrastructure is required from a technical standpoint. Moreover, port infrastructure is frequently indivisible, implying that increase in port capacity can only be realised in quantum chunks.
- The initial development costs cause large capital investment opportunity losses as a result of underutilised capacity during the initial phases of the port lifecycle.

Consequently, private investors invest primarily in port terminal facilities but not in the underlying

## PORTS

India's ports are highly constrained for capacity and are expected to remain so in the near future. Port



infrastructure. Typically, private investors develop terminal infrastructure under the BOT model on behalf of the public port authority under a concession of 30-40 years.

In the Indian situation, problems emerge at each stage. All stakeholders lose time and money due to two major reasons: pre-tendering delays and weak implementation of projects.

#### PRE-TENDERING DELAYS

There are significant delays in regulatory approvals, security, environmental clearances during the pre-tendering phase, due to lack of defined timelines during this phase. In addition, the approvals across various departments and levels happen sequentially rather than in parallel. Delayed approval at one stage can therefore stall the entire process. Hence PPP projects take time to move from conceptualisation to the tendering stage.

#### WEAK IMPLEMENTATION OF PROJECTS

Even after uptake, most projects suffer from time and cost over-runs due to several factors.

**Low quality design and engineering:** The detailed project report (DPR) forms a much smaller percentage of project costs in India compared to global benchmarks. This is because engineering consultants are chosen for a project primarily based on price, with some small weightage for quality. Such consultants might cut corners, leading to inaccurate surveys and low quality DPRs. This can often result in surprises during construction and a change in project scope or plans, adding to delays and costs.

**Shortage of skilled manpower:** The pool of skilled and semi-skilled manpower, such as welders and fitters, has not kept pace with the construction needs of infrastructure. In effect, 70 to 80 per cent of the existing workforce is untrained. This affects the quality of project implementation.

Some of the other reasons behind delays in project execution are absence of specified financial institutions, delay in financial closures, involvement of multiple parties and inadequate hinterland connectivity.

#### REGULATORY FRAMEWORK

Multiple attempts have been made over the last two decades to modernise the port sector and introduce an appropriate regulatory framework including the right port management structure.

While Non-Major Ports have been relatively successful under the management of maritime states, and have attracted significant private participation, there is still no consistent national ports policy aimed at transforming the Major Ports into viable and autonomous undertakings which can function

While Non-Major Ports have been relatively successful under the management of maritime states, and have attracted significant private participation, India still lacks a consistent national ports policy aimed at transforming the Major Ports into viable and autonomous undertakings which can function properly within a market-oriented economy.

properly within a market-oriented economy. Some basic elements of the Landlord Port model have been implemented for Major Ports, such as introduction of privately owned terminals, but it can be rightly argued that partial implementation of the model creates more problems than it solves.

#### GOVERNANCE MODEL

All Major Ports operate on the Public Service Port model predominant till the 1990s, with the exception of the corporatised Ennore. Since then, globally, most ports have been converted to the Landlord model or in some cases such as the UK, been completely privatised. While the Service Port model in India was consistent with a centralised economy, it does not fit well in a market-oriented economy.

- Service ports are generally less efficient, not commercially oriented and often characterised by severe over-manning, sub-standard equipment, congestion and chronic service failures.
- All investments in port infrastructure, superstructure and equipment need to come from public sources. Private funds would become available only if the terminal operations could be performed by the private sector on a long-term basis.
- Container handling, which now dominates the break-bulk sector, is significantly faster and more efficient than traditional (manual) cargo handling. Publicly managed terminals are less able to benefit from the productivity improvement associated with this as compared to private terminals.
- Service ports are prone to political interference which often disrupts professional port management. Frequent changes in government also have a negative impact, introducing an element of instability in the system.
- Service ports are particularly vulnerable to labour problems.
- In service ports, the port trust is both the landlord and the terminal operator. When private terminals come up alongside port trust-run terminals, there is a conflict of interest.

Even a corporatised port does not serve the function of a landlord port, where the landlord authority oversees port administration and is separated from all terminal operations.

It is a common assumption that cargo moves to the nearest port from the origin because of distance advantage, but it has been seen that in reality, exporters' preference for a particular port is governed by efficiency in port operations, freight advantage, connectivity and port tariff. Thus, cargo from Kerala is transported to distant Mumbai instead of Kochi port.

#### ROLE OF REGULATORY AUTHORITY

Tariff regulation, in general, is a controversial issue in the international port sector. The objective of tariff regulation is to limit monopoly profits through regulation of price and rate of return. However, in the current Indian situation, where the key challenge is to dramatically increase port capacity, this may not be the foremost consideration. The primary objective of regulation must be to encourage accelerated development of new port and terminal infrastructure through greater public-private participation with optimal risk sharing and to ensure that terminal operators meet minimum performance standards through provisions in the concession agreements.

Not only is the notion of tariff regulation by a central authority unsuitable for development of the port sector, but the methodology followed for tariff setting also needs to be re-examined. TAMP had issued a new set of guidelines for PPP projects for Major Ports in February 2008. These aim at providing comfort to investors by announcing the tariff in advance, before they submit their financial bids, thereby reducing regulatory uncertainties. But since a normative approach is adopted to fix tariff, the tariff does not necessarily account for the actual costs of an individual operator. The underlying expectation is that the revenue share to be offered by the bidders will be the leveller between the standards assumed and the actual cost of an operator. Nonetheless, the efficacy of the upfront tariff system hinges upon the reasonableness of the norms adopted and reliability of the capital estimates considered. Investors may desire that these issues are addressed and a fool-proof procedure is evolved for implementation.

In particular, there are two issues with the current tariff fixation methodology:

- The major pitfall is keeping the same tariff base unaltered for the whole concession period of 30 years. Indexation of tariff at WPI-X alone may not provide adequate comfort to investors as it does not capture the additional financial commitments which they might have to make in view of the environmental, market and technological changes that may take place after commencement of the concession. Most importantly, the seaward services

at Major Ports are not offered for PPP and the related services and facilities continue to be provided by the port trusts.

- On the other hand, the 2005 TAMP guidelines for tariff fixation follow a cost plus method. Consequently, cost of inefficiency and redundancy seeps into tariff computation in the name of the actual. Inadequate maritime infrastructure and high marine cost at the ports may adversely affect the business of private terminal operators providing land side services. There is, therefore, an immediate need to review the cost plus regime of tariff fixing. Further, a significant part of the demurrage costs should be borne by ports.

In an effort to address the issues with tariff regulation and therefore lack of private investment, the Ministry of Shipping, in 2013, has issued draft guidelines for tariff setting in Major Ports. They propose a shift to a more progressive market-driven tariff regime, that would enable Major Ports to compete with other ports, including those operated by private players, by allowing them to fix tariffs based on market conditions. As per the draft guidelines, though TAMP will fix the reference tariff for each port for different commodities, the Major Port Trusts (MPTs) can set their own tariff, which can be higher or lower than the reference tariff. TAMP will also specify minimum efficiency standards for cargo terminals. If the actual tariff proposed to be levied is higher than the reference tariff, a proposal including the upgraded efficiency standards to be maintained by the private operator or government-owned port shall have to be submitted to TAMP in advance. Government aims to boost investor confidence with the market-driven progressive tariff regime, though with certain riders.

#### HINTERLAND CONNECTIVITY

The fact that Indian ports are constrained for capacity indicates that cargo evacuation facilities are under great strain, warranting effective quick evacuation within the ports as well as to the external hinterland.

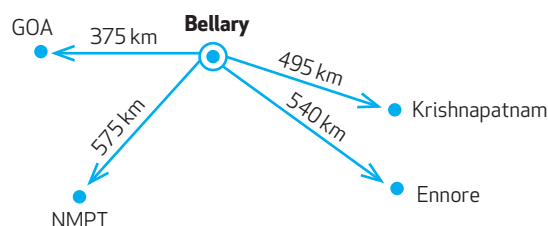
#### FLOWS: ACTUAL VS IDEAL

It is a common assumption that cargo moves to the nearest port from the origin because of distance advantage, but it has been seen that in reality, exporters' preference for a particular port is governed by efficiency in port operations, freight advantage, connectivity and port tariff.

Thus, cargo like umbrellas from Kerala is transported to distant Mumbai instead of Kochi port. Similarly, cashew moves over a longer distance to Tuticorin rather than Kochi. Textile units situated in and around Bangalore transport their products in various directions up to Mumbai, New Mangalore, Tuticorin and Kochi despite the longer distances.

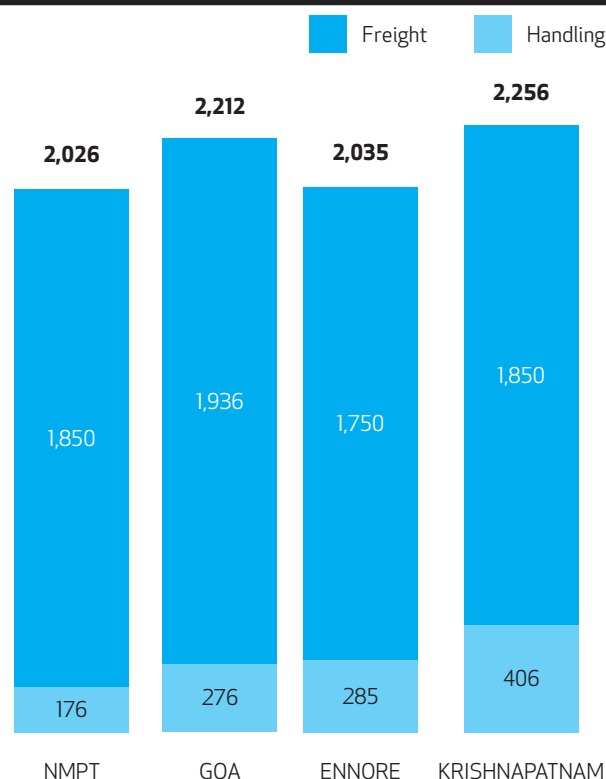
Figure 4.27

### Lead Distance between Ports in South India and Bellary-Hospet



Source: NTDP (2012b).

### Consolidated Charges for Handling Iron Ore Rs per Tonne



Tobacco processed in Andhra Pradesh moves to Chennai rather than Visakhapatnam. Actual flows do not conform to the ideal flows.

The same holds true for container cargo. Cargo from the northern hinterland destined for China and South East Asian countries moves through JNPT and other west coast ports rather than the East coast, resulting in longer sailing distance and higher cost. One of the reasons for this imbalance is lack of adequate/dedicated rail connectivity between production centre and gateway port.

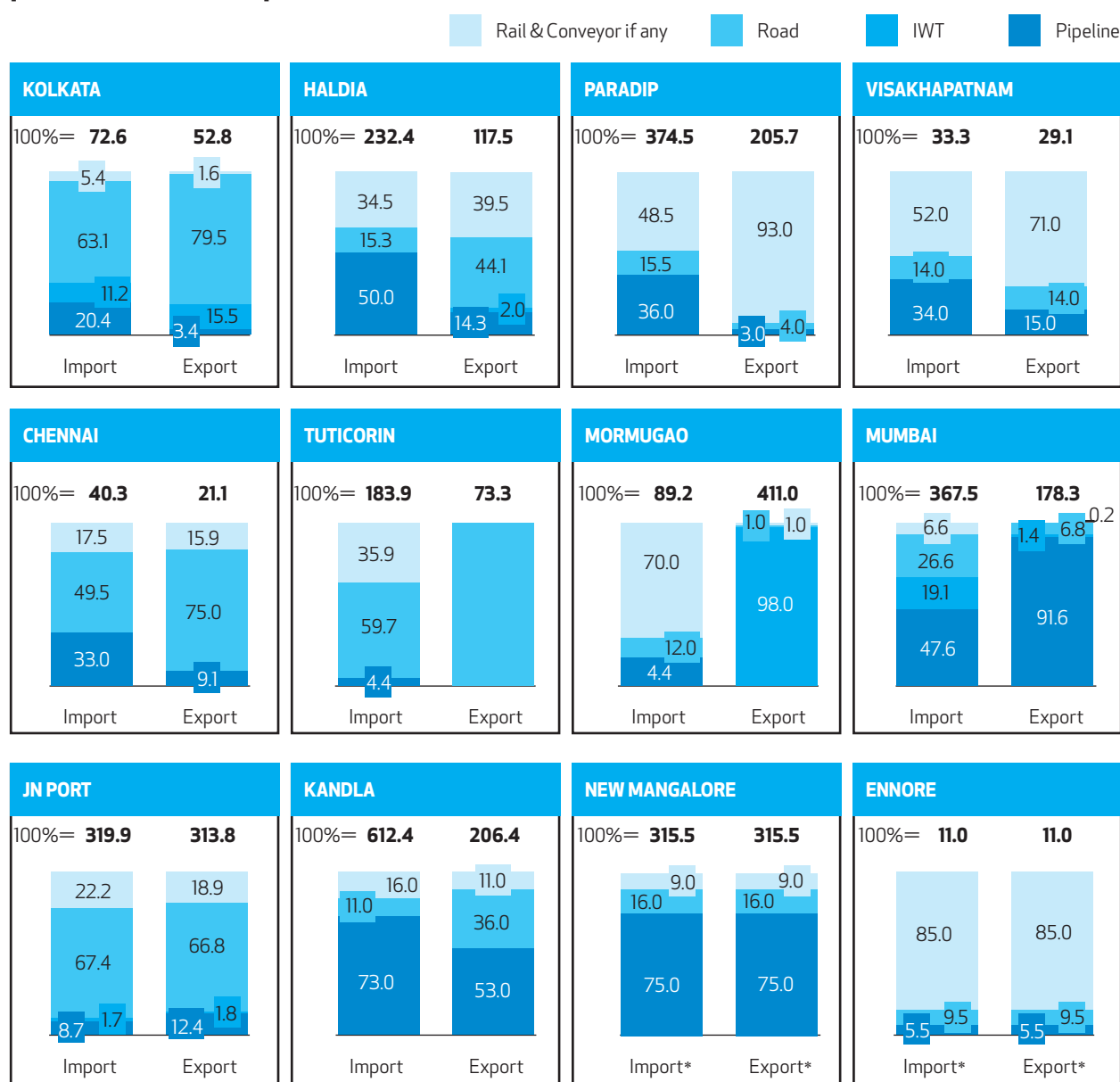
Further, freight costs by railways/road for containers are exorbitant in India and more often, the ocean freight for bringing cargo from the Far East and South East Asia are much less than the land freight within the country by rail. Unless proper rationalisation of freight structure is undertaken to make the rate more affordable, a shift may not make economic sense. Ideally, flows should conform to distance advantage, and connectivity plays an important role in making the ideal flows possible.

The phenomenon of traffic shifting from one port to another is even more common in situations where several ports are present in neighbouring states. Consider iron ore transported from Bellary in Karnataka. A comparison of lead distance between the

various ports and Bellary reveals that Goa is the closest, followed by Krishnapatnam, Ennore and New Mangalore, respectively. However, connectivity to Goa port is through a mountain road with steep grades, which gives other ports a competitive advantage. The railway freight from Bellary to Goa is Rs 1,936 per tonne whereas the rate per tonne for Ennore is Rs 1,750. In case of New Mangalore and Krishnapatnam, the rail freight is Rs 1,850 per tonne. This is, however, still an incomplete picture. This railway freight charges are to be seen in conjunction with port handling charges while determining the competitive advantages of each port. Figure 4.28 shows that New Mangalore is the most favourable destination for iron ore from Bellary despite the distance disadvantage.

Another important factor in determining the flow of container cargo is the distribution and location of CFSs and ICDs. It is possible to alter hinterland-port linkages for ideal flows by changing the CFS locations. Containerisation has changed the flow pattern of cargo through ports. All over the world, most break-bulk cargo is being containerised, along with some liquid and project cargo. Thus, CFS and ICD have emerged as key nodes in handling and transportation of cargo within the hinterland. Availability of CFS and ICD facilities in a region attracts container cargo. In India, at present, there is surplus

Figure 4.28  
**Transport Modal Share in Evacuation of Cargo at Major Ports**  
 [Lakh Million Tonne]



\*Only aggregate import and export volumes available for New Mangalore and Ennore ports.  
 Source: NTDPCC (2012b).

capacity in some of the CFS clusters at Mundra, Kandla, JNPT and Chennai, and deficit capacity at the remaining clusters in the eastern ports. Of all the regions, the container traffic handled at ICDs/ CFSs in the northern region (including north-central region) is predominant at 54 per cent. Region-wise analysis of ICDs reflects:

- Northern and north-central region—Jammu and Kashmir, Punjab, Haryana, Delhi, Uttaranchal, Himachal Pradesh—has the highest ICD container volume. The major cargo centres are Amritsar, Jalandhar, Ludhiana, Panipat, Delhi, and Dadri. Top two ICDs in the country, namely Tughlakabad (Delhi) and

Dhandarikalan (Ludhiana) are in this region. Long lead distances of cargo generating centres in the region generate high container volumes at ICDs.

- The second highest volumes are observed in the southern region, with Bangalore, Chennai, Coimbatore, Madurai and Tuticorin being the major cargo centres. ICDs at Bangalore and Chennai handle large volumes. Though the cargo centres are close to gateway ports, extensive rail network is one of the reasons for high container volumes at ICDs.
- Eastern and central regions have very low ICD movement, since the states in this region—



Table 4.2  
**Leading KPIs to Monitor Port Objectives**

Operations Related KPIs

PORT OBJECTIVES (HIERARCHICAL)	LEADING KPI
1 Low Cost of Import/Export	■ Cost Per Tonne of Import/Export
2 Fast Cargo Transit	■ Cargo Dwell Time
3 Fast Vessel Turnaround	■ Vessel Turnaround Time
4 Optimum Asset Utilisation	■ Asset Utilisation/Productivity
5 Contribution to Employment and Economic Value for Nation	■ Number of Jobs or Amount of Value Added Per Tonne of Goods Handled
6 Maximum Shareholder Return	■ Return on Invested Capital
7 Minimum Environmental Impact	■ Emission Per Tonne of Goods Handled

Table 4.3  
**KPIs Derived from Operations-Related Performance Indicators**

LEADING KPI	PERFORMANCE DRIVERS	DERIVED KPIS	PARTIES INVOLVED
1 Cargo Dwell Time (excluding vessel related time)	<ul style="list-style-type: none"> <li>■ Terminal management system (IT system and yard operating system)</li> <li>■ Dwell-time incentives (free storage time)/ customer preferences (to use port as forward storage location)</li> <li>■ Customs clearance process</li> </ul>	<ul style="list-style-type: none"> <li>■ Vessel pre-berthing time</li> <li>■ Yard dwell time</li> <li>■ Gate transit time</li> </ul>	<ul style="list-style-type: none"> <li>■ Customs/port authority</li> <li>■ Terminal operator, customs, cargo owner</li> <li>■ Customs, shippers</li> </ul>
2 Vessel turnaround time	<ul style="list-style-type: none"> <li>■ Amount of traffic to be loaded/unloaded</li> <li>■ Distance from anchor point to berth</li> <li>■ Efficiency of port service operators (tugs/pilots)</li> <li>■ Efficiency of terminal operator (working hours, number of cranes, crane speed)</li> </ul>	<ul style="list-style-type: none"> <li>■ Pre-berthing time (hours)</li> <li>■ Berthing time/unit of cargo handled</li> <li>■ Post-berthing time</li> </ul>	<ul style="list-style-type: none"> <li>■ Customs/port authority (service providers)</li> <li>■ Terminal operator</li> </ul>
3 Asset Utilisation	<ul style="list-style-type: none"> <li>■ Handling equipment (number of cranes, crane spacing, crane speed, operating hours)</li> <li>■ Yard storage system (RMG, RTG, straddle carrier, forklifts, etc.)</li> <li>■ Amount of cargo throughput</li> </ul>	<ul style="list-style-type: none"> <li>■ Cargo throughput (TEU/tonne) per quay metre</li> <li>■ Cargo throughput (TEU/tonne) per hectare of land</li> </ul>	<ul style="list-style-type: none"> <li>■ Terminal operator (quay design parameters)</li> <li>■ Terminal operator (yard design)</li> </ul>

Source: NTDPCC Working Group Analysis.

Uttar Pradesh, Madhya Pradesh, Bihar and West Bengal are primarily agricultural states which do not lend themselves to container-based movement.

Hence, the policy of setting up of CFS and ICDs may need a constant review to ensure balanced distribution within different regions, and to ensure optimal





















connectivity to ports from the originating centres through these nodes.

MODAL SHARES: ACTUAL VS OPTIMAL

Port traffic within India is carried largely by railways and road transport, with pipelines carrying some crude oil and petroleum products. Alternative modes such as inland waterways have remained

Figure 4.29  
**Dwell Time at Indian Ports in Comparison with Global Best Practices**

Indian ports have much higher dwell times than global best practices  
 Number of days, 2006

	DRY BULK		CONTAINER	
	IMPORT	EXPORT	IMPORT	EXPORT
Indian Average	 38	 27	 2.0	 3.8
Indian Best	 13	 13	 1.2	 1.0
Indian Worst	 64	 34	 8.2	 6.5
	 +171 Per cent	 +93 Per cent	 +186 Per cent	 +443 Per cent
Best Practice	 14	 14	 0.6-0.8	 0.6-0.8

Note: Based on best practices at Rotterdam and Singapore ports.  
 Source: Gol (2009).

largely undeveloped and the situation is unlikely to change substantially in the medium term. Figure 4.28 gives modal shares at various transport modes in evacuation of cargo at Major Ports during 2010-11.

These modal share estimates are based on some assumptions on commodity-wise optimal mode of transport, the geographical features of the regions, certain cargo characteristics, and distances travelled from the hinterland. For instance, cargo such as coal and iron ore would preferably be transported by railways unless alternative arrangements such as conveyors are available. The estimates<sup>7</sup> suggest that while the railways should have carried 34 per cent of port traffic, it actually moved only 24 per cent. Roads, by contrast, presently carry 36 per cent of the traffic as compared with the 22 per cent they should ideally carry.

Therefore, it is not just important to have overall sufficient levels of hinterland connectivity. It is important to have the necessary connectivity within each preferred mode for a particular port for a particular commodity.

## PORT OPERATIONS

Operational performance indicators can help enhance port performance by identifying areas for closer attention. The next step is to collaborate with all stakeholders to facilitate the working of operational areas under their control.

## KEY PERFORMANCE INDICATORS

Ports serve different objectives during various stages of maturity (Table 4.2). Certain operations-related key performance indicators (KPIs) help measure and improve operational performance at ports.

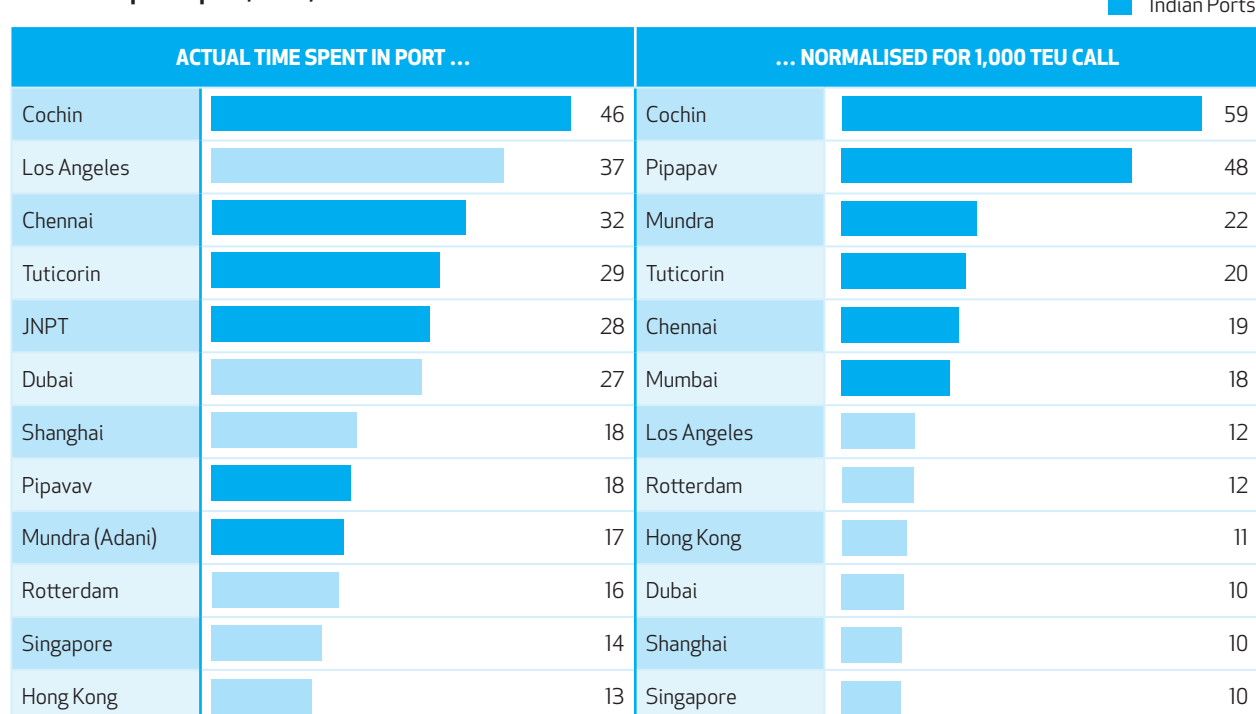
Three of these leading KPIs are relevant in port operations: fast cargo transit, fast vessel turnaround and optimum asset utilisation. Each has its own performance drivers and parties involved in the outcome. And each can be broken down to a set of derived KPIs for better and easier monitoring (Table 4.3).

**Cargo dwell time**, or transit time, consists of the time before the ships are allowed to berth, the time they spend unloading and loading, and the time the cargo spends in the yard before being picked up or dropped off by shippers in the port. Parties involved

7. World Bank Report (2007).

## Figure 4.30 Vessel Turnaround Times at Indian Ports in Comparison with Global Best Practices

Indian ports have much longer vessel turnaround times than global best practices  
Vessel time spent in port\*, hours, 2010



\*Derived from several months of Maersk Line's recorded statistics of port entry and exit times of their vessels.  
Source: www.maerskline.com (accessed 3 March 2013).

in the overall dwell time of the cargo are the customs authority (clearance process), port authority (vessel planning), terminal operations (load handling) and shippers (port as inventory stock). Any cuts in cargo dwell time can reduce the inventory cost of shippers. Good information management systems, incentives to limit extra storage time and smooth customs processes are all drivers of shorter dwell time.

The average Indian port lags far behind on international best practices in this KPI the dwell times of both container and bulk cargo are at least double that of international best ports (Figure 4.29). While the best performing Indian ports are in line with international best practices, the worst performers in India are two to 10 times worse.

**Vessel turnaround time.** This is the time needed for loading, discharging and servicing a vessel from berthing until its departure. The main parties involved in vessel turnaround are the port authority and the terminal operators. Seamless communication between these parties and the ship operators is essential for a quick vessel turnaround process.

Important drivers of vessel turnaround time are the amount of traffic to be loaded or unloaded, distance

from anchor point to berth, efficiency of port authority in pilotage/tugging and the efficiency of terminal operator in handling the vessel.

Indian ports have huge potential to reduce the average time a vessel spends in the port as compared to international best practices (Figure 4.30). To a certain extent, scale plays a role here, but even ports of the scale of JNPT and Chennai have 50 to 100 per cent higher turnaround times than international best practice ports like Singapore and Rotterdam.

**Asset utilisation.** High productivity of port assets such as quay and land plays an important role in vessel turnaround time and cargo dwell time. Asset productivity is also important given the ultimate public ownership of ports and therefore the return on capital of assets.

Productivity, however, can be constrained by bottlenecks, which usually lie in quayside operations—the most expensive element of overall costs. On rare occasions, the bottleneck can also lie in yard layout or extreme water and soil conditions that hamper berth construction.

## Figure 4.31 Terminal Quayside Productivity at Indian Ports in Comparison with Other Countries

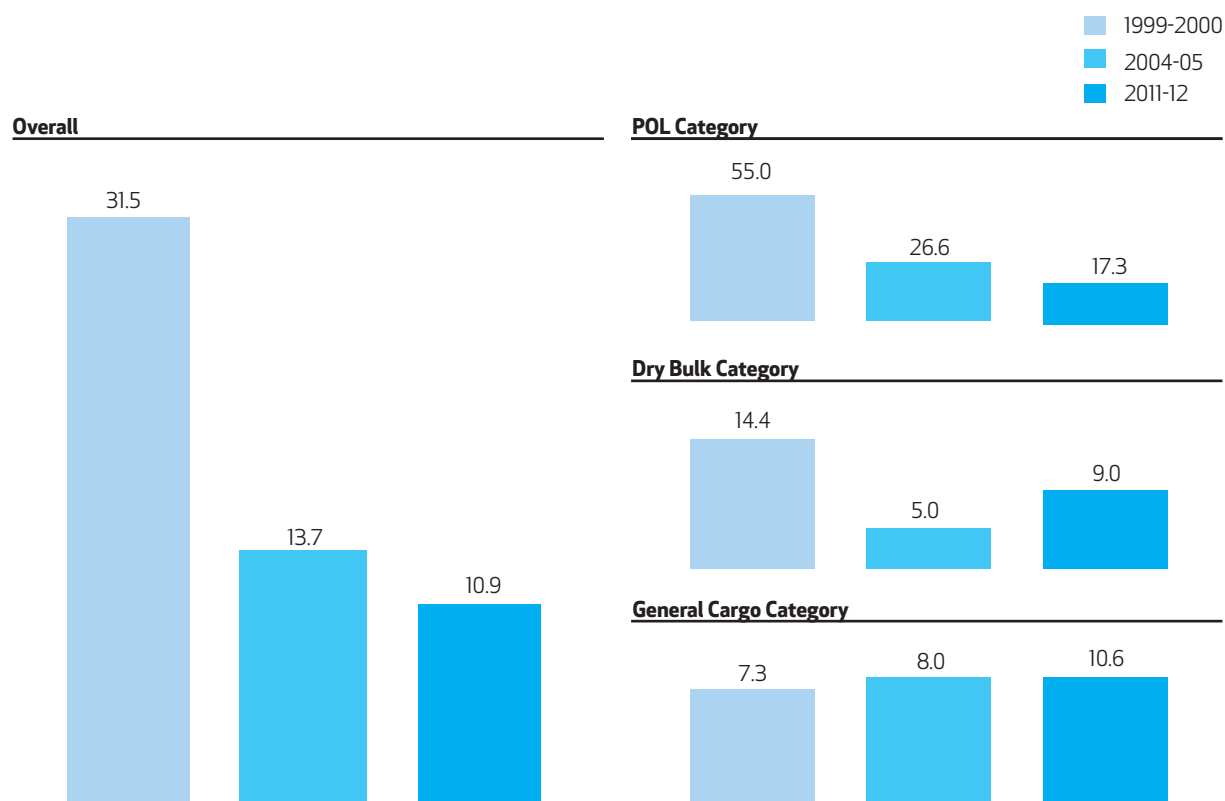
Terminal quayside productivity at Indian ports is far below global figures  
2008

	TEU/ Quay Metre/ Yr	'000 TEU/ STS Crane/Yr	STS Crane Spacing (m)
JNPT	1,639	164	100
Chennai	1,356	171	126
Tuticorin	1,185	146	123
Mundra	666	84	126
Cochin	612	86	141
Pipapav*	188	32	173
<hr/>			
T. Pelepas	2,593	207	80
Hong Kong	2,205	192	87
Singapore	1,730	189	84
Port Klang	1,307	166	127
Colombo	1,259	141	112

- JNPT is the only port that comes close to quayside performance of best practice ports
- Quayside performance partially affected by scale

\*Pipapav is in ramp-up phase.  
Source: Containerisation International.

## Figure 4.32 Share of Indian Tonnage [Per cent, 1999-2000 to 2011-12]



Source: NTDP (2012b).

The main parties that manage asset productivity are the terminal operator and the port authority. While the port authority is principally involved in the design phase around the layout of the port and the location of the terminal, the terminal operator is responsible for the terminal layout and production system quay and yard cranes.

Indian container terminal operators are lagging behind their international peers in operational efficiency, in terms of Twenty-foot Equivalent Unit (TEU), representing a container of 20 feet length) throughput per metre of quay (Figure 4.31). This is due to a combination of crane spacing average distance between cranes and the productivity of individual cranes. Large-scale Indian container terminal cranes should be able to run at 170,000 to 190,000 TEU per crane per year, whereas smaller ones should at least be able to achieve 100,000 TEU. Crane spacing in India should be reduced to approximately 80 m for larger operations and 100 to 120 m for smaller terminals.

## SHIPPING

India has one of the largest merchant shipping fleets among developing countries and is ranked 16<sup>th</sup> in the world in terms of gross tonnage under its flag.

### DECLINING SHARE OF INDIAN BOTTOMS IN OVERSEAS TRADE

The overall share of Indian ships in the carriage of the country's overseas seaborne trade has been declining over the years. From about 40 per cent in the late 1980s, it is currently around 10.87 per cent (Figure 4.32)

### TAX REGIME

The current treatment of indirect tax (service tax) on voyage and time charter makes Indian shipping expensive. Given the far greater tax advantage available to a majority of foreign players, it is felt that the rather restrictive regime in India fails to provide a level playing field to national shipping lines.

### COASTAL SHIPPING

Coastal shipping is an ideal solution to help de-bottle-neck India's infrastructure and logistics challenge.

It is the cheapest and least polluting mode of transport (Rs 0.55 per tonne-km versus Rs 0.90 for rail and over Rs 1.50 for road). With India's road and rail infrastructure in most high traffic areas running at over 100 per cent utilisation, there is urgent need to create additional capacity. Given land acquisition problems and other challenges, coastal shipping offers a relatively easier option. It can significantly help improve energy security and carbon footprint of India.

Yet, coastal shipping remains underdeveloped, because it faces the following challenges:

Coastal shipping is the cheapest and least polluting mode of transport (Rs 0.55 per tonne-km versus Rs 0.90 for rail and over Rs 1.50 for road). India's road and rail infrastructure in most high traffic areas are running at over 100 per cent utilisation. Coastal shipping can significantly help improve energy security and carbon footprint of India.

- Penetration of container shipping is low, with the east coast at zero penetration. As on 31 December 2012, monthly container capacity of Indian shipping companies' is 14,287 TEUs/month (all of it on the west coast) according to the Director General of Shipping.
- Lack of port infrastructure leads to higher turnaround times. This is primarily due to low priority for berthing of coastal container ships. Even a two-day wait for a coastal container ship increases the cost of the movement by close to 10 per cent given the short voyage durations.
- Duties are higher for coastal vessels. The total duty on bunkering for coastal ships is presently over 30 per cent. This makes shipping on the Indian coast more expensive relative to international shipping, as well as coastal shipping in other countries. This adds 10 per cent to the overall cost of movement. Further, the inconsistency in provision of fuel subsidy (diesel subsidy of Rs 9.28 per litre) between road/rail and shipping (no subsidy) creates price distortion.
- Evacuation infrastructure is poor, including road and rail connectivity at many key ports, leading to increased land bridging costs and reduced service levels.
- Coastal vessels are unable to attract adequately qualified sailors, given preference for ocean going vessels due to tax exemption. Personal tax exemption for sailors alone can reduce operating cost by 5 per cent.
- Getting adequate financing for coastal ships is difficult due to lack of dedicated agencies and inability to leverage the ECB route for lack of foreign currency earnings.
- A judicious view must be taken on cabotage law with a longer perspective. Indian cabotage restrictions may discourage the growth of coastal shipping insofar as Indian tonnage is not adequate. It is also argued that international competition would bring about greater efficiency. A counter-argument is that relaxing cabotage laws will tilt the scales against Indian



The choice of port management model adopted in a country is influenced by the socioeconomic structure of a country, the historical development of the port, the location (urban area or isolated region), and the types of cargo that are typically handled (liquid or dry bulk, containers).

shipping. However, if the primary objective is to increase coastal shipping and make coastal tonnage competitive, it might be desirable to allow foreign vessels to compete for coastal cargo. A stricter cabotage law can be enforced later when there is sustained growth in coastal shipping. There is also a view that cabotage on carriage of empty and/or transshipment containers should be partially relaxed with certain conditions. This may facilitate the efficient movement of containers as well as ease congestion at ports and port storage.

- Considering that coastal vessels do not have to conform to the different conservancy and safety requirements in different foreign ports and face the hazards of the high seas, there is a strong case for revisiting the issue of safety. Coastal vessels are constructed to specifications of oceangoing vessels even though they are not subject to the same stress and turbulence. This needlessly increases capital costs.

#### INLAND WATER TRANSPORT

India's IWT sector is relatively under-developed compared to other large economies due to a mix of natural reasons (such as inadequate depth and seasonal siltation) and policy lacunae (among them, lack of public investment and preferential treatment of other modes).

#### NAVIGATIONAL INFRASTRUCTURE

Absence of adequate navigation infrastructure is one of the biggest challenges facing the sector.

**Inadequate depth:** Large parts of Indian Waterways have inadequate depth for commercial movement of cargo. Sufficient depth or Least Available Depth (LAD) is required to enable navigability of larger vessels, essential to make IWT commercially viable through economies of scale. Moreover, Indian rivers (especially rivers in the northern plains) face severe problems of siltation round the year. The river bed rises, impeding movement of cargo during non-monsoon months.

**Inadequate air draft:** Multiple bridges with low vertical clearance obstruct the passage of bigger IWT vessels on waterways such as NW-3. There are several navigable canals in the states of Uttar Pradesh, Bihar, West Bengal, Tamil Nadu and Andhra Pradesh: Sarada canal, Ganga canal, Yamuna canal, the delta canal systems of the Krishna, Godavari, Mahanadi

and Brahmani. But these cannot be utilised for cargo movement due to air draft restriction.

**Shortage of IWT vessels:** Vessel building is highly capital intensive and faces difficulties in obtaining project finance from banks and financial institutions since it does not enjoy 'infrastructure' status. The private sector is reluctant to invest in barges unless long-term cargo commitments for onward/return trips are made from user industries.

**Lack of night navigation infrastructure:** Rudimentary night navigational facilities and markings are also a major issue.

**Shortage of MRO facilities:** There is severe shortage of MRO (Maintenance, Repair and Overhaul) facilities for IWT vessels.

#### POLICY PARITY

The government needs to establish a level playing field between the various transport modes. While IWT is cost competitive in general with other transport modes such as rail and road, the situation is sometimes distorted by preferential treatment offered to other modes. An example is freight subsidy for transportation of fertiliser being extended to rail and road but not to IWT. This artificially makes rail and road more competitive on the cost curve and drives traffic away from IWT. Road and rail also enjoy preferential tax treatment.

#### MODAL INTEGRATION

Lack of intermodal IWT terminals on inland waterways inhibits door-to-door connectivity. There are IWT terminals on NW-1, NW-2 and NW-3, but most of these terminals are not properly linked with road/rail networks.

Given that IWT terminals are not final destinations in themselves but nodes in a larger logistics chain, it is imperative to establish good road and rail last-mile connectivity.

#### LACK OF PUBLIC INVESTMENT

While considerable emphasis has been laid on development of rail and road infrastructure in successive Five Year Plans, IWT has received scant attention. Consequently, public investment in IWT has been far below the levels in other modes.

To illustrate the case in point, while development/maintenance cost of road is about Rs 50 million per km, the amount spent in the last 24 years on development of the fairway of 2,716 km of the existing three National Waterways is only about Rs 8 billion Rs 3 million per km only. To put the total investment figure in perspective, the corresponding investment in the road sector the NHDP programme for widening and upgrading of National Highways is Rs 3,000 billion and that for railways, Rs 593.60 billion for 2011-12 alone. At this

Table 4.4  
**Port Governance Models**

	INFRASTRUCTURE	SUPERSTRUCTURE	PORT LABOUR	OTHER FUNCTIONS
Public Service Port	Public	Public	Public	Majority Public
Tool Port	Public	Public	Private	Public / Private
Landlord Port	Public	Private	Private	Public / Private
Private Service Port	Private	Private	Private	Majority Public

Source: World Bank (2007).

rate of investment, the possibility of IWT becoming viable as a mode of transport is limited.

Since the extent of public investment is limited in the transport sector, this situation poses a choice for the government. Do funds need to be redirected towards IWT to make it a commercially viable mode? Or should the funds instead be used for the modes of transport that have the maximum potential impact because of the sheer volume of cargo and passenger traffic they carry? The answer is as important as the other decisions on technical, regulatory and operations issues in the ports, shipping and IWT sector.

## PORTS

Port governance is structured by ownership and administration models and regulatory frameworks. A short summary of these models and frameworks may be useful before moving on to describing international case examples for a selected set of countries.

### GOVERNANCE MODELS

During the past three decades, discussions on port reforms focused particularly on the relevance of a number of port management or administration models. The choice of model adopted in a country is influenced by the way the ports are organised, structured and managed. These factors include the socioeconomic structure of a country, the historical development of the port, the location (urban area or isolated region), and the types of cargo that are typically handled (liquid or dry bulk containers).

These models differ by whether the services are provided by the public sector, private sector or mixed ownership providers; their orientation (local, regional or global); who owns the superstructure and capital equipment; and who provides dock labour and management.

### SERVICE PORT MODEL

This is a predominately public model in which the Port Authority owns the land and all available assets—fixed and mobile, and performs all regulatory and port functions. All cargo handling operations are performed by labour directly employed by the Port Authority. This model is used in a (decreasing) number of developing countries.

A Service Port is usually controlled by the Ministry of Transportation (and/or Communications). The Chairman of the Port Authority is usually a civil servant who directly reports to the appropriate Minister. In some cases, cargo handling services are performed by separate public entities; this division of operations between separate public entities can present unique management challenges.

Under this model, the same organisation has the responsibility for performing regulatory functions, developing infrastructure and superstructure, and executing operational activities. In general, there is no private sector involvement.

The strength of this model is that facilities development and operation are the responsibility of only one entity, making for a streamlined and cohesive approach. On the other hand, the dearth of internal competition can lead to inefficient administration, lack of innovation, and services that are not user- or market-oriented. Dependence on government for funding may lead to wasteful use of resources or under-investment.

### TOOL PORT MODEL

Here, operational responsibilities are divided. The Port Authority owns, develops and maintains the port infrastructure and superstructure, including cargo handling equipment. Port Authority equipment is usually operated by its own labour, but other operations are performed by private cargo handling firms, on board vessels as well as on the quay and apron. The private operators are usually small firms.

## Box 4.1

### Public Private Partnership (PPP) in Ports

The role of the port authority is to provide and manage common facilities like the breakwater and entrance channel, utilities and road and rail access; and to plan and implement the expansion and development of the port. Most PPP models in the ports sector sit within a landlord port structure in which a public sector port authority (often autonomous) enters into PPP contracts for a series of individual terminals. The operators of the terminals are usually different, and the PPP model used may differ from one terminal to the next. The most common PPP models for individual business units are:

**The management/investment model for existing public assets:** The private operator manages publicly owned assets and makes additional investments in them, in exchange for being given the right to use them for a specified period of time. Ownership of the public assets remains with the public sector throughout this period; this type of PPP model is generally associated with the port privatisation programmes which have taken place since the late 1980s in southern Europe, South America, Africa and South Asia.

**The development rights model for new private assets:** Here the private investor buys the right to build new port assets and have exclusive use of them for a fixed period of time before transferring them over to the public sector. This is a model which has been increasing in popularity in the ports sector as the stock of public assets suitable for private management has dwindled. However it raises the question of why private investors should have to give back their assets to the public sector, often free of charge, when a hotel complex built on the same waterfront site would be treated as freehold property.

**The public-private joint venture model:** In this, the public sector has an influential or controlling stake in the Special Project Vehicle (SPV) set up to hold either a management-investment contract or a development rights contract for new port facilities. These contracts otherwise operate broadly as described above, although the existence of a large public sector stake in the SPV has a significant effect on the detailed provisions of the contract. This type of PPP model has become the norm in China and Indonesia, but is rarely found elsewhere.

**Management contracts:** Where the private sector operates port facilities on behalf of the public sector with minimal investment of its own, are also now quite rare. This is partly because they generate small returns in relation to the inputs of relatively scarce management time required. There is also a history of failure caused by conflicts over strategy, usually arising when private operators are not given the freedom they need to satisfy public sector objectives for the contract.

**Short-term leases:** Of public assets of up to 15 years, are more popular than management contracts because they give the operator greater commercial freedom.

Source: Farrell (2012).

While duplication of facilities is avoided, since investment in infrastructure and equipment is provided by the public sector, the fragmentation in responsibility for cargo handling can lead to conflict between small operators and between stevedoring companies and port administrators. Another weakness of the model is the risk of under-investment. Strong stevedoring companies are not developed as a local economic benefit.

#### LANDLORD PORT MODEL

The Port Authority maintains ownership of the port, while the infrastructure is leased to private operating companies. The Port Authority's responsibilities as landlord include economic exploitation, long-term development of the land and maintenance of basic

port infrastructure such as access roads, berths and wharves. The private operating companies that lease from Port Authority provide and maintain their own superstructure and purchase and install their own equipment. Dock labour is also employed by the private firms.

The advantage: the same entity both executes operations and owns the cargo handling equipment; so the planning is likely to result in better outcomes and is more likely to respond effectively to changing market conditions. However, sometimes, there may be a duplication of marketing effort as both terminal operators and the Port Authority visit potential customers; so the model needs fine planning and co-ordination between stakeholders.

#### PRIVATE SERVICE PORT MODEL

Here, the public sector (the State) no longer has any interest in port activities. Port land is owned by the private sector. All regulatory functions and operational activities are performed by private companies. This is the model used in many ports in the UK.

A particular strength of the model is that port development and tariff policies tend to be market-oriented. On the other hand, it could result in monopolistic behaviour as well as a loss of public involvement in developing long-term economic policy and strategies.

Today, the landlord model is the mainstream port governance structure worldwide and becoming the dominant port model in larger and medium-sized ports. The landlord port is characterised by its mixed public-private orientation. Under this model, the publicly governed port authority acts as regulatory body and as landlord, while private companies carry out port operations (especially cargo-handling).

Though widely acknowledged, the landlord model is not fully implemented everywhere since it requires a level of institutional and managerial competence which is not always available in port organisations. Moreover, transition to the landlord model assumes a regulatory framework in place geared to encourage fair competition on a level playing field.

#### ECONOMIC REGULATORY FRAMEWORK

The shift in the role of the public sector from port services provider to a landlord calls for enhanced responsibilities as a regulator of activities that are now executed by the private sector.

Regulation in the port sector may entail controlling behaviour of port sector entities by rules or regulations or alternatively a rule or order issued by an executive authority, a regulatory agency or a Port Authority, having the force of law. Regulation may cover all activities of public or private behaviour—economic, social, environmental, safety and security—that may affect the development and management of ports and port terminals including their access roads, rail links, pipelines and waterways.

Economic regulation typically involves intervention in the functioning of markets in terms of setting and controlling tariffs, revenues and profits; controlling market entry or exit; and ensuring that fair and competitive practices are maintained within the sector. The overarching philosophy of regulation under the landlord model is that of competition regulation as opposed to tariff regulation.

#### PORT COMPETITION

There are three categories of port-related competition:

The regulator for port competition should preferably have the character of an arbitrator rather than a court of law, and be accepted by the port community as being independent. In case boundaries between port authorities and terminal operators are vague or nonexistent, for instance a regulator might be a solution for guaranteeing a level playing field for all operators

- **Inter-port competition** The scale of inter-port competition often depends on the size of the hinterland of the concerned ports. For example, Rotterdam competes with Antwerp, Hamburg and Bremen for cargoes destined for Central Europe. Trans-shipment container trade competition often concerns an entire region; for example, in South Asia, Colombo is competing with Singapore, Tanjung Pelepas, Dubai, Salalah, Aden, and possibly with Valparadam.
- **Intra-port competition** refers to a situation where two or more terminal operators within the same port area compete for the same type of cargoes. In general, intra-port competition is favoured by both government and port users, but is not always feasible. It depends on the volume of the cargo, which has to be sufficient to allow two or more operators to run profitable and effective businesses.
- **Intra-terminal competition** refers to two or more (stevedoring) companies competing within the same terminal. This situation is rare and usually only exists within small ports operating under the service port model with independent stevedores.

Establishing competition in the port sector requires four steps:

- Assessment of sector unbundling, especially in the case of a public service port. This relates to the financial and economic feasibility of creating more than one terminal handling the same commodity.
- Implementation of the new port management structure, if and when required.
- Conclusion of concession or lease agreements that include tariff regulation mechanisms, if required by the absence of intra-port competition.
- Introduction of regulatory oversight by the government (port competition act), but only with respect to those tariffs that relate to a monopolistic market situation.

When intra-port competition is deficient or absent, terminal operators, public or private, have an incentive to use their monopolistic market position to charge high tariffs particularly for captive cargoes



which may justify regulation. The need for such regulation may lead to the creation of an independent port competition regulator. This regulatory function is usually instituted by law.

The main objective of the regulator is to ensure fair competition among operators in the port; control monopolies including public ones and mergers; and prevent anti-competitive practices. Generally, a port sector regulator has powers to interfere in anticompetitive practices such as:

- Use of a dominant position to prevent or lessen competition
- Cross-subsidisation from monopoly services to contestable services, where it threatens fair competition
- Price fixing among competitors
- When a firm or a person providing port services pursues a course that of itself has or is intended to have the effect of restricting, distorting, or preventing competition
- Monopoly situations, which are most likely to occur in medium size or smaller ports. In many ports, only one container or oil terminal exists. Generally, when a monopoly or merger situation is not in conflict with the public interest, it may be permitted.

The regulator for port competition should preferably have the character of an arbitrator rather than a court of law, and be accepted by the port community as being independent. In case boundaries between port authorities and terminal operators are vague or nonexistent, for instance when a port authority not only runs its own container terminal but also owns shares in a competing facility, as is the case in Sri Lanka, a regulator might be a solution for guaranteeing a level playing field for all operators. The regulator and a possible national level competition regulator may have a concurrent role where cases may be referred equally to either of them based on who is most suited for a required intervention. The regulator, however, should not jeopardise the legal powers of port authorities to operate freely in the market or the ability of a terminal operator to negotiate tariffs with its clients.

In principle, tariff setting or other price controls should not be exercised under the landlord model but left to the market. Rather, economic regulation pertains to establishing conditions for fair competition on a level playing field. Only under serious market imperfections, as mentioned above, some pricing control may be indicated.

#### PORT REGULATORY POLICY

To help design an economic regulatory policy, reflecting the above principles of enhancing competition, the following guidelines have been suggested in the World Bank Port Reform Toolkit:

- Government should have a clear understanding of the competitive environment of the port sector
- A decision on economic regulation should be based on the risk of anti-competitive behaviour or on evidence that monopolistic behaviour is occurring and that other methods of intervention (for example, cease-and-desist orders, sanctions, or fines) are not feasible, adequate, or appropriate
- The regulator should clearly define what form of economic regulation (for example, rate of return or tariff setting) is to be applied and under what circumstances
- Responsibilities for regulation of port operations and competition should be formally separated and assigned to two different entities
- In the event that economic regulation is imposed, regulators will need to have a reasonable understanding of the cost structure of the operation; this means that regulators will need proprietary financial information and will have to weigh the trade-offs between the need for information and the burden of the reporting requirements on the operators
- When a determination is made that economic regulation is not necessary, but instead tariff monitoring or approval is warranted, then the regulator will need to clearly set out the tariff reporting requirements, the review process, and impose a time limit on itself as to when an approval decision is to be made
- The entire competition regulation policy should be conveyed to the port and shipping community, as should the disposition of anti-trust cases and regulatory policy decisions
- Policy and case deliberations should include the opportunity for affected parties to present their views
- Any decisions made by the regulator should be enforceable with recourse for appeal

#### KEY REGULATORY AGENCIES

Under the Landlord Port Model, the following entities are active as regulators:

- The Ministry responsible for port affairs, with respect to drafting and implementation of transport and port laws, national and international conventions, regulations and decrees
- The public Port Authority issuing bye-laws inter alia with respect to safety of vessels in port or at anchor, reporting and communication with vessels, berthing, securing of vessels, shifting, control of dangerous goods in ports, delivery of sewerage, obnoxious and toxic wastes, specific use of terminal areas and other specific port-related issues. As part of its landlord function, a Port Authority concludes rent, lease and concession agreements with private operators and port users.



Table 4.5  
**Key Agencies in the US**

KEY AGENCIES	ROLE
<b>Department of Transportation (DoT)</b>	<ul style="list-style-type: none"> <li>To serve the US by ensuring a fast, safe, efficient, accessible and convenient transportation system that meets vital national interests and enhances the quality of life of the American people, today and into the future Oversees federal highway, air, railroad, and maritime and other transportation administration functions</li> </ul>
<b>U.S. Maritime Administration</b>	<ul style="list-style-type: none"> <li>The Maritime Administration is the agency within the US Department of Transportation dealing with waterborne transportation. Its programmes promote the use of waterborne transportation and its seamless integration with other segments of the transportation system, and the viability of the US merchant marine</li> </ul>

Source: Bossche (2012).

Table 4.6  
**Key Agencies in Canada**

KEY AGENCIES	ROLE
<b>Transport Canada</b>	<ul style="list-style-type: none"> <li>Transport Canada is responsible for transportation policies and programmes. It ensures that air, marine, road and rail transportation are safe, secure, efficient and environmentally responsible.</li> </ul>
<b>Infrastructure Canada</b>	<ul style="list-style-type: none"> <li>The main trading ports are Canada Port Authorities (CPAs) and these fall under federal jurisdiction. Under the Canada Marine Act (CMA), the federal government owns the port lands and infrastructure of six CPA ports in the province [British Columbia] but leaves administration to local authorities The CMA was introduced to allow ports to be more responsive to market opportunities. The Port Authorities provide port infrastructure (e.g., vessel berths) and lease terminal sites to private operators</li> </ul>

Source: Bossche (2012).

Table 4.7  
**Key Agencies in the UK**

KEY AGENCIES	ROLE
<b>Department for Transport</b>	<ul style="list-style-type: none"> <li>The Department for Transport provides leadership across the transport sector to achieve its objectives, working with regional, local and private sector partners to deliver many of the services</li> </ul>
<b>Infrastructure Planning Commission (IPC)</b>	<ul style="list-style-type: none"> <li>The IPC is the independent body that decides applications for nationally significant infrastructure projects. These are the large projects that support the economy and vital public services, including railways, large wind farms, power stations, reservoirs, harbours, airports and sewage treatment works</li> </ul>
<b>Scottish Executive</b>	<ul style="list-style-type: none"> <li>The devolved government for Scotland is responsible for most of the issues of day-to-day concern to the people of Scotland, including health, education, justice, rural affairs, and transport</li> </ul>
<b>Welsh Assembly</b>	<ul style="list-style-type: none"> <li>Devolved Government for Wales</li> </ul>
<b>Northern Ireland Executive</b>	<ul style="list-style-type: none"> <li>Devolved Government for Northern Ireland</li> </ul>

Source: Bossche (2012).

Apart from generally applicable legislation by any competent authority, specific port related regulation can also be exercised by a Competition Regulator giving regulations and specific orders to prevent anti-competitive behaviour in ports or abuse of dominant position by a Port Authority or private operators. Usually a Competition Regulator has the power to issue a tariff order. It might also deal with mergers of port service providers which endanger fair competition in ports. The Competition Regulator could be positioned at different levels: Sub-sector, e.g., Seaports; Sector, e.g., ‘transport’ or ‘infrastructure’;

Multi-sector, eg., National Competition Policy; and Maritime Authority, in the event that the Port Authorities are deemed to be too commercially oriented.

#### INTERNATIONAL EXAMPLES: PORT GOVERNANCE

##### US

In the US, the majority of ports are owned and managed by counties and municipalities and operate as landlord ports. The port operations are largely in the hands of private enterprise. Key agencies in the US and their role are provided in Table 4.5.

Table 4.8  
**Port Management Approaches in the EU**

PORT MANAGEMENT APPROACHES IN EU				✓ Dominant model in a member state
MEMBER STATE	MEMBER STATE	GOVERNMENT DIRECT	PORT MANAGEMENT PUBLIC ENTITY	PRIVATE ENTITY
<b>Belgium</b>	Municipal/Regional		✓	
<b>Cyprus</b>	National		✓	
<b>Denmark</b>	Municipal/Regional	✓	✓	✓
<b>Estonia</b>	National		✓	
<b>Finland</b>	Municipal	✓	✓	✓
<b>France</b>	National/Regional	✓	✓	
<b>Germany</b>	Regional/Municipal	✓	✓	✓
<b>Greece</b>	National/Municipal		✓	
<b>Ireland</b>	National		✓	✓
<b>Italy</b>	National	✓	✓	
<b>Latvia</b>	National/Municipal		✓	
<b>Lithuania</b>	National		✓	
<b>Malta</b>	National		✓	
<b>Netherlands</b>	Municipal/Regional/ National		✓	✓
<b>Poland</b>	National/Municipal		✓	
<b>Portugal</b>	National		✓	
<b>Slovenia</b>	National		✓	
<b>Spain</b>	National/Regional		✓	
<b>Sweden</b>	Municipal	✓	✓	
<b>UK</b>	National /Municipal/ Regional	✓	✓	✓

Source: Bossche (2012).

#### CANADA

The main trading ports in Canada are Canada Port Authorities (CPAs) and these fall under federal jurisdiction. Under the Canada Marine Act (CMA), the federal government owns the port lands and infrastructure of six CPA ports in British Columbia, but leaves administration to local authorities. The CMA was introduced to allow ports to be more responsive to market opportunities. The Port Authorities provide port infrastructure and lease terminal sites to private operators. Table 4.6 lists the key agencies in Canada and their role.

#### UK

Most commercial ports' operations have been privatised. Fifteen of the 20 largest ports (by tonnage) in the UK are in private ownership, which accounts for two-thirds of the UK's port traffic. These private ports

have no government investment; all their investment must be privately financed on a commercial basis. Many of the smaller ports are trust ports (independent statutory organisations but without shareholders), as well as a few larger ones such as the Port of London Authority. A few ports are also municipal ports belonging to local authorities. Key agencies in the UK and their role are provided in Table 4.7.

The governance model in the UK is however not representative of the European Union. Port management methods vary considerably from country to country. In some member states, ports are managed by private entities which own port land, or avail themselves of rights similar to those of an owner. Those ports are entirely private business. In other cases a large majority in continental Europe—ports are managed by public entities or undertakings.

Table 4.9  
**Key Agencies in Australia**

KEY AGENCIES	ROLE
<b>Department of Infrastructure, Transport, Regional Development</b>	<ul style="list-style-type: none"> <li>The Department of Infrastructure, Transport, Regional Development and Local Government is responsible for infrastructure planning and coordination; transport safety, including investigations; land transport; civil aviation and airports; transport security; delivery of regional and rural specific services; maritime transport including shipping; regional development; matters relating to local government; and major projects facilitation</li> </ul>
<b>National Transport Commission (NTC)</b>	<ul style="list-style-type: none"> <li>The role of the National Transport Commission is to work closely in partnership with peak industry bodies and government to develop more consistent, practical and effective land transport policies, laws and practices.</li> </ul>
<b>State Government Departments of Transport</b>	<ul style="list-style-type: none"> <li>Infrastructure Australia will develop a strategic blueprint for the nation's future infrastructure needs and—in partnership with the states, territories, local government and the private sector—facilitate its implementation. It will provide advice to Australian governments about infrastructure gaps and bottlenecks that hinder economic growth and prosperity. It will also identify investment priorities and policy and regulatory reforms that will be necessary to enable timely and coordinated delivery of national infrastructure investment.</li> </ul>
<b>Australian Transport Council (ATC)</b>	<ul style="list-style-type: none"> <li>The ATC was established in June 1993 to provide a forum for Commonwealth, State, Territory and New Zealand Ministers to consult and provide advice to governments on the co-ordination and integration of all surface transport and road policy issues at a national level</li> </ul>
<b>State Government Departments of Transport</b>	<ul style="list-style-type: none"> <li>Each State Department of Transport is responsible for road, rail and port policy in their respective states</li> </ul>

Source: Bossche (2012).

Table 4.10  
**Evolution of Port Governance in China**

PHASE	POLICY	KEY ELEMENTS OF POLICY
<b>Phase I (1979-84)</b>	<ul style="list-style-type: none"> <li>Central control of port sector</li> </ul>	<ul style="list-style-type: none"> <li>Port ownership with Ministry of Communications; key functions included: <ul style="list-style-type: none"> <li>Control of planning and strategy</li> <li>Management of operational activities</li> <li>Definition of infrastructure priorities</li> </ul> </li> </ul>
<b>Phase II (1984-2004)</b>	<ul style="list-style-type: none"> <li>Decentralised control of ports</li> </ul>	<ul style="list-style-type: none"> <li>Classification of 14 coastal cities as 'Open cities'</li> <li>Regulations introduced by State council to promote economic cooperation and terminal interchange with foreign countries; and to speed up development of ports and terminals</li> </ul>
<b>Phase III (2004 onwards)</b>	<ul style="list-style-type: none"> <li>Further decentralisation and beginning of corporatisation</li> </ul>	<ul style="list-style-type: none"> <li>'Port Law' introduced in 2003; seen as a signal of high importance attached to port industry by the state</li> <li>Primary ownership with local authorities</li> <li>Central government only plays an oversight role in strategic planning</li> </ul>

Source: Bossche (2012).

Table 4.11  
**Key Agencies in Shanghai Port**

KEY AGENCIES	ROLE
<b>Shanghai Port Authority</b>	<ul style="list-style-type: none"> <li>In 2003 Shanghai's port oversight body underwent a restructure resulting in the Shanghai Port Administration Bureau, which took responsibility for port planning, administration and regulations, and the Shanghai International Port Group (SIPG). The latter was designated port manager and operator and also given responsibility for the operation and management of Yangshan's first five berths</li> <li>Today administration of the Shanghai Port is the charge of the Shanghai Municipal Transport and Port Authority (the 'Shanghai Port Authority'), which has the authority to: <ul style="list-style-type: none"> <li>Implement guidelines and policies and enforce laws, rules and regulations</li> <li>Formulate plans and strategies for the Shanghai harbour (including Yangshan)</li> <li>Enforce trade regulations application to the Yangtze River (within the Shanghai municipality)</li> <li>Supervise and manage environmental issues</li> <li>Coordinate research and development</li> <li>Supervise the quality and safety of construction projects</li> <li>Vessel management</li> <li>Tarification</li> <li>Supervise and administer pilotage within the port</li> <li>Conduct cooperation and technical exchanges between the Shanghai Port and other domestic and foreign ports</li> <li>Administer technical and vocational training, including examinations and the issuance of certificates for workers engaging in port activities</li> </ul> </li> </ul>
<b>Shanghai International Port Group (SIPG)</b>	<ul style="list-style-type: none"> <li>Established in 2003, the SIPG was wholly floated on the Shanghai Stock Exchange in 2006. Its major shareholders are the Shanghai Municipal Council (44 per cent), China Merchants International Terminals (Shanghai) Co. Ltd (26 per cent), and Shanghai Tongsheng Investment (Group) Corp (16 per cent). The Shanghai Municipal Council's major stake is consistent with the model of governance adopted throughout China since it began to corporatise and privatise ports from 2001.</li> </ul>

Source: Bossche (2012).

Table 4.12  
**Key Agencies in Singapore Maritime**

KEY AGENCIES	ROLE
<b>Maritime and Port Authority of Singapore</b>	<p>The Maritime and Port Authority of Singapore (MPA) regulates and licenses port and marine services and facilities. It also manages vessel traffic in the Singapore port while ensuring safety and security. The port section contains information, guidelines and procedures on matters relating to the port and its operations. The shipping section covers information on how to register a ship under the Singapore flag as well as manning guidelines, procedures and requirements for owners and masters of Singapore-registered ships.</p> <p>MPA also posts circulars and notices to update the port and shipping community. Also important to the communities are information on port, shipping and other MPA tariffs. As an active member of the international maritime community, MPA posts updates on IMO matters.</p>
<b>PSA Singapore Terminals</b>	<p>The Port of Singapore Authority was formed on 1 April 1964 to take over the functions, assets and liabilities of the Singapore Harbour Board. On 25 August 1997, a parliamentary bill was passed to corporatise the Port of Singapore Authority, and PSA Corporation Ltd was created. PSA's staff are represented by the Singapore Port Workers' Union and the Port Officers' Union. Both unions enjoy a close relationship with PSA's management.</p>
<b>Singapore Maritime Academy (SMA)</b>	<p>As the country's main maritime training institution, SMA offers a full range of maritime diplomas and specialist diplomas, Certificate of Competency (CoC) courses as well as Standards of Training, Certification and Watchkeeping (STCW) courses.</p>

Source: [www.mpa.gov.sg](http://www.mpa.gov.sg); [www.singaporepsa.com](http://www.singaporepsa.com); [www.sma.sp.edu.sg/](http://www.sma.sp.edu.sg/) (all accessed 3 March 2014).

Table 4.8 shows government level and type of port management—direct government, public entity, private entity—in EU member states.

#### AUSTRALIA

Australia has three levels of government commonwealth, state and local. The commonwealth has key functions involving the ports, including security, environment and competition policy, and border control. It also finances and owns specific infrastructure assets including certain railways and roads. Port corporations are owned by state governments which also control adjacent land uses, with the exception of South Australia, which was privatised in 2001. Queensland is also currently processing the privatisation of the port of Brisbane. Australian ports are mainly landlords to terminal operators (stevedores) and are primarily only responsible for the management of port infrastructure such as dredged channels and berths. Terminal operating/stevedoring services are provided by a small number of specialist firms that own the container handling equipment but lease berth space from the relevant port authorities. Key agencies in Australia and their role are provided in Table 4.9.

#### CHINA

Ports in China generally feature open access, and are managed at the municipal level, with local govern-

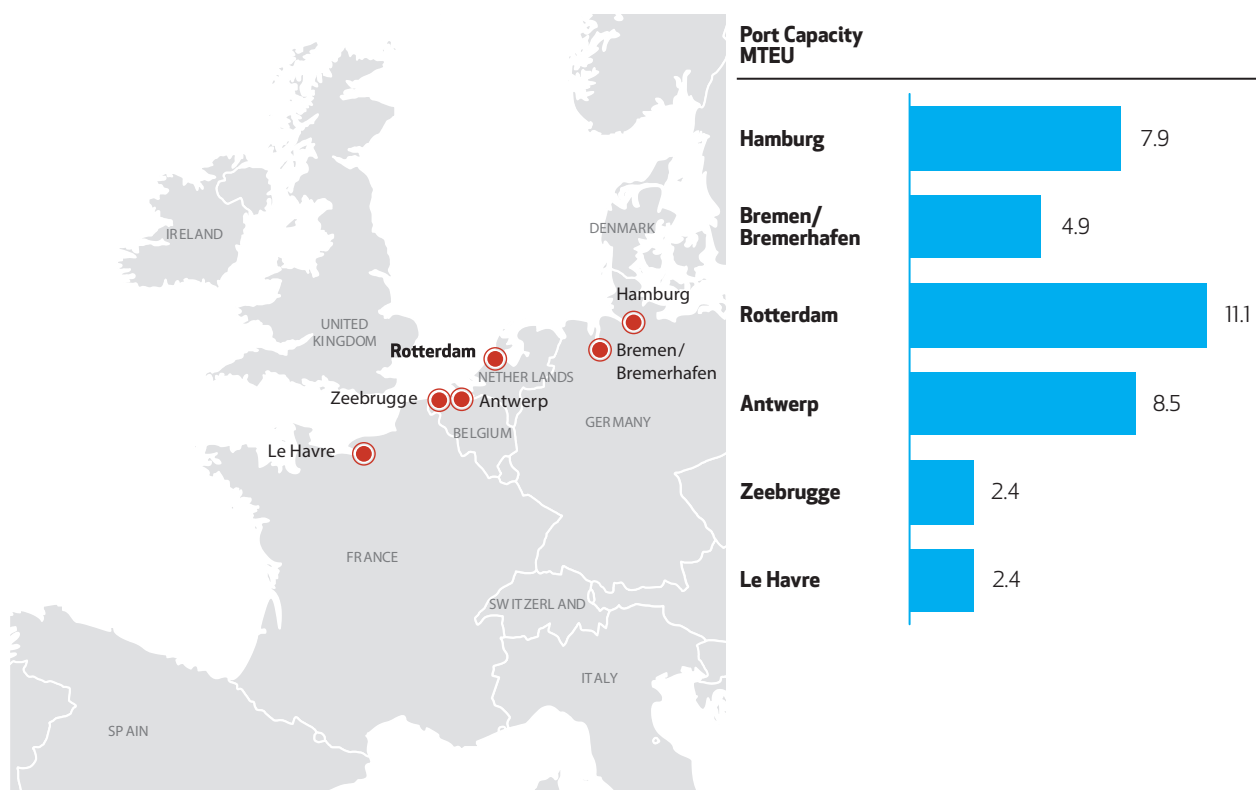
ments taking a substantial interest in corporatised operations. Port governance in China has undergone significant change since 1979 across three phases of evolution, which are outlined in Table 4.10.

As an example, the key agencies for governance of Shanghai port and their roles are outlined in Table 4.11.

#### SINGAPORE

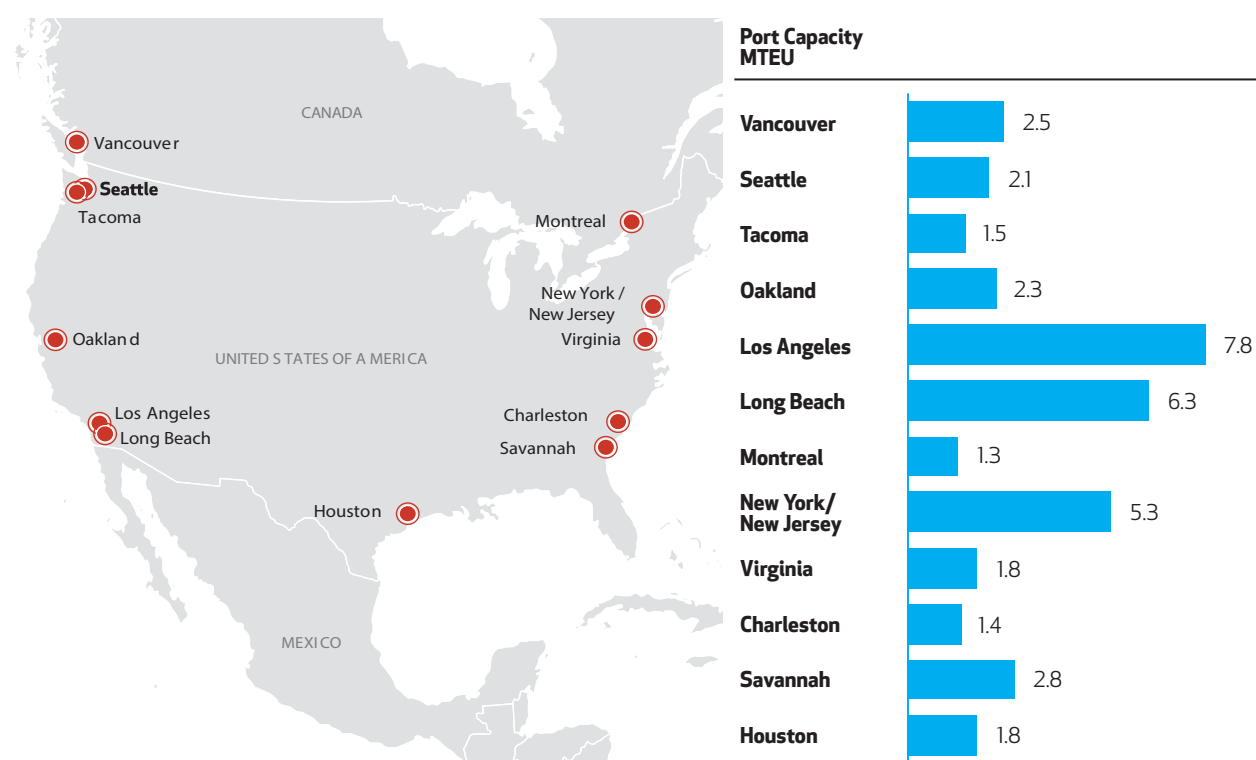
Up to 1996, Singapore was one of the few large public service ports in the world. It combined land ownership, regulatory functions and port operations as part of the Government of Singapore. In 1996, the government decided to change the management structure. First, it corporatised the terminal operations of the port under PSA Corporation, which is now one of the largest and most global container terminal operators in the world. Second, a new port authority was created as the MPA, Maritime and Port Authority of Singapore, which operates as landlord in the port, developing, promoting, regulating and securing safety. However, the full transitioning towards a landlord will be complete when the port authority divests its shares it has in PSA. As of now, the authority is not yet completely independent from operations. Key agencies in Singapore maritime are provided in Table 4.12.

Figure 4.33  
**Main Container Ports in Hamburg-Le Havre Range (NW-Europe)**



Source: Containerisation International, 2010.

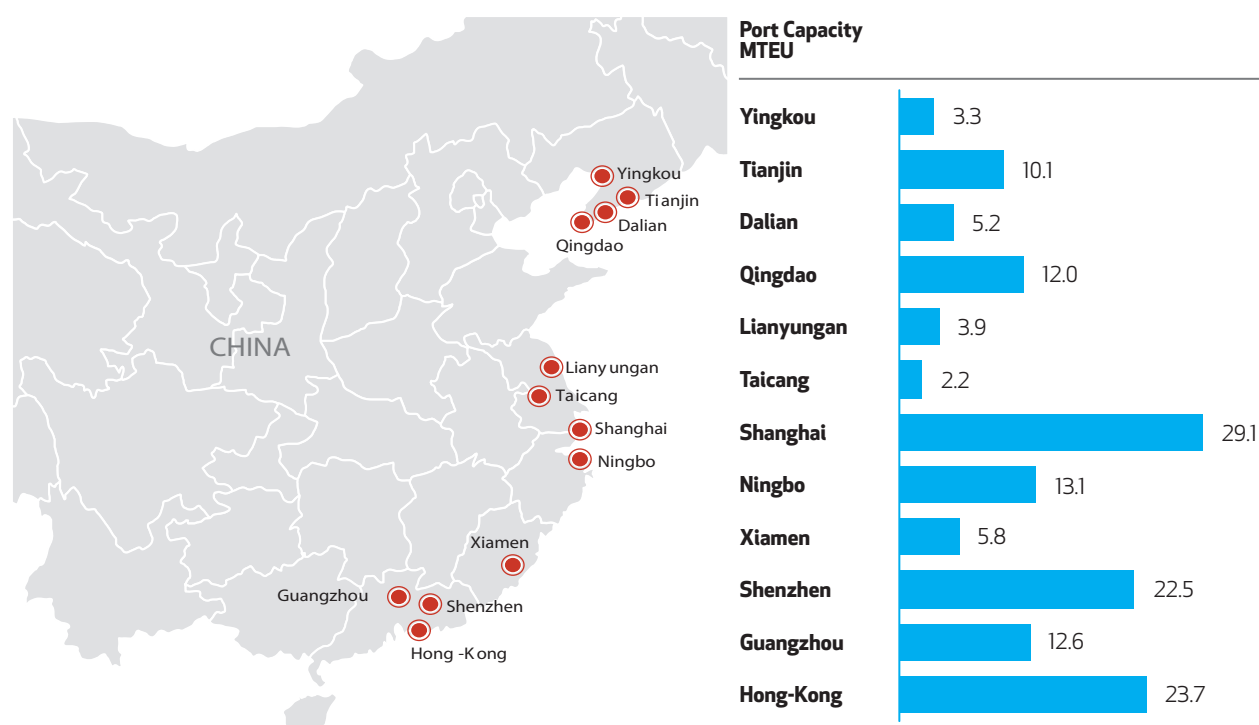
Figure 4.34  
**Main Container Ports in US and Canada**



Source: Containerisation International, 2010.

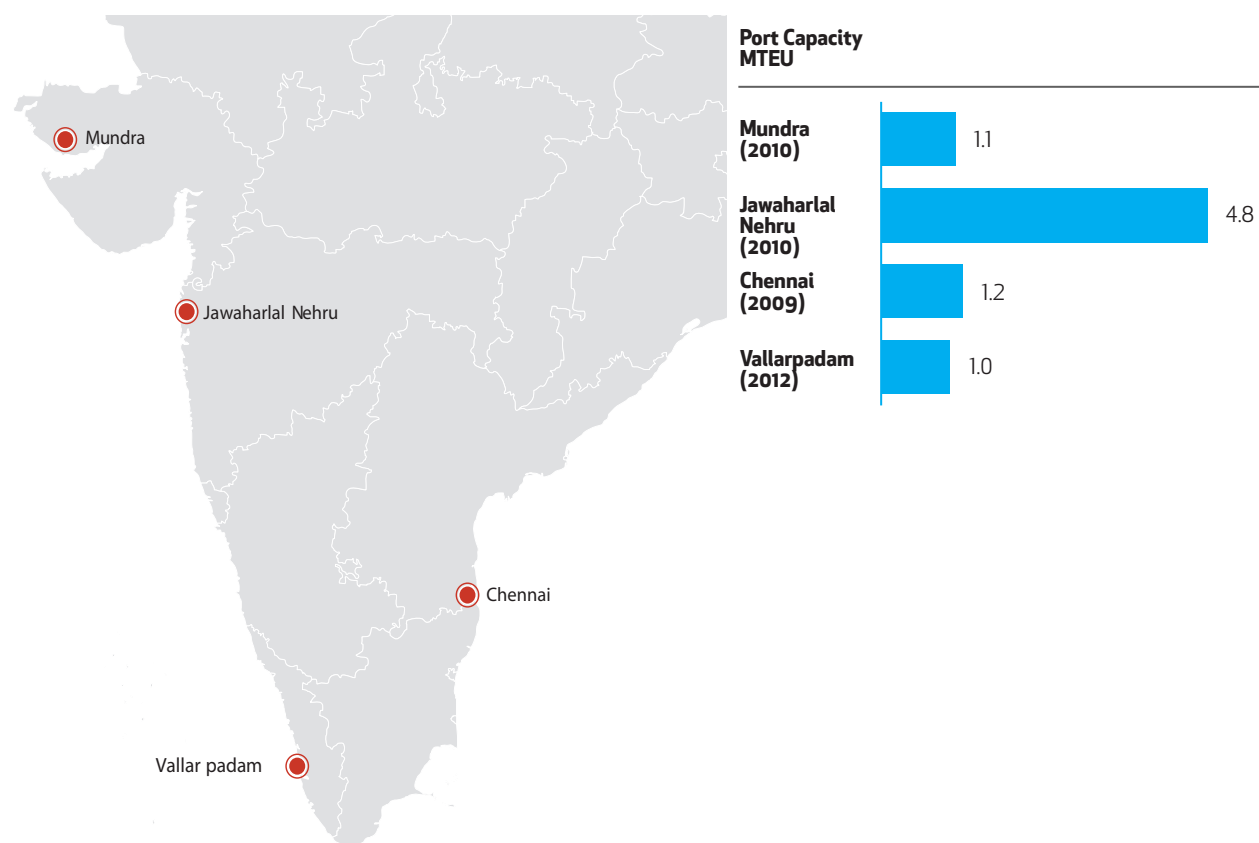


Figure 4.35  
**Main Container Ports in China**



Source: Containerisation International, 2010.

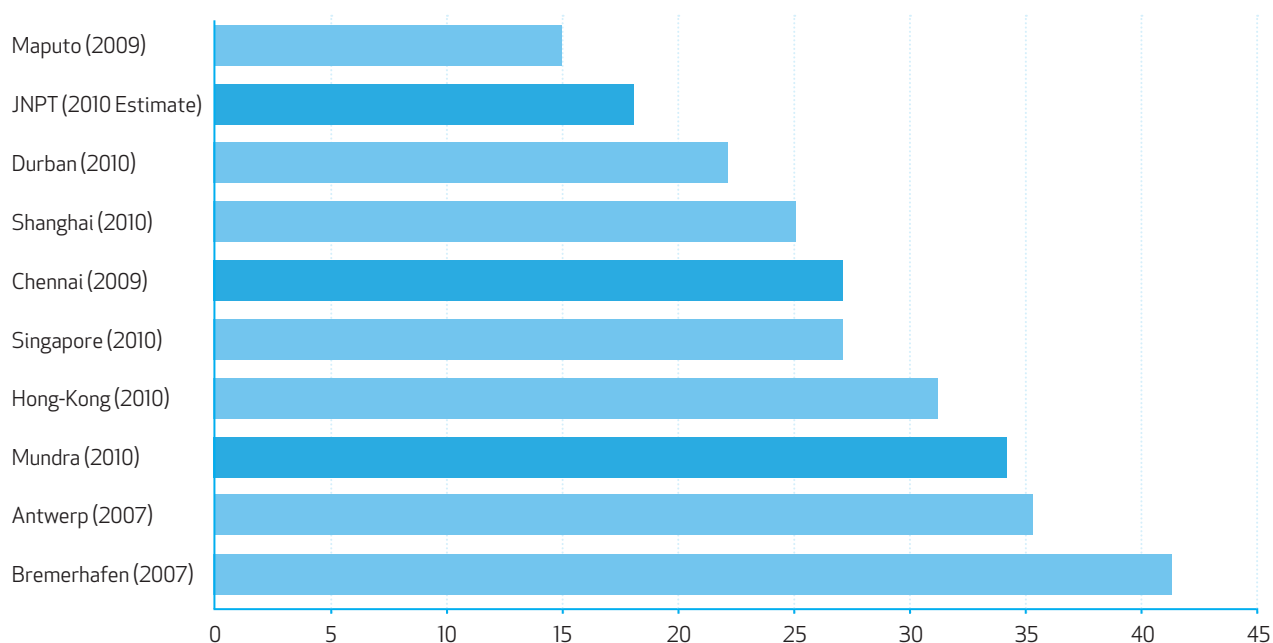
Figure 4.36  
**Main Container Ports in India**



Source: Containerisation International, 2010.

Figure 4.37  
**Indian Container Ports in Comparison with Container Ports of Other Countries**  
 [Container Crane Output]

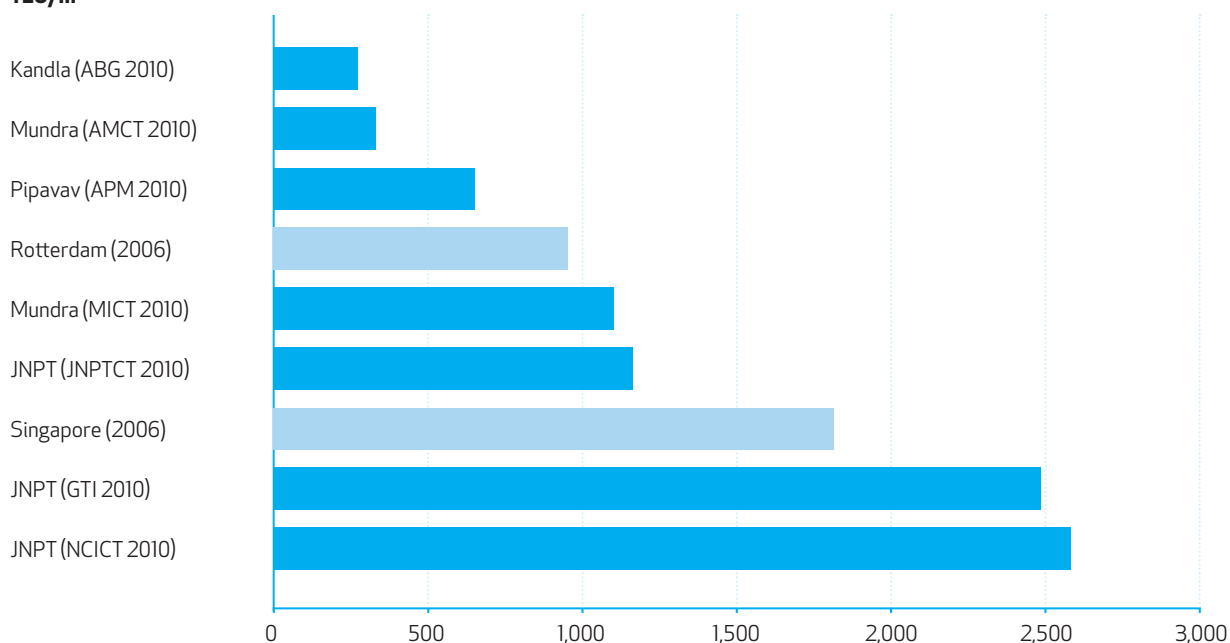
**Port Performance**  
**Container Crane Output**  
**Boxes/Hour**



Source: Container productivity at New Zealand ports, Ministry of Transport, 2011.

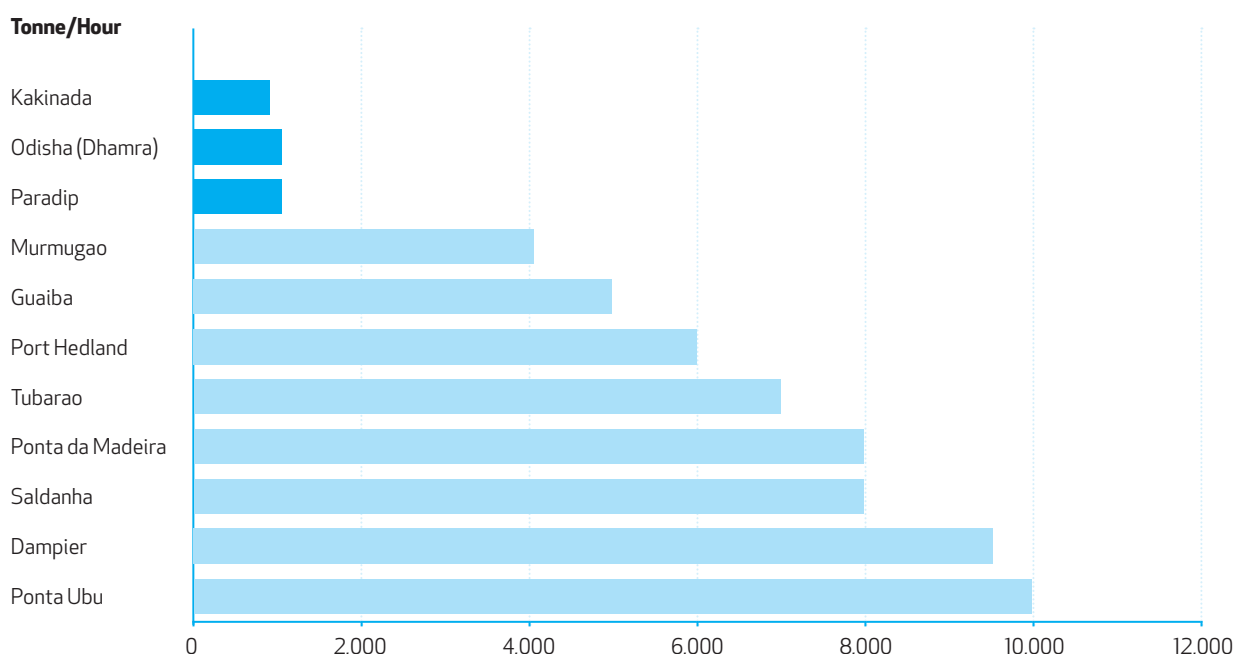
Figure 4.38  
**Indian Container Ports in Comparison with Container Ports of Other Countries**  
 [Container Quay Throughput]

**Port Performance**  
**Container Quay Throughput**  
**TEU/m**



Source: Indian ports: Port efficiency change in container handling terminals: a case of ports in JNPT-Mundra range of ports in India; Bhatt and Gaur (2010); Singapore and Rotterdam: Container port Markets in the Middle East and South Asia to 2020, Ocean Shipping Consultants Ltd, 2007, England.

Figure 4.39  
**Indian Ports in Comparison with Ports of Other Countries**  
 [Iron Ore Export Terminals Loading Rates]



Source: Global iron ore load ports: information handbook; Wilhelmssen Ships Service (2008).

#### INTERNATIONAL EXAMPLES: PORT EFFICIENCY

##### CONTAINER PORT CAPACITY

Figures 4.33-4.36 show all container ports of 1 million TEU and over, in Northwest Europe, US/Canada, China and India, respectively (2010 figures).

India has only three such ports compared to six in Europe and 12 each in the US and China. Even if container volume in ports with less than 1 million TEU is considered, the picture does not change much. Clearly, container penetration in India is not very high. A lot of general cargo is still transported in loose form, which is less efficient than transport in containers.

However, this may change drastically in the coming years or decades. Continuous GDP growth will lead to more (containerised) imports; growth of industrial production will lead to more containerised exports. Moreover, as the Indian economy gets more interconnected with worldwide logistics chains, the container penetration will increase. These two factors combined are expected to result in enormous growth in Indian container volumes. This growth will have to be catered to by a large number of container ports and/or container terminals at existing ports. Careful and strategic selection and development of the best locations for this additional capacity is of utmost importance.

##### CONTAINER PORT PERFORMANCE

The best port performance will be achieved in a competitive environment for terminal operators.

Monopolistic situations tend to result in lower scores on KPIs. And privately operated terminals generally perform better than publicly operated terminals.

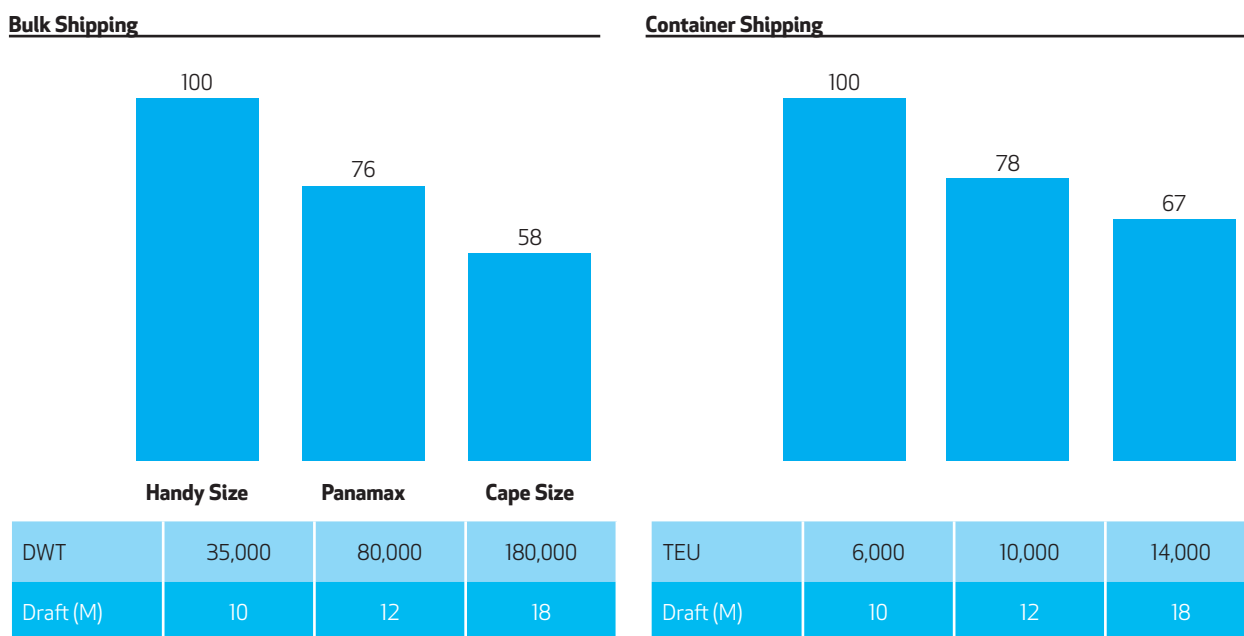
Figures 4.37 and 4.38 provide a comparison of Indian container ports with others across the world, for two KPIs commonly used at container terminals: container crane output (boxes per hour), and container quay throughput (TEU per metre of quay per year). The figures show that there is quite some variation in the scores of Indian ports on these two KPIs, but that the same variation is found in ports throughout the world.

##### BULK PORT PERFORMANCE

Bulk ports can be compared using loading or unloading rates as a KPI. Figure 4.39 shows the loading rates of a selection of major iron ore export ports throughout the world. These are gross loading rates; net loading rates will be lower due to the time needed to berth and un-berth ships and to position loading equipment. It is clear that loading rates at Indian iron ore exporting ports are lower than those of similar ports worldwide.

It should be noted that the Indian ports generally service smaller ships than the other ports. The maximum draft at Paradip is 13 m, at Marmugao it is 13.7 m, and at Kakinada, 11 m. This means the maximum vessel size at the first three ports is Panamax (70,000 to 80,000 dwt dead weight tonnage, 12 m draft when

Figure 4.40  
**Comparison of Ship Sizes and Transport Costs**  
[Index]



Source: Bossche (2012).

fully loaded). In Kakinada, handy size bulkers are the largest size that can be fully loaded (about 35,000-45,000 dwt and 10 m draft). The other ports in the overview offer drafts of 19 to 25 m, enough to handle at least capesize bulkers (180,000 dwt, 18 m when fully loaded).

The question is whether the Indian ports do not handle larger vessels because the required draft is not available or because the markets they serve do not require larger vessels. For major bulk such as coal and iron ore, the rule of thumb is that the larger the bulk ship the better. Economies of scale can greatly reduce transport costs per tonne. Some Indian ports use barges to load larger vessels offshore. From a logistics point of view however this is suboptimal, as it requires extra cargo handling from barge to ship.

#### SHIP SIZE ECONOMIES AND PORT DRAFTS

The size of vessels a port can service is determined by:

- Draft limitations in ports and their access channels. For bulk shipping, this means the ports at both ends of the journey; for container shipping, all ports along the route.
- Physical limitations elsewhere along major shipping routes, such as the Suez Canal (maximum draft 20 m), the Panama Canal (maximum draft 12 m, and for the new locks from 2014 onwards, 15.2 m), and to a lesser extent the Strait of Malacca (21 m).

The design vessel of a port the maximum ship size a port can take is always a trade-off between invest-

ment costs necessary to create sufficient draft and capacity in the port and the transport cost savings that can be realised by the employment of larger ships.

Figure 4.40 provides a comparison of ships sizes and the transport costs per unit for bulk and container shipping. It shows that:




For bulk shipping, the costs per tonne in a capesize are about 58 per cent of the costs per tonne in a handy size bulker. For instance, the cost of transporting a tonne of coal from Richards Bay, South Africa, to Vishakhapatnam with a cape size vessel is \$10 per tonne less than that for a handy size bulker.

For containers, the costs per TEU on a 14,000 TEU ship (Maersk E-class) are 67 per cent of that on a 6,000 TEU ship. Meanwhile, Maersk has 18,000 TEU ships on order (Maersk triple E class), which the company claims will result in a 25 per cent cost saving per TEU compared to the 14,000 TEU E-class container vessels. And the hull design of the triple E-class is such that the maximum draft is 14.5 m, compared to 15.5 m for an E-class.

It should be noted that the drafts mentioned in the table are design drafts, based on the maximum weight that these vessels can carry. In practice, the draft is often lower as many containers are loaded with relatively light cargo, such as electronics or other consumer goods. It therefore is possible that 14,000 TEU vessels call at ports such as Antwerp or Hamburg, which both have a maximum allowed draft of 13 m. Often, these vessels call at Rotterdam (16.7 m

Figure 4.41

## Comparison of Maximum Drafts at Indian Ports with Other Countries [Metres]

		BULK SHIPPING	CONTAINER SHIPPING
EUROPE 	Hamburg	13	13
	Rotterdam	23	17
	Antwerp	13	13
CHINA 	Shanghai	12	15
	Tianjin	22	18
	Ningbo	21	21
	Qingdao	14	14
	Guangzhou	14	14
INDIA 	Chennai	17	13
	JNPT	13	13
	Paradip	12	12
	Visakhapatnam	17	15

Source: Bossche (2012).

at container terminals) first in order to reduce their draft and then continue to ports that offer less draft.

Figure 4.41 compares drafts at various European, Chinese and Indian ports. Drafts at Indian ports generally match those at major European and Chinese ports, particularly for containers. In the bulk sector, European and Chinese ports generally offer more draft.

The drafts available at Indian ports are clearly inadequate to handle higher capacity ships such as the cape size for bulk transport and 14,000 TEU for containers that are increasingly being put to use worldwide. While deeper drafts may be desirable for most Indian ports in general, strategic investments in at least a few special ports will have to be made expeditiously.

### INTERNATIONAL EXAMPLES: PORT CONNECTIVITY

The performance of a port is strongly related to its hinterland connections, whose capacity needs to match that of the port. Policy makers increasingly aim at developing transport corridors.

- Transport corridors connect various economic production and consumption centres
- They often cross national borders, which calls for efficient customs procedures that disturb logistic flows as little as possible
- Transport corridors often offer multimodal solutions, combining various transport modes

into door-to-door logistics

- They require strategically placed inland terminals sometimes referred to as dry ports. If run in conjunction with maritime ports, these can take up the role of satellite ports, receiving cargo in large efficiently organised transport flows from the maritime port for further distribution in the hinterland.
- Ports are important nodes in transport corridors, where maritime transport connects with other transport modes

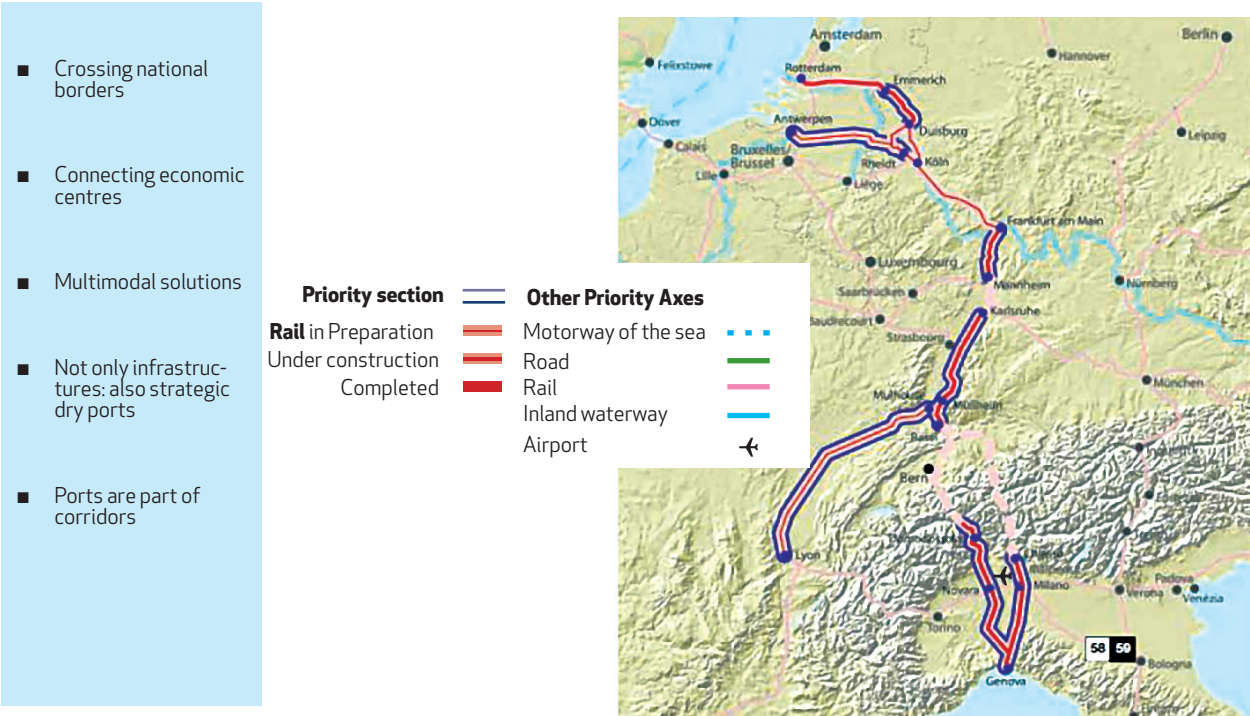
The European Union regards its ports as nodes in the Trans-European Network for Transport (TEN-T). Figure 4.42 shows the TEN-T Priority Axis 24, a corridor connecting the Italian port of Genoa and the French economic centre around the city of Lyon with the ports of Antwerp and Rotterdam. The river Rhine forms an important part of this corridor, connecting Rotterdam (and Antwerp) with major industrial and population centres in Germany (Rhine-Ruhr area and the region around Mainz and Mannheim) and Switzerland (Basel). Along the Rhine, major road and rail connections complete the corridor. The connections between Basel and Genoa, and Basel and Lyon consist of rail and road links.

The TEN-T priority axis concept is an umbrella for several projects along the corridor network, aimed at upgrading infrastructure. They include



Figure 4.42  
**TEN-T Priority Axis 24**

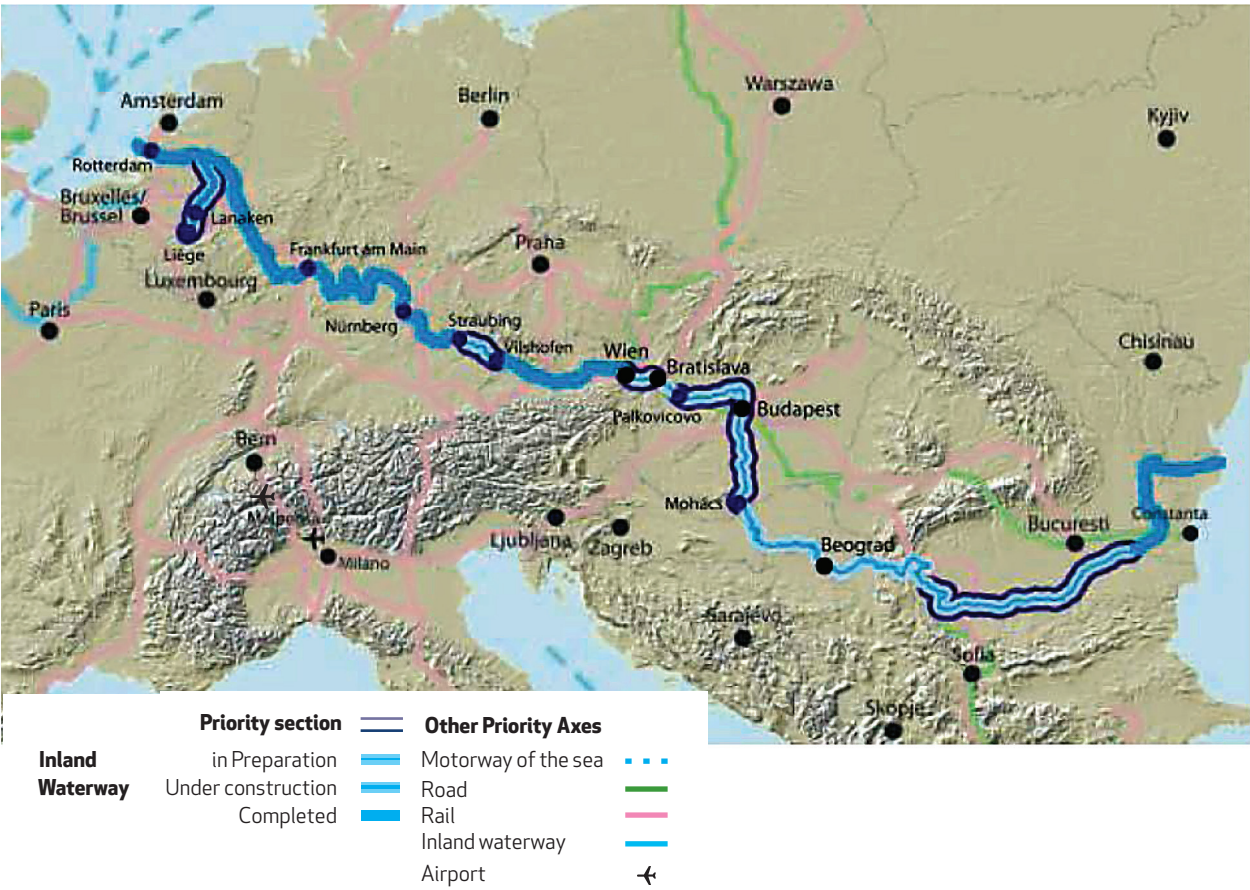
Example: TEN-T Priority Axis 24 Railway Axis Lyon/Genoa-Basle-Duisburg-Rotterdam/Antwerp



Source: European Commission (2005).

Figure 4.43  
**TEN-T Priority Axis 18**

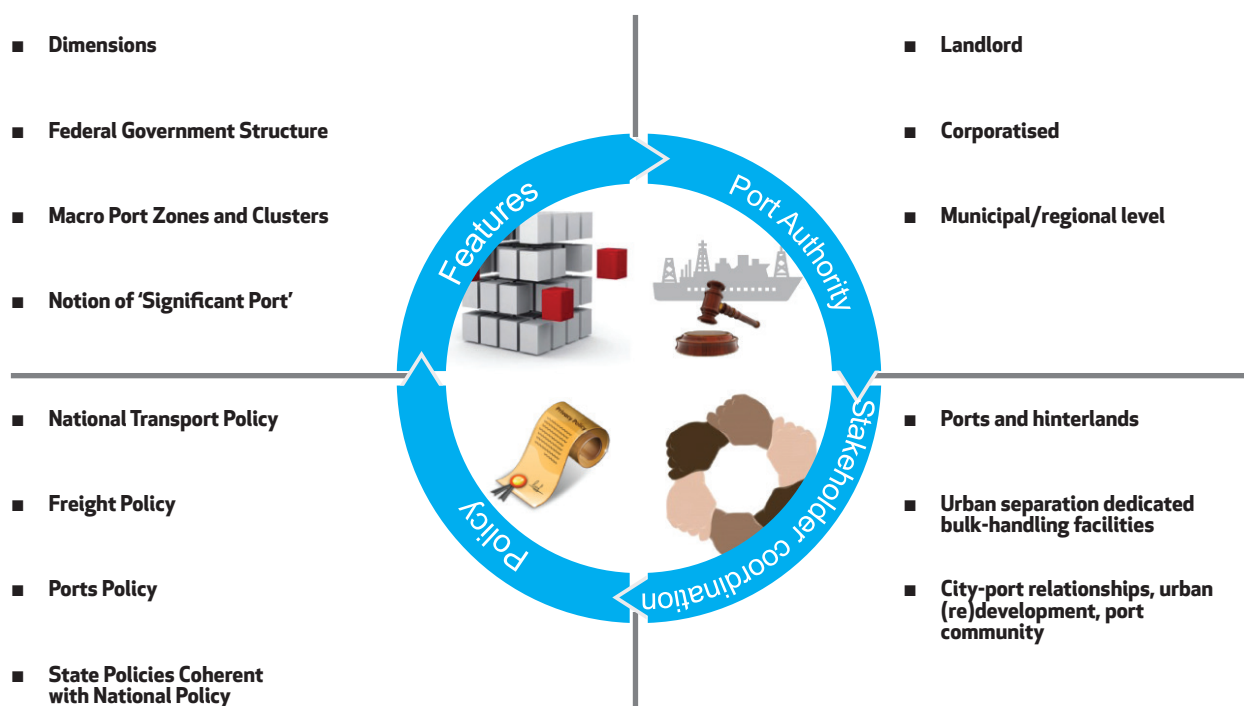
Example: TEN-T Priority Axis 18 Rhine/Meuse-Main-Danube Inland Waterway Axis



Source: European Commission (2005).

Figure 4.44

## Key Characteristics of Australian Ports Policy and Management



Source: Bossche (2012).

- Construction of dedicated rail freight connections from Rotterdam to the Betuwe rail network in Germany, and from Antwerp to the German Iron Rhine rail network
- Upgrading or expanding existing railway lines
- Upgrading rail systems, such as the introduction of European Rail Traffic Management Services (ERTMS) at rail sections along the corridor
- Creation of high speed passenger rail connections

Priority Axis 24 is aimed at creating efficient rail connections, as the inland waterways in the corridor are already well developed. But in Central and Eastern Europe, where the road network is partly underdeveloped, priority axes include motorway development. Figure 4.43 shows Priority Axis 18, aimed at developing an inland waterway connection between the North Sea and the Black Sea, along the rivers Rhine, Meuse, Main and Danube.

### INTERNATIONAL EXAMPLES: DREDGING

Currently, most of the Major Ports in India have been financing capital and maintenance dredging from their own internal resources with the exception of Kolkata where maintenance dredging is financed through budgetary resources of the Centre.

Internationally, and specially in developed economies, port channels are used as a national asset and dredging projects are funded by local municipalities or the government, and not by the ports themselves.

One of the most comprehensive legislations on cost sharing in dredging is the US Water Resources Development Act, 1987, under which, the Federal Government meets 90 per cent of the dredging costs and 10 per cent is met by the local port authority for a depth upto 20 ft. For a depth up to 45 ft, about 75 per cent of the incremental maintenance dredging costs are met by the Federal Government and 25 per cent by the local port authority. For depth exceeding 45 ft, the incremental cost of dredging is to be borne by the Federal Government and the local port authority on a 50:50 basis. This implies that it is the responsibility of the Federal Government to provide some minimum level of navigational facilities in harbour projects.

The rejection of the concept of full cost recovery from direct users/beneficiaries seems to have been widely accepted by Canada, Japan and most West European countries. However, there is one important caveat. A study for the US Army Corps of Engineers on the economic benefits in terms of total industrial production from channel dredging and landfill development in the ports of Los Angeles and Long Beach found that the direct benefits were concentrated in

the immediate area of the port; the indirect revenues are distributed across the country.

#### LEARNING FROM GLOBAL BEST PRACTICES

A study of port governance structures and regulatory frameworks worldwide indicate that Landlord Port is the preferred port management model globally. Also, today's Port Authority is usually a corporatised entity with sufficient autonomy to pursue port regulations at the local/regional level. Port Authorities have been proven best placed to deal with traditional roles, landlord, regulator, operator, and enhanced functions, such as shaping supply chains, planning and financing of port development, port-related industrial development and urban (re)development.

It is also clear that a port policy needs to be embedded in a national integrated inter-modal transport policy, to be defined at the central government level. Countries differ substantially in port management policies, but one, Australia, is outstanding in this, and especially relevant to the Indian situation. Figure 4.44 provides a summary of the key characteristics.

#### SHIPPING

In several countries or regions, short sea shipping (SSS) is an important logistic solution for cargo flows. The EU for instance actively promotes SSS as an alternative to road transport in order to reduce road congestion and to reduce the environmental footprint of freight transport. Elsewhere in the world, similar policies can be found, such as in the US and Vietnam.

In the EU, about 30 per cent of all maritime shipping is SSS (978 million tonnes out of 3,333 million tonnes), defined as intra-EU and domestic shipping. In practice, the SSS share may be slightly higher, as some of the intercontinental shipping in the EU would also classify as short sea (short distance) shipping, particularly shipping services in the Mediterranean and the Black Sea, where short sea transport takes place between EU member states and neighbouring states.

The main bottlenecks to the use of SSS for cargo movements are:

- Lack of infrastructure specific short sea terminals
- Lack of service levels frequencies and inter-modal connections
- Lack of logistics service providers offering a door-to-door service
- Traditional stance of cargo owners, who perceive it easier to arrange door-to-door road transport than an intermodal transport chain

#### SHORT SEA SHIPPING IN THE EU

The EU has targeted these bottlenecks with a variety of policies and programmes. Short sea shipping is explicitly mentioned in the European White Papers on Transport, both in 2001 and 2011, as a means of reducing road congestion and reducing the environmental footprint of transport. The key developments in EU SSS have been:

**Marco Polo:** In its 2001 white paper, the EU launched the Marco Polo programme as a follow-up of the Pilot Action for Combined Transport programme. Though in principle aimed at promoting modal shift from road to other transport modalities, Marco Polo specifically made efforts to harness the advantages of short sea shipping. The programme financially supported new inter-modal services, covering initial losses of services that were expected to be commercially viable in the long term. Marco Polo has, in some cases, been criticised for creating unfair competition and market distortions, as existing intermodal operators claimed they lost tonnage to Marco Polo-supported services. Following this, the criteria for support have been tightened to make sure intermodal services that received support indeed contributed to the objective of removing freight tonnage from the roads. In the 2011 white paper, Marco Polo is no longer mentioned.

**Motorways of the Seas (MoS):** The concept was introduced in the 2001 white paper. Whereas Marco Polo was aimed at intermodal in particular short sea services, MoS was aimed at the maritime infrastructure needed for the promotion of SSS as an alternative to freight transport on road motorways. The aim was to develop MoS as a real alternative to land transport, thus improving access to markets in Europe and relieving the overstretched European road system. MoS does not exclude rail and inland waterways, but it is primarily aimed at SSS. The EU defined MoS corridors and integrated these into the TEN-T network. Fifty-seven ports have been designated as TEN-T ports.

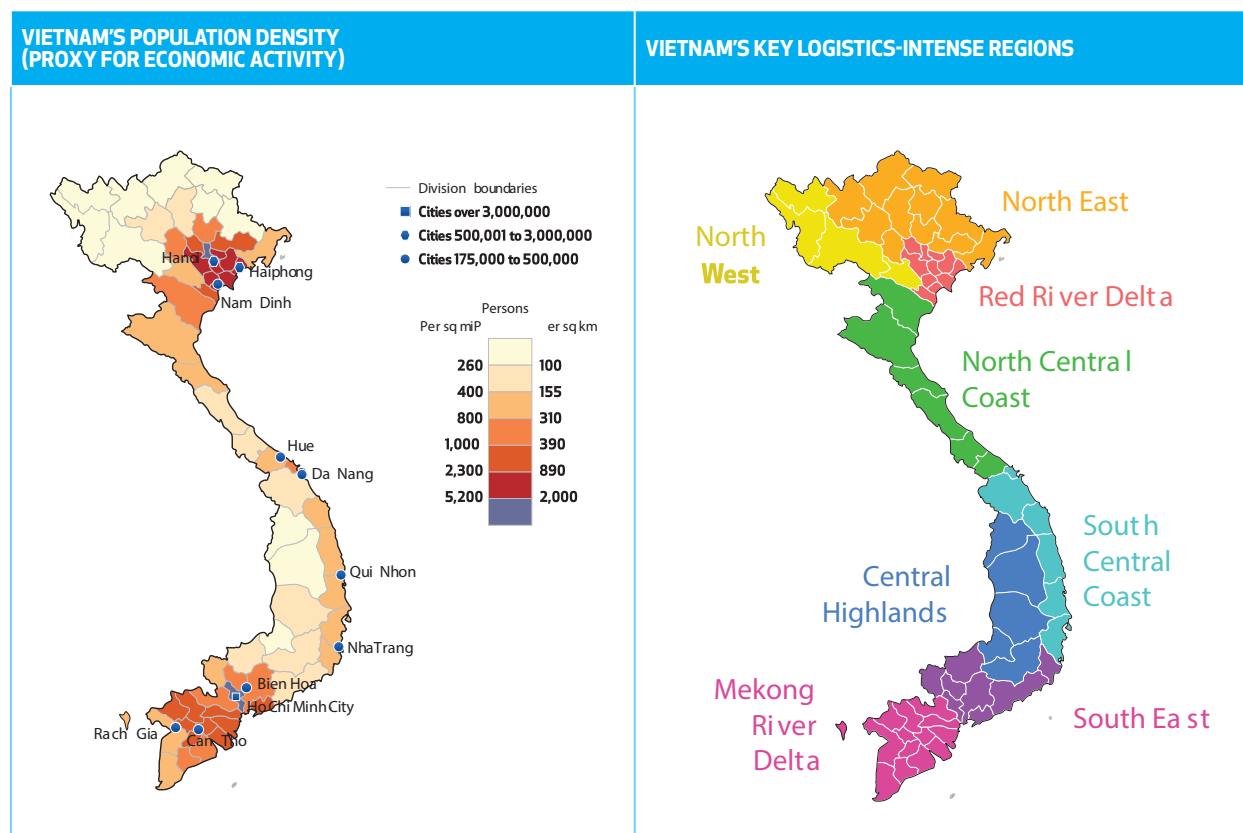
**Short sea network:** In the late 1990s, several EU countries established short sea promotion offices. These offices have the advantage of being much 'closer' to the market than the Brussels institutions of the EU, and thus better positioned to actively promote short sea shipping in these countries. Their tasks are to inform cargo owners and transport providers about the possibilities that SSS has to offer, to provide information on national and EU support programmes, to keep an updated inventory of intermodal services and to take away biases against SSS in the transport market. In 2000, the European Shortsea Network (ESN) was established



Figure 4.45  
**Coastal Shipping between North and South Vietnam**

**SHORT SEA SHIPPING AS SOLUTION FOR VIETNAM**

**90 PER CENT OF TRADE FLOWS BETWEEN NORTH AND SOUTH VIA SHORT SEA SHIPPING: RAPID GROWTH**



Source: Bossche (2012).

to provide coordination and support to the national organisations.

**SHORT SEA SHIPPING IN VIETNAM**

Due to its shape, a long and narrow country with a long coastline, Vietnam is very suitable for developing coastal shipping. Its main economic centres in the north (Red River Delta/Hanoi) and south (Mekong Delta/Ho Chi Minh City) are connected by a highway and a railway line, but these cannot cope with the increasing traffic. Freight transport via coastal shipping therefore experienced rapid growth; currently it accounts for over 90 per cent of all freight transport between the north and the south. Figure 4.45 provides an overview.

**LEARNING FROM GLOBAL BEST PRACTICES**

Domestic shipping has been regarded by most maritime countries big and small across the world as an effective tool to reduce increasing land congestion, particularly on roads. It is also five times as energy efficient as road transport.

Europe is regarded as a world model, for the way it long developed its short sea transport to its advantage, and today hauls as high as about 40 per cent of its domestic goods by way of its coastal seas. However, far more than just promoting domestic shipping itself, the reason that led to European success was the vision with which the short sea transport was made a part of an integrated transport network. Further, the continuous evolution of supportive policies and programmes such as the Marco Polo scheme and Motorways of the Seas have ensured that bottlenecks are addressed and provided the momentum to generate returns to scale.

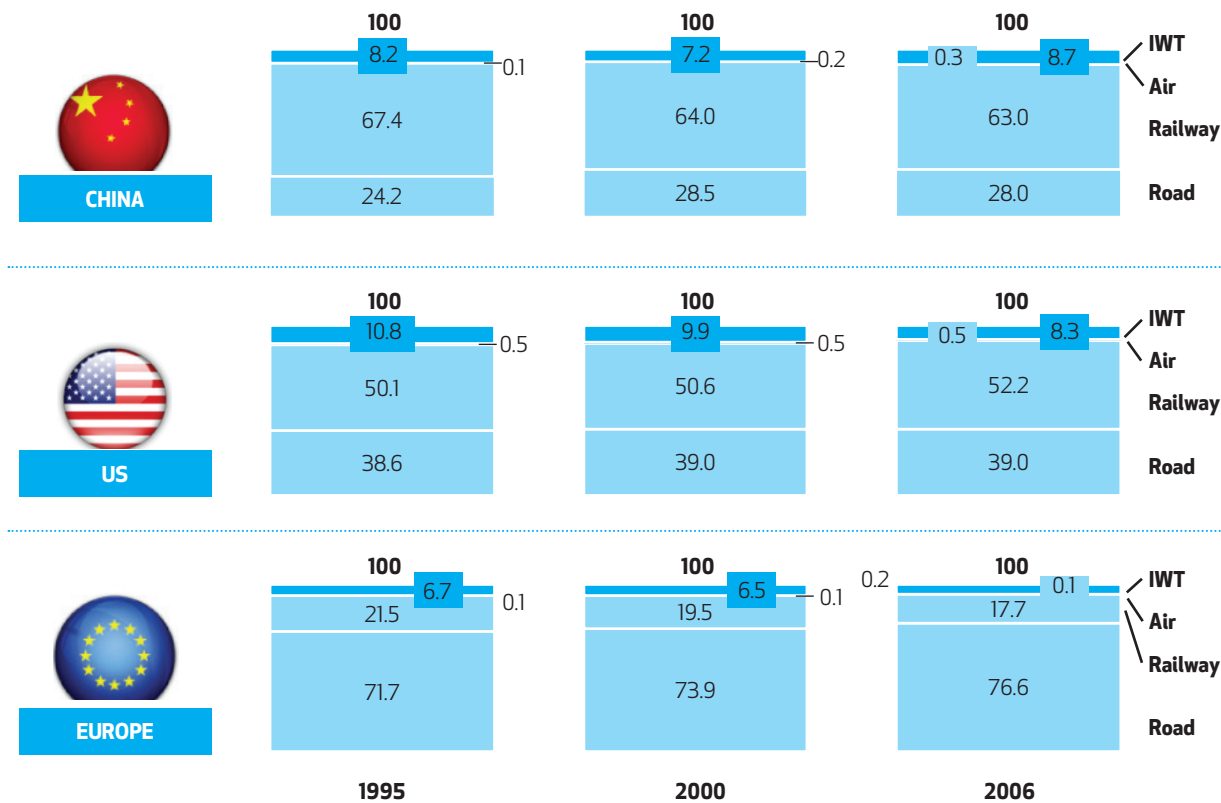
The US, which currently undertakes limited coastal shipping, is also gearing up to expand short sea shipping in domestic waters to accommodate the anticipated increase in domestic freight movements, especially containerised goods. Coastal sea lanes are increasingly being referred to as Marine Highways.

Most maritime nations like US, China and Indonesia practise an absolute cabotage restricting movement

Figure 4.46

**Modal Shares for Modes of Inland Transport in China, US and EU**

[Per cent]



Source: Bossche (2012).

of coastal cargo only under their own flag vessels. Beijing has, effective January 2013, issued new regulations that further underscore the ban on foreign-flagged ships on Chinese waters. Such an approach, however, might be premature in the case of countries like India which have a long way to go before becoming self-reliant in supporting the needs of coastal sea transport. It may be worthwhile only after this is achieved to consider imposing absolute cabotage.

Landside congestion and infrastructure decay are both costly to fix, and coastal shipping is considered to provide a relatively inexpensive alternative. However, without it being suitably embedded in the overall transport plan that allows for efficient inter-modal access on both sides of the sea leg, any expectation for potential gains to the economy might be unfounded.

**INLAND WATER TRANSPORT**

In most countries where development of IWT has been given due importance, it has contributed significantly to the economy.

**US**

The US inland navigation system is nearly 12,000 miles of commercially navigable inland and coastal waterways. More than 630 MT cargo moves annually on the inland waterway system.

Inland navigation operates much like the highway system. Main stem waterways, the Mississippi, Ohio, Illinois, and Tennessee rivers and the Gulf Intra-coastal Waterway, are like interstate highways, and these routes carry most of the traffic. By building a series of barrages and navigation locks, these waterways have been developed with assured 9 depth all round the year, making inland navigation highly commercially viable. Smaller tributary waterways act as secondary roads or neighbourhood streets, allowing commerce on and off the main routes and providing access to communities not located on the main waterways. These tributary waterways carry less traffic than the main stem waterways, but, like neighbourhood streets, they play a vital role in linking communities to the system as a whole.

The trip on the tributaries is usually only a small part of the full journey between producer and consumer, but very important, as it connects origin and destination. They allow shippers and consumers on tributary waterways to take advantage of the huge economies of scale offered by large barge tows on the main stem, resulting in lower transportation costs. They also allow millions of tonnes of cargo to stay in barges until much closer to a final destination, rather than moving longer distances by highway or rail and adding to congestion.



At present, there is no comprehensive and coherent strategy for the location of ports in the country or indeed for the overall investment programme in these ports.

#### CHINA

China, with an inland waterway system of 119,000 km of navigable length, has the most developed IWT sector in the region. The majority of the country's total length of navigable waterways is located within the courses of the Yangtze, Pearl, Huaihe, Helongjiang rivers and the Grand Canal. The Yangtze, with its tributaries, alone has a navigable length of 58,000 km, of which 3,000 km is suitable for navigation by vessels of 1,000 dwt or more. There are about 2,000 inland ports, including 85 leading ports capable of accommodating vessels of up to 10,000 dwt. Seven of these ports each have an annual cargo throughput of at least 10 MT. The network has some 900 navigational structures such as ship-locks and ship-lifts. China is concentrating its IWT development thrust on five specific areas: the Yangtze, the Pearl, the Beijing-Hangzhou Grand Canal and the Yangtze and Pearl river deltas. Shanghai, the world's largest container port, is linked with the Yangtze, which moves 80 per cent of the country's IWT traffic, thus enhancing cargo evacuation capacity of the port.

The fleet of vessels plying the inland waterways now numbers 231,000 with a total deadweight tonnage of 20.67 million. The average vessel size is growing; it increased by 36 per cent between 1995 and 1999. In 2000, the cargo volume carried on the inland waterways of China reached 690 MMT and the total cargo task, measured in tonne-km, touched 155 billion, which is an average trip distance of 212 km.

Since 1990, the growth of container traffic has dominated overall traffic growth on the inland waterway system. The volume of containers carried to or from major river ports grew by 38.6 per cent per annum, from 100,000 TEU in 1990 to 1.88 million TEU in 1999.

#### THE NETHERLANDS

The Netherlands have a dense inland waterway network, due to the estuaries of the rivers Rhine/Wall, Meuse and Scheldt. The total length of the Dutch waterways amounts to 5,200 km.

The Dutch waterways provide seamless hinterland connectivity to the ports of Rotterdam and Amsterdam, not only for cargo destined for the Netherlands but also for countries like Germany, Belgium, France, Switzerland and Austria. The waterways account for about 40 per cent of international freight movements in the Netherlands and 20 per cent of domestic freight.

The waterways are an integration of canal and river networks with well-defined classification based on

the barge configurations that can ply on a stretch. Intermodal terminals ensure last mile connectivity.

#### GERMANY

The German waterway system is 7,300 km long comprising of 2,540 km of free flowing rivers, 3,030 km of rivers with flood control, and 1,730 km of canals.

Since 1990, container traffic has dominated overall traffic growth on the inland waterway system. The volume of containers carried to or from major river ports grew by 38.6 per cent per annum, from 100,000 TEU in 1990 to 1.88 million TEU in 1999.

The waterways provide direct connectivity to two major sea ports of Hamburg the world's ninth largest container port and Bremen, and transport both domestic and exim cargo. They are largely being used for traffic like container, mineral oil and bulk cargo like ore and coal. The share of waterways with regard to the entire goods transport is 12 per cent, which is comparable to haulage of the German railway. Fifty-six of the 74 German metropolitan regions are directly connected to the waterway system. Most of the over 100 inland ports are developed on a tri-modal logistic platform, so that cargo is directly connected with the waterways, the railway network and the most important trunk roads.

Duisport, located at the crossroads of European transportation routes and cargo flows, is one of the largest inland ports, delivering cargo up to Moscow. Waterways, railroad lines and highways turn over upwards of 100 MMT of cargo at Duisburg, while connecting it with other European countries and other continents. Approximately 20,000 ships and 16,000 trains move goods through the port; over 350 rail connections to 80 European destinations originate from the combined traffic hub. More than 300 globally active transport and logistics providers are active on site.

#### MODAL SHARES IN CHINA, EU AND US

The share of the IWT in 2006 is similar in China (8.7 per cent) and the US (8.3 per cent), but lower in the EU (5.6 per cent). However, the modal share of IWT has declined significantly in the US and the EU over the last 10 years. In China, the declined between 1995 and 2000, but has since rebounded by about a fifth. Figure 4.46 gives the data.

It is important to note that while the percentage figures are small compared to the dominant modes, these are significant numbers both in absolute terms and in comparison to share of IWT in other countries, including India.

It is also important not to confuse mode share across large regions with market share. IWT can only 'share' or compete for markets in any particular transport corridor where it actually exists. In all three regions,

most transport corridors do not offer a realistic IWT option. Market shares in IWT corridors in all three regions are therefore much higher than regional averages. For example, though the overall mode share of IWT in the EU is quite low, in the Netherlands, which has many excellent waterway routes, IWT carries more tonne-km than any other mode.

#### LEARNING FROM GLOBAL BEST PRACTICES

An analysis of IWT development indicates three important lessons for India.

##### INTEGRATION WITH OTHER TRANSPORT MODES

World over, bimodal and tri-modal inland terminals have become an intrinsic part of the transport system. Most gateway ports are linked with all the three modes of transportation—road, rail and IWT—that provide alternatives for both inbound and outbound cargo. This in turn provides smooth evacuation from the gateway port that in turn reduces the chance of congestion within the port and enhances productivity.

##### PUBLIC INVESTMENT IN IWT

Waterways in the EU and USA have reached the state of mature asset with massive public investment over a century. The Chinese IWT infrastructure is also a state contribution. At this belated stage of IWT development in India, there needs to be a push from the State for funding of infrastructure, though other models like PPP and viability gap funding could be considered in cases which are commercially viable.

An efficiently run IWT system has clear environmental and social benefits over other modes of freight transport. It helps minimise loss of agricultural land, reduce congestion on roads and road accident costs, and of course, can contribute significantly to shrinking the carbon footprint. These are powerful reasons to try and enhance the role and scale of IWT within national transport strategies. They also provide a stronger case for state funding of IWT infrastructure projects.

##### STANDARDISATION OF WATERWAYS

Complete standardisation of waterway exists in the EU, US and China to ensure depth and width, which in turn enables fixation of barge specification and configuration.

## RECOMMENDATIONS

### PORTS

There are positive signs of progress in India's ports sector and the potential for growth and development is enormous.

Exports and imports for India, bulk of which takes place through the seaports, have demonstrated unprecedented growth during the last decade. While exports grew at a CAGR of about 21 per cent, imports

witnessed a 25 per cent growth. The pace of trade growth is likely to continue in the coming years. Thus, from a long-term transport policy perspective, it is extremely important to review current limitations to ensure that the facilitating environment, comprising both physical infrastructure and government policy, evolves in the desired manner.

At present, there is no comprehensive and coherent strategy for the location of ports in the country or indeed for the overall investment programme in these ports. Till now, investment in both Major and Non-Major Ports has been done in a somewhat haphazard piecemeal fashion, resulting in sub-optimal hinterland connectivity, inadequate infrastructure and drafts, and low levels of containerisation, all these in turn having a bearing on port congestion, cargo evacuation and higher transaction costs. One clear manifestation of the inadequacy is that at present, a good proportion of India's maritime trade is transhipped in Colombo or Singapore because of lack of capable ports on the Indian coastline to handle larger container ships. In particular, in order for major ports to accommodate larger mother vessels going forward, the draft at major ports needs to be increased to at least 17 metres, by the first half of 13<sup>th</sup> Plan. The associated incremental capital dredging at most of the ports would require continued government support.

Current investment trends may lead to significant waste and inefficiencies in the building of transport links that connect with the burgeoning Non-Major Ports. While physical infrastructure grew rather arbitrarily, there has also been little progress towards the generally accepted and successful landlord model of port governance. The ports in India, essentially the Major Ports, widely follow a hybrid format of the long obsolete service port model and the preferred landlord model. This has resulted in a conflict of interest between the port trusts and the private sector, with the former acting both as port regulators and providers of commercial services in many instances.

#### INVESTMENT IN KEY MEGA PORTS

A key government priority should be to invest in four to six Mega Ports over the next 20 years, with two to three on each coast. These Mega Ports can be established either by transforming some of the exist-

Current investment trends may lead to significant waste and inefficiencies in the building of transport links that connect with the burgeoning Non-Major Ports. While physical infrastructure grew rather arbitrarily, there has also been little progress towards the generally accepted and successful Landlord Model of port governance.

An expert group should be set up to undertake detailed studies to identify potential location and modalities for creation of Mega Ports, preferably two to three on each coast. The expert group shall have to take due cognizance of developing and planning high-density freight corridors, as they analyse potential locations for such Mega Ports.

ing Major (or Non-Major) ports into Mega Ports, by combining some major and minor ports, or by setting up totally new Mega Ports. As opposed to other large economies, each of which have a few Mega Ports (such as Shanghai, Shenzhen in China; Los Angeles, New York in US; Hamburg, Bremen in Germany and so on), India has none.

Planning for Mega Ports would involve identifying the port locations, projecting the cargo requirements for 2030, identifying the capacities and investment required to handle larger ships, container traffic and varieties of cargo, planning and designing the ports and the inland connectivity. As ports are nodes in the overall logistics chain, adequate hinterland connectivity through multiple transport modes assumes great significance. Typically, provision of sufficient rail/road connectivity is primarily a result of concerted public investment. But since public investment is limited, it may not be possible to provide superior multi-modal hinterland connectivity to all ports. For maximum impact of the investment, it is logical to identify ports with large proportion of country's capacity as Mega Ports that can then be connected with a multi-modal transport system. An effective implementation of such a decision would invariably call for close coordination with the maritime states. This strategy should also take note of the transport requirements of key commodities such as coal, petroleum and iron ore.

There are several critical benefits of developing Mega Ports:

**Economies of scale:** Average costs of handling are reduced when more volumes are put through a port. First of all, larger (Mega) ports facilitate larger vessels to call due to higher drafts, which create cost advantages on the seaside of the supply chain. Second, the fixed costs of land, infrastructure and facilities in the port are distributed over a larger number of units, decreasing average costs. The hinterland transportation leg can also benefit from the larger volumes concentrated in the Mega Ports by having economies of scale in transport by rail, road and possibly inland waterways.

**Economies of scope:** Larger ports, in most cases, are able to handle a larger variety of goods than smaller ports. Therefore, the assets necessary to handle one

type of goods can also be used without additional fixed costs for other types of goods. In large ports, for instance, the access canal, port infrastructure, rail connections and pilotage and tug services can be used by containers, bulk shipments, industrial products and many others because these services and facilities need to be present anyhow. Accordingly, specialised terminals for POL/coal/containers and so on can be built on adjacent sites within the port.

**Agglomeration economies:** Related to economies of scope are benefits from clustering of activities and services. Larger ports can host many different types of companies, suppliers, industrial complexes and logistic companies. Being clustered together in one port, they benefit from the presence of each other in terms of synergies and shared infrastructure. Companies can even be located in a large port close to some of their suppliers and customers, and all can benefit from reduced transport costs.

**Economic:** Multiplier large ports are stimulators for the national economy. They create jobs, facilitate trade and attract companies.

**Intra-port competition:** Larger ports may host multiple competing companies—for instance, terminal operators, creating a competitive environment within their field of operation in the port. This might benefit the consumers by lower handling charges.

**Transshipment hub:** A large port with the capability to handle larger mother vessels and having large container yards could be a transshipment hub. As such, the port can attract additional cargo volumes which have to be feedered out to smaller ports in the vicinity. For the port itself, this means more income, because transshipment cargo is handled twice on the seaside—incoming and outgoing—and therefore also paid for twice.

Mega Ports and smaller ports can act very well together. Especially in the container segment, when a hub-and-spoke system serves India and coastal shipping is stimulated, the hub ports capture all major global maritime flows and feed the smaller ports with their specific markets behind them. Thus, both types of ports operate optimally within their own boundaries and opportunities.

#### DECISION CRITERIA FOR MEGA PORTS

Mega Ports are proposed with a view to provide strategic direction to otherwise piecemeal investments so as to result in ports with superior infrastructure, more specifically in terms of capital intensive multi-modal hinterland connectivity and deeper drafts, among others. The decision to channel greater investments, therefore, should be based on scrupulous identification of potential port locations. A port needs to be identified as a possible future Mega Port

when certain conditions are met in a port and its environment.

#### EXPERT GROUP

An expert group should be expeditiously set up, to undertake detailed studies to identify potential location and modalities for creation of Mega Ports, preferably two to three on each coast. The expert group shall have to take due cognizance of developing and planned high-density freight corridors, as they analyse potential locations for such Mega Ports, so that there is planned and efficient integration of these ports with the transport corridors. If Mega Ports are to be commissioned, decisions to do so must be taken speedily. This is so that initiating studies and other actions for port construction are in concert with plans for other transport infrastructure.

The following conditions should serve to define whether a port has the potential to develop into a Mega Port and when the government should focus its policies to accommodate this growth:

**Physical conditions:** Ports need to meet the physical and technical conditions to be or have the potential to become a Mega Port. It should have or be suitable for creating sufficient draft to accommodate larger vessels, enough berthing and terminal capacity, and the necessary equipment, space and superstructure to handle large volumes.

**Volumes and market size:** Large ports can only be developed when there is sufficient market potential to attract high volumes. Market potentials could be export and import markets in their hinterland or being in the close vicinity of major world shipping routes to become a transshipment port. For instance, Rotterdam functions both as gateway and as transshipment port.

**Hinterland connections:** In case of a gateway port, the hinterland connections should facilitate distribution of high volumes handled in the port into the specific hinterland. There should be enough potential to develop these connections into safe, efficient and high-capacity corridors. The presence of rail, road and possibly inland waterway operators and infrastructure, as well as distribution centres and inland terminals are required.

**Feeder connections:** If a Major Port tends to develop as a transshipment port, feeder connections to smaller ports are necessary.

**Management capabilities:** A large port should be equipped with the sufficient management capabilities to manage and administer the land in the port and relations with private concessionaires in case of a landlord structure.

A crucial reason for having a Mega Port on the east coast is to tap the immense potential that ASEAN has to offer. While ASEAN is becoming one of the most important regions of the world, the trade relationship between ASEAN and India is still limited. The major obstacle cited is the high cost of moving goods across the borders, reflecting insufficient infrastructure for physical connectivity.

#### POTENTIAL LOCATIONS FOR THE PROPOSED MEGAPORTS

The studies will help establish potential locations for Mega Ports based on a more detailed technical analysis. However, a limited commercial analysis undertaken by the Committee (see chapter on Transport of Energy Commodities) does indicate a few potential locations, with Gujarat as the prime area, based on expected highest port traffic from POL and coal over the next two decades. A port on the southern end of the Maharashtra coast that could also be used to serve Goa and Karnataka. Odisha, Andhra Pradesh and Tamil Nadu are potential candidate states for Mega Ports on the east coast.

A crucial reason for having a Mega Port on the east coast is to tap the immense potential that ASEAN has to offer. While ASEAN is becoming one of the most important regions of the world, the trade relationship between ASEAN and India is still limited. The major obstacle cited is the high cost of moving goods across the borders, reflecting insufficient infrastructure for physical connectivity. Greater connectivity will help both sides achieve rebalancing strategies and provide more opportunities for less developed areas such as Northeast India. ASEAN-India trade was historically carried out through maritime routes while land transport connected major urban centres. In the modern world, an integrated transport system at the regional level is essential and the Comprehensive Asia Development Plan (CADP) recommends a strategy based on a multi-modal, multi-functional and multi-tier approach to enhance ASEAN-India connectivity (See chapter on International Connectivity). The two principal proposed routes to enhance ASEAN-India connectivity are:

- Sea route along the Mekong-India Economic Corridor (MIEC), the most important part of which is the development of Dawei port, Myanmar
- Land routes, with various options, along the Trilateral Highway (TH)/Asian Highway (AH)-1 connecting Thailand, Myanmar and India.

A strategic Mega Port on the Indian east coast along the MIEC needs specific consideration to benefit from the emerging world's largest free trade areas.



The existence of two fundamentally different systems for governance of Major and Non-Major Ports creates hurdles to achieving balanced growth. The necessary integration between these two systems cannot be done without the cooperation of maritime states.

Some of the existing ports that have deeper drafts, an important feature that makes them suitable candidate for development as Mega Ports are Mundra (Gujarat), Gangavaram (Andhra), Dhamra (Odisha), and Ennore (Tamil Nadu).

However, selection of sites for locating Mega Ports will require extensive modelling and analysis. First, all types of port traffic including contain-

ers and other commodities needs to be included in the analysis. Second, detailed data are required on the cost of development of candidate ports, and then detailed modelling is required to examine the costs and benefits of various alternative selections from a short list of potential sites.

#### IMPROVING HINTERLAND CONNECTIVITY

Identification of ports as Mega Ports and planning for capacity expansion is only the first step towards a well-developed port system. Concerted efforts need to be made to ensure adequate, preferably multimodal, hinterland connectivity for these Mega Ports.

**Roads:** The committee endorses the recommendations made by the Committee of Secretaries (CoS) set up under the chairmanship of Member Secretary, Planning Commission, on the minimum levels of surface transport infrastructure that needs to be provided to and from the Major Ports. The CoS had recommended that each Major Port should preferably have minimum four-lane road and double-line rail connectivity and this should be established within a fixed timeframe. This should be taken up for speedy implementation. At the same time, the location of the proposed Mega Ports should be harmonised with NHDP plans.

**Dedicated Freight Corridors (DFC):** The Ministry of Railways has undertaken the construction of a dedicated DFC between Delhi and Mumbai. It will be a high-speed rail corridor with multiple linkages with feeder lines. It stretches over 1,483 km in length, covering six states. The DFC will help alleviate congestion on the Delhi-Mumbai corridor considerably. It is critical to the hinterland connectivity of the Mumbai and Gujarat port clusters that handle a large share of India's port traffic. The focus is also to ensure high-impact development within 150 km on either side of the DFC. The first DFC should be completed at the earliest, preferably by the end of 12<sup>th</sup> Plan and should extend up to JNPT. The second DFC, between Ludhiana and Dankuni, is expected to provide connectivity mainly for the traffic stream of coal to power houses, although later on, connectivity to Kolkata port is also a possibility. There are

four more DFCs planned: Kolkata-Mumbai, Chennai-Kolkata, Delhi-Chennai and Goa-Chennai. The need to integrate the development of the proposed Mega Ports with the planned DFCs and possible new freight corridors that come along in due course cannot be overemphasised.

**Inland waterways:** The connectivity for select ports Ganga-Bhagirathi-Hooghly river system (NW-1) and the Brahmaputra (NW-2) are linked by the Indo-Bangladesh protocol route via Sunderbans and Meghna (total 2,258 km) and provide hinterland connectivity to the Major Ports of Kolkata and Haldia. Similarly, the East Coast Canal and Hijili Tidal Canal, along with the Brahmani river (NH-5) provides 588 km hinterland connectivity to the ports of Kakinada, Krishnapatnam and Ennore. The 205-km West Coast Canal System (NW-3) connects the Major Port of Kochi and also Neendakara, Kayamkulam and Munambam. The Mandovi and Zuari rivers, along with the Cumberjua canal (122 km) are connected with the Major Port of Mormugao and the port of Panjim. The backwater system of Mumbai-Thane-Ulhas waterway (142 km) provides hinterland connectivity to Mumbai and JNPT. Thus, a vast network of waterways has the potential to provide viable IWT connectivity at many ports.

Given the near saturation of rail/road connectivity to Major Ports in particular, it is imperative to explore and augment connectivity through inland water mode wherever feasible. IWAI is setting up intermodal terminals at major cargo centres on all national waterways. Terminals have been built at Patna and Pandu, and similar terminals are planned or under construction at Kolkata, Varanasi, Allahabad on NW-1, Dhubri and Jogighkopa on NW-2, eight terminals on NW-3, 16 on NW-4 and seven on NW-5. Likewise, terminals are being set up on Goa and Mumbai waterways by the respective state governments. All IWT terminals need to be linked with the nearest NH by road, for which appropriate junctions with NWs are to be provided by NHAI. Further, permission for use of service roads as link loads, or use of NH land for construction of link roads needs to be granted for proper linkages with NHs.

#### STRATEGIC INSTITUTIONAL SHIFT: LANDLORD PORT MODEL

The current governance structure of Major Ports the public service port model lacks potential to attract private capital and therefore competitiveness. While it was appropriate for a period when centralised economic planning was the norm, the need today is to move towards a landlord model.

The existence of two fundamentally different systems for governance of Major and Non-Major Ports creates hurdles to achieving balanced growth while rendering it difficult to draw on the experiences of either of the two for any meaningful comparison.



The necessary integration between these two systems cannot be done without the cooperation of maritime states. Moreover, given that Non-Major Ports under the management of maritime states have enjoyed more success as compared to Major Ports, any progressive regulatory shift should attempt to bring in the cooperation and participation of maritime states.

#### GOVERNANCE MODEL

The governance structure of Major Ports needs significant change. Incremental improvements, while retaining the essence of the current centralised structure, will not yield the desired benefits. The path recommended for Major Ports is of corporatisation and decentralisation.

While the term 'privatisation' has often been used in the context of port reform processes, it actually refers to the introduction of private sector into the public domain by privatising terminal services under a landlord port regime. To implement the shift, a three-step approach is recommended.

1. Transform the current port trusts into statutory landlord port authorities. The ownership of these port authorities should be public. They would own the land and only when they become landlords would they function as the neutral regulatory authority for the terminal operators.
2. Subsequently, unbundle all Major Ports and corporatise terminal operations of port trusts as public sector corporations.
3. The corporatised public sector terminal operators could potentially be disinvested, listed, and possibly privatised at a later stage.

The port authorities could be corporatised as a statutory authority by a separate Incorporation Act under its own articles of incorporation, supported through the application of an umbrella legislation. Corporatisation in this manner—as opposed to corporatisation under the Companies Act, 1956—provides considerably more room for socio-political objectives rather than just maximisation of value for shareholders.

Corporatisation of port authorities would allow them to have the freedom to manage capital investment programmes essential for capacity augmentation. The corporatised authorities could borrow from capital markets without the constraint of government spending limits. Thus, investments can be made in accordance to the needs of the port without having to contend for funding with other entities in the public sector.

Corporatised port authorities as well as terminal operators would also be exposed to the rigour and discipline of financial markets, pushing them to be more efficient.

Management should shift from the current centralised form to a decentralised one where the Port Authorities are given autonomous powers within the policy frameworks of the central and state governments.

The management should shift from the current centralised form to a decentralised one where the port authorities are given autonomous powers within the policy frameworks of the central and state governments. The objective should be to support efficient functioning within a commercial setting and do away with unnecessary reliance on central authorities, including the Ministry of Shipping.

Currently, maritime states do not have any stake in the development and functioning of the Major Ports. This needs to change. The direct participation of the relevant maritime states needs to be done through corporatisation, thereby opening up opportunities for acquisition of shares in the port authorities of Major Ports. State governments should be encouraged to have substantial shareholding to ensure their participation in development and expansion of these ports. This will be mutually beneficial, as the state governments would in turn benefit from the development of infrastructure and hinterland connectivity in the state.

At the same time, it is important to ensure that the corporatised port authority is professionally run, insulated as much as possible from government intervention. The Board of Directors should largely comprise professionals with sufficient expertise in technical, finance, strategy, marketing and other relevant disciplines. Depending on equity contribution, a few seats could be fixed for the central and state government.

The Committee is not recommending complete privatisation of port authorities. Under the landlord model, ownership of port land is not transferred to a private party, even temporarily, such as under the BOOT system.

There is pressing need to expedite the adoption and implementation of the landlord port model for Major Ports. On the other hand, given the relative success of Non-Major Ports, it is recommended that their governance structure should be retained and the management of these ports should continue to be performed by the maritime states.

#### UNBUNDLING

Currently, a majority of the Major Port trusts in India carry out terminal operations as well. Unbundling of the terminal operations of the port trusts and corporatising them as public sector corporations

Table 4.13  
**Functions of Port Authority**

PUBLIC FUNCTIONS	COMMERCIAL FUNCTIONS
<ul style="list-style-type: none"> <li>■ Planning and administration of port land and waters</li> <li>■ Issuance of public licenses</li> <li>■ Regulation of port and terminal activities by issuing bye-laws within the framework of applicable law</li> <li>■ Construction and maintenance of basic port infrastructure and common areas</li> <li>■ Ensuring public order and safety in port area</li> <li>■ Protection of the port environment</li> <li>■ Representing the entire port community</li> </ul>	<ul style="list-style-type: none"> <li>■ Establishment of contractual (concession, lease) and other conditions (Public license) for private operator to provide marine or terminal services; application of transparent and open public tender procedures with clear and objective selection criteria</li> <li>■ Construction and maintenance of terminal infrastructure, across roads/rail and port basins</li> <li>■ Re-development of existing port areas that have lost their port function, in conjunction with local and regional authorities</li> </ul>

Source: NTDPCC (2012b).

Table 4.14  
**Functions of Ministry in Charge of the Port Sector**

PLANNING	LEGISLATIVE FUNCTIONS
<ul style="list-style-type: none"> <li>■ Planning and development of a basic maritime and port infrastructure comprising coastline defenses (shore protection), port entrances, lighthouses and aids to navigation, navigable sea routes and canals</li> <li>■ Planning and regulating port development (location, function, type of management)</li> <li>■ Planning and development of port hinterland connections (roads, railways, IWT, pipelines)</li> </ul>	<ul style="list-style-type: none"> <li>■ Drafting and implementation of transport and port laws, national regulations and decrees</li> <li>■ Inclusion of international conventions (SOLAS, MARPOL, etc.) into the national legislation</li> </ul>
INTERNATIONAL RELATIONS	FINANCIAL AND ECONOMIC AFFAIRS
<ul style="list-style-type: none"> <li>■ Developing and executing national policies for furthering international transport capability of the country</li> </ul>	<ul style="list-style-type: none"> <li>■ Planning, financing and budget preparation of national plans and projects</li> <li>■ Evaluating socio-economic/financial feasibility of projects in relation to national policies in various sectors</li> </ul>

Source: NTDPCC (2012b).

shall accordingly be the next logical step under the landlord port model. Involvement of the port authority in terminal operations leads to a conflict of interest and works against objectivity. The neutrality of the landlord port authority is a basic requirement for fair competition between port service providers, specifically the port terminal operators.

Even if some indirect involvement is required in the form of strategic investments by a port authority for overall development of the port area, it should be limited. The port terminals including infrastructure should be leased out to private terminal operators who will:

- Provide and maintain their own superstructure, including buildings offices, warehouses, container freight stations, workshops and often also terminal infrastructure such as quay walls
- Install their own equipment in the terminal such as quay cranes, transtainers, conveyor belts
- Employ stevedores port and dock labour with the exception of some ports where labour is provided through a pool system

Eventually, both private and corporatised public sector terminal operators would compete under the aegis of the landlord port authority. The landlord port authority would carry out all public sector services and operations such as administration of port land and waters, development of common infrastructure, dredging, award of bids for containers and other terminals. The main objective of unbundling is to eliminate direct control of the government or port authority over the terminal operator and make it more responsive to market forces. It must also be ensured that the board and management of the corporatised entity should be free of political and bureaucratic interference. This can only be the first step towards full privatisation and should be treated as that. At the end of a reasonable period, the corporatised public sector terminal operators could potentially be disinvested, listed and possibly privatised.

Unbundling could be a complicated task for older ports, and the transition process needs to be customised for each Major Port. During the changeover phase when terminal services such as stevedoring activities are still being provided by the port trusts,

there needs to be a clear demarcation between each of the terminal service activities and other activities. This, in turn, requires that the internal accounts for each of the activities are kept separate, and all costs and revenues are correctly allocated on the basis of consistent and justifiable accounting principles, which need to be clearly identified and stated.

#### SEPARATION OF RESPONSIBILITIES

There should be clear separation of responsibilities between the Ministry of Shipping and the port authorities. The Ministry should avoid micro-management of day-to-day operations of the port. It should rather play an enabler role. Tables 4.59 and 4.60 provide the functional areas of the port authorities and the Ministry respectively.

#### ROLE OF REGULATORY AUTHORITY

As observed already, given the relative success of Non-Major Ports, their governance structure should be retained and the management of these ports should continue to be performed by the maritime states. The existing regulatory mechanism for the Major Ports, on the other hand, will have to be suitably revamped to make it more responsive to the needs of capacity augmentation and market demand.

The three-pronged approach to reform tariff regulation (short, medium and long-term) suggested by the B. K. Chaturvedi Committee has already been discussed. The report recommends moving away from tariff regulation, leaving its determination to market forces as competition sets in. As mentioned before, the Australian landlord port model is certainly one that India could adopt.

Drawing on the above and keeping in mind the key priority of Indian ports sector to add capacity quickly through private participation, the role of regulatory body is recommended to undergo an enabling structural change:

- In principle, tariff setting or other price controls should not be exercised under the landlord model but left to the market. Rather, economic regulation pertains to establishing conditions for fair competition on a level playing field.
- To this end, TAMP should soon start delegating tariff determination and setting to corporatised terminal operators, where efficient price discovery should be market-driven rather than being regulated. All terminals and cargo handling facilities at ports should be encouraged to operate at higher levels of efficiency using the best available technologies. This can only be achieved through competition and not through a tariff setting process.

There should be clear separation of responsibilities between the Ministry of Shipping and the Port Authorities. The Ministry should avoid micro-management of day-to-day operations of the port. It should rather play an enabler role.

- Only in cases of inadequate competition between terminals in a port or among ports, or serious market imperfections, may some pricing control be required. Accordingly, TAMP, set up under the Major Ports Trust Act, should be restructured under a new Major Ports Authority Act (needed to transform port trusts into port authorities) and allowed to regulate tariff setting on a normative basis till such time that it is found essential or in specific cases where competition is inadequate. TAMP could also act as the Appellate Tribunal for all tariff-related matters where tariff is determined by service providers.
- A new regulatory authority, Maritime Authority for Ports (MAP), should be constituted under a modernised Indian Ports Act 1908, suitably empowered to regulate competition and port conservancy across all ports in the country. The proposed MAP should essentially have two main functional divisions:

**Conservancy division:** This should set standards for conservancy, safety and environment as a unified code applicable to all ports, and carry out periodic audits to see if the required functions are satisfactorily carried out and to decide on the qualification of the conservator.

Port conservancy management has been relatively less discussed in India. At the same time, all the conservancy powers in ports and all other regulatory functions are vested in the port trusts. Conservancy needs to be regarded as a national issue and any form of regulation should facilitate establishing a common conservancy code for Indian ports. This can perhaps be better monitored and enforced by the proposed Maritime Authority for Ports (MAP). For this, India needs to draw on experiences of certain international port regulating bodies that have created substantive frameworks to address port conservation. One such successful model is that of the Maritime and Port Authority (MPA) of Singapore which is responsible for ensuring port safety and conservancy in addition to promoting, regulating and

licensing of port and marine services and facilities.

**Competition Division:** The proposed MAP should be parallelly vested with powers pertaining to competition regulation on the lines of other sectoral regulators such as the Central Electricity Regulatory Commission (CERC). This might create overlapping jurisdiction between MAP and CCI. This is not unusual and exists in all infrastructure and utility sectors that have a specific regulator. Since the sector regulator is likely to better deal with specific regulatory and competition issues that call for sector/domain expertise, it is best to empower the proposed regulatory authority to address complaints concerning alleged anti-competitive practices or abuse of a dominant position. In addition, it should also be charged with merger approvals and review of draft concession agreements to advise the port authority on whether any provisions may be incompatible with the promotion of competition. The sector regulator is likely to have the best information about the sector to monitor it. For example, competition issues arising from imperfect price and non-price conditions of access to unbundled elements in landlord ports, or cross-subsidy problems would be best understood and addressed by sector regulator. In essence, the sector regulator and CCI can have a concurrent role with matters being referred or interventions made depending on who is best equipped to deal with a particular issue. This would clearly call for establishing a mechanism for close coordination and consultation between the sector regulator and the CCI.

It may not be possible to shift from the current state tariff regulation to the proposed one competition regulation immediately. The 2013 draft guidelines for tariff setting in Major Ports proposed by the Ministry that allow market-driven tariff can be considered a step forward in support of the recommended shift to tariff deregulation under a landlord model of port governance. However, going forward, these guidelines will have to be reviewed, given that they still retain the concept of tariff regulation.

Under tariff regulation, the final issue to be dealt with pertains to vessel-related activities. Currently, the tariff setting is done on a cost plus basis which does not incentivise efficiency. However, the shift to a normative approach is a complex task because of the lack of standardisation across different situations. An expert panel should be set up to recommend

a normative approach for tariff setting in vessel-related services.

In addition, regulatory approvals need to be granted in a time-bound manner and towards this end, the regulatory process should be streamlined including adequately strengthening administrative and statutory aspects of regulatory organisations.

#### PORT LEGISLATION

It is recommended that the two Acts governing the Indian ports—the Indian Ports Act, 1908, and the Major Port Trusts Act, 1963—be kept separate but modernised. A review of port legislation should be undertaken to have one unified law relating to conservancy and competition and a new law to transform the port trusts to landlord port authorities with functional and financial autonomy. The following approach to reform of port regulation is recommended:

- The Major Port Trusts Act (MPTA) should be replaced by a new Major Port Authority Act (MPAA) that allows port trusts to become landlord port authorities and enable them to function on the basis of commercial principles, subject to the rigour and discipline of financial and capital markets.
- The Indian Ports Act, 1908 that already deals with the safety of ports (both major and non-major) can be modernised to introduce setting up of a new Maritime Authority of Ports vested with power to regulate intra-port and inter-port competition as well as port conservancy across all the ports in India.
- TAMP should ideally cease to exist with time as port operations become competitive and tariff regulation is no more required.

#### STRENGTHENING PROJECT IMPLEMENTATION





The route to the much-needed capacity addition to India's ports is through effective implementation of PPP projects. Three initiatives have been identified to facilitate this.

##### HIGH-POWER GROUP FOR PORT PROJECTS

Such a group can add transparency and force decisions to strengthen weak project implementation and enable progress. Its scope should cover a small number of larger projects. The group can be headed by a minister or a secretary and carry out functions on the lines of the Cabinet Committee on Investment. It can bring in other ministries as necessary. The group should

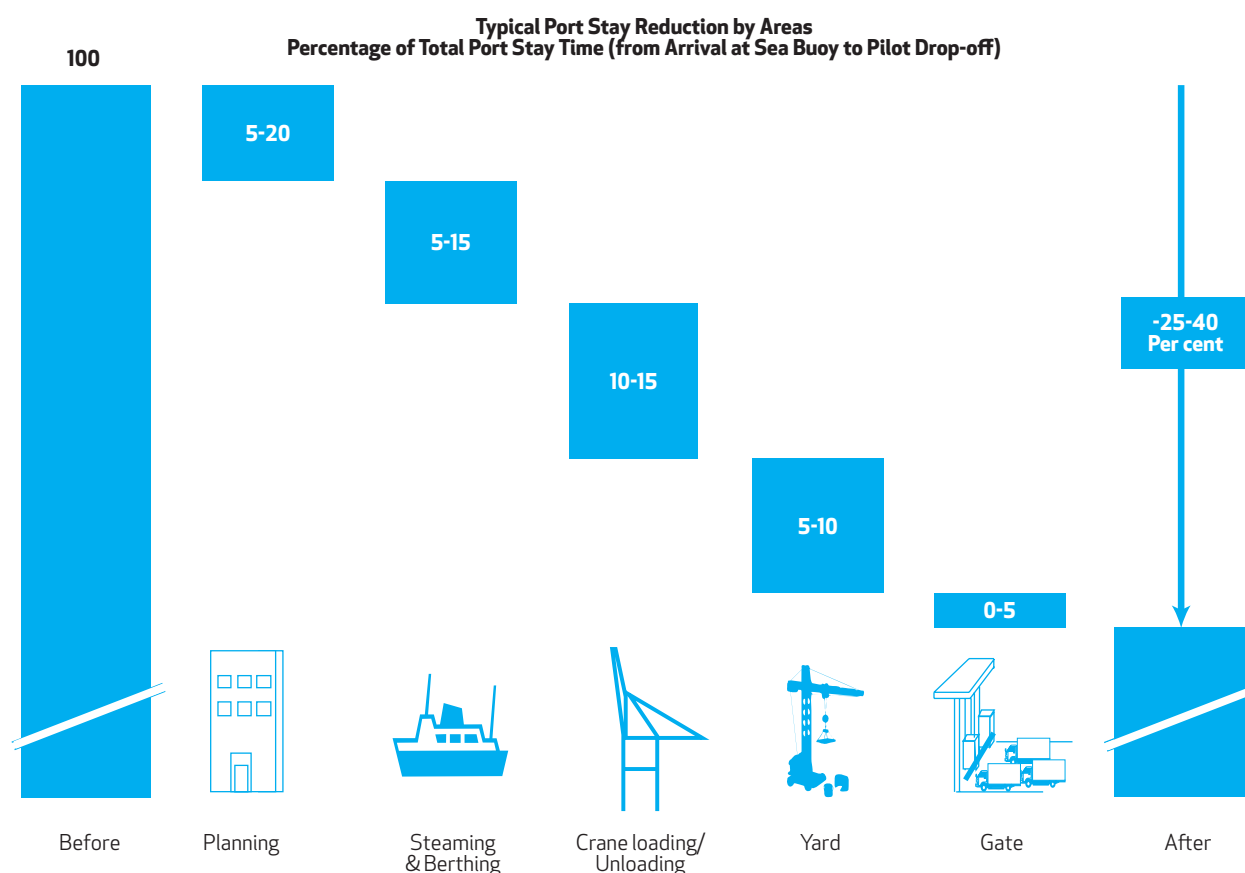
- Identify key projects that need to be implemented on a time-bound basis, involving investments above Rs 5 billion and upto Rs 10 billion, or any other project identified as critical by the Committee
- Prescribe time limits for issue of requisite approvals and clearances by the ministries/

Figure 4.47  
**In Line with Global Norms, QCBA Approach should be used to Select Consultants**

CRITERIA FOR QUALITY ASSESSMENT			COST OVER-RUNS [PER CENT]
<ul style="list-style-type: none"> <li>■ Technical rating (80 per cent weightage) includes <ul style="list-style-type: none"> <li>– Performance rating (50 per cent weightage), based on appraisals over the last 3 years</li> <li>– Health rating (30 per cent weightage), based on cash position; project portfolio.</li> </ul> </li> <li>■ Bid price (20 per cent weightage)</li> </ul>	Canada (Ontario Ministry of Transportation)		5
<ul style="list-style-type: none"> <li>■ Technical rating includes <ul style="list-style-type: none"> <li>– Performance on previous projects</li> <li>– Health rating, based on sector experience of the firm; quality of staff; education and experience of personnel</li> </ul> </li> <li>■ Ratio of technical score-to-price quote is used to determine the winner</li> </ul>	US (FHWA, State DOTs)		9
<ul style="list-style-type: none"> <li>■ Technical rating includes <ul style="list-style-type: none"> <li>– Quality of bidder's technical suggestions on the project (value engineering)</li> <li>– Health rating</li> </ul> </li> </ul>	China (Highways agency)		12
<ul style="list-style-type: none"> <li>■ Technical rating includes <ul style="list-style-type: none"> <li>– Experience of similar work</li> <li>– Suggested approach and methodology</li> <li>– Staffing, resume of key personnel</li> </ul> </li> </ul>	India		22
<ul style="list-style-type: none"> <li>■ Technical rating, wherever used at final tendering stage, delivers better results</li> <li>■ Factoring the consultant's past performance in his technical rating makes the pre-qualification very robust</li> </ul>			

Source: NTDPCC (2012b).

Figure 4.48  
**Total Port Stay can be Cut by 25-40 Per Cent across 5 Main Levers**



Source: NTDPCC (2012b).  
Note: From typical very large vessel's port stay of 12-24 hours to 10-15 hours with move count over around 1,500 containers.



A Port Community System (PCS), a single technology based platform which brings together all stakeholders and shares information is essential. An 'e-custom' solution could also be developed later. While implementation of PCS has been already initiated, its rollout has not been very successful.

departments concerned in respect of identified projects

- Monitor project portfolio and port performance on at least three key metrics: on-time award; actual construction progress against planned milestones; and within-budget completion, including time taken to obtain approvals
- Involve providers of identified projects to understand bottlenecks and collaborate on solutions for delays and over-runs
- Remove inter-ministerial bottlenecks that are impeding important projects pre- or post-tendering to relevant authorities, and push for decisions. For instance, the group can selectively convene ministers and bureaucrats from concerned areas, creating an empowered group to expedite the resolution of bottlenecks
- Take decisions regarding grant/refusal of approval or clearance of specific projects that have been unduly delayed, if deemed necessary

#### CAPACITY BUILDING

The skill set of public sector port managers in structuring PPP projects is limited. This affects timely implementation of projects due to frequent delays in the pre-tendering phase itself. There is a strong need to build capacity of port officials to structure and manage private investments, as well as officials in the ports/shipping ministries and departments at the Centre and in the maritime states.

**CONSULTANT SELECTION ON QUALITY-CUM-COST BASIS**  
Paid consultants help to prepare most DPRs and can impact the time and cost of project execution. It is important to select technical consultants using a quality-cum-cost-based assessment (QCBA), instead of the traditional L1—lowest cost—approach. Figure 4.47 lists some of the criteria used for quality assessment in Canada, the US and China along with the consequent impact on cost overruns. The quality score should count for 50 to 80 per cent of overall assessment as in Canada and the US. Evaluators can rate the consultant through feedback from the respective port trusts about his or her performance on previous and ongoing projects. The port trusts in turn can assess performance in a standard manner across projects using a set of standard guidelines with objective scoring parameters. For instance, evaluators can look

at the magnitude of design changes during project execution and the reasons for the same.

#### OPERATIONAL PERFORMANCE OF PORTS

Optimising the vessel handling process end-to-end can reduce the port stay time of a vessel by up to 40 per cent (Figure 4.48). In this context, five typical stages of a vessel's port stay need close attention.

**Planning:** Better planning, coordination and communication ahead of the vessel's arrival in a port can help save 5 to 20 per cent on total port stay time

**Steaming:** Optimising berthing and steaming process for container ships can save 5 to 15 per cent of total port stay time

**Handling:** Efficient crane loading and unloading can cut port stay times by 10 to 15 per cent

**Yard operations:** Better yard layout and production process storage and retrieval of boxes can save 5 to 10 per cent on existing timelines

**Gate operations:** This might not result in direct savings for shipping lines or terminal operators, but it reduces the dwell time of the cargo for the shipper and limits the duration for which shippers need to hire the truck driver. There can be a maximum of 5 per cent savings if the port focuses on avoiding non-value-added activities at the gate, and arranging better arrival/departure pattern of incoming and outgoing trucks and containers to smooth peak loads.

Prudent use of information and communication technologies (ICT) can substantially help to address the operational constraints with Ports in India. While a discussion on ICT intervention for the Ports sector is undertaken in greater detail in Chapter 9, a broad introduction on the proposed framework for ICT in ports is placed hereunder:

#### FRAMEWORK FOR IMPLEMENTATION OF ICTS IN PORTS

Most significantly, all major ports would need an extensive IT infrastructure to manage their day to day operations. To create an interconnected network of ports and ensure consistency in ICT policies, it is required that the Ministry of Shipping lay down the ICT policy and roadmap for the Indian maritime sector. An important requirement will be of interoperability between IT systems owned by various entities and provision for Electronic Data Interchange (EDI). It will help them share latest information, analyse data, monitor progress and support quick decision making.

All of this should facilitate movement to a Single Window system. This would involve looking at various processes and documentation requirements from a trader's point of view and weeding out redundancies, improve transparency and reduce process



lead times, thereby improving India's competitiveness in trade.

Smart cargo is the next step in automation of maritime operations. Recent developments in Radio Frequency Identification (RFID) and Global Positioning Systems (GPS) seek to make the cargo intelligent. It will help reduce handling time, and eliminate risks associated with container security and missing consignments.

#### ICT TECHNOLOGIES FOR PORTS

There is no clear view of yard storage space to plan movement of cargo which leads to sub optimal utilisation of a port's storage and loss of revenue. **Geographic Information System (GIS)** solutions could be used to get a real time view of the storage area. It can lead to better yard operations thereby increasing yard throughput and enhance customer satisfaction.

Another application is **Radio Frequency Identification (RFID)** technology for monitoring container movement in yards. It can be used for container identification, information related to cargo origin-destination, and can also help check cases of seal tampering.

Traffic congestion at port gates is another critical problem with currently little or no automation. The entry and exit of vehicles and drivers through the gates of container terminal can be automated. The **Optical Character Recognition (OCR)** system can be installed at the terminal gates and driver's **biometric identity** and his authentication documents could be stored in a **smart card** which he can flash at the counter to gain entry.

It would also be useful to implement **Enterprise Resource Planning (ERP)** solutions which are driven by an integrated suite of software that supports the basic internal business process of any organisation. Importantly, a **Port Community System (PCS)**, a single technology based platform which brings together all stakeholders and shares information is essential. An 'e-custom' solution could also be developed later. While implementation of PCS has been already initiated, its rollout has not been very successful. Thus, before embarking on such plans, focus should be on building the foundation and developing stakeholder capabilities.

#### INSTITUTION AND CAPACITY BUILDING

A well-coordinated and integrated approach will require a strong institutional framework. In that context, the Committee recommends the establishment of an organisation, the Indian Institute of Maritime Research & Planning (IIMRP). Its functions can include supporting government in policy formulation, planning, carrying out high-end research, improving operational efficiency and developing standards and protocol for ICT solutions

etc. It should be controlled by an advisory board and should have participation by both government and private sector.

#### ICT IMPLEMENTATION ROADMAP

For effective implementation of ICT applications, considerable groundwork is required. The first phase, Foundation Building, should focus on developing the ecosystem, capacity building and creating necessary institutions. The next phase should be capacity building, focusing on setting up ICT systems at port and provide assistance with technology implementation to various stakeholders. In the third phase, Integrated Traffic management system, focus should be on integrating business processes and IT systems of various stakeholders. Some of the initiatives could be Single Window concept, RFID tagging, etc.

A review of various ports in India suggests that a 'one size fits all' strategy cannot be adopted. Separate studies need to be undertaken to assess IT maturity of individual ports and identify specific action items for each of them in line with the overall ICT enablement roadmap.

#### INVOLVING ALL STAKEHOLDERS

The four main stakeholders in the port productivity improvement process are the government either directly or through the port authority; the shipping lines; the terminal operators; and the cargo owners or shippers. Each stakeholder has a specific and critical role in accelerating performance.

- Government and/or port authorities have to make sufficient pilots/tugs available to bring vessels to their berths with minimal delay. They must also ensure clearance of cargo in the ports to limit the dwell time of these goods inside the port.
- Shipping lines need to clearly align and communicate with terminal operators around their port arrival planning and preferred handling process. This enables terminal operators to turn their vessels around in the fastest possible time.
- Terminal operators need to ensure transparent communications, apply leaner operations in berthing, loading/unloading and yard operations processes, and facilitate faster exit/entry at the terminal gate.

A review of various ports in India suggests that a 'one size fits all' strategy cannot be adopted. Separate studies need to be undertaken to assess IT maturity of individual ports and identify specific action items for each of them in line with the overall ICT enablement roadmap.

While it may be desirable to exercise absolute cabotage, given the current inadequacy of the Indian coastal fleet and the need to introduce competition and growth in containerisation, a certain degree of cautious relaxation in cabotage policy might be needed for next couple of years till coastal shipping grows sufficiently.

- Shippers need to limit the dwell time of the cargo inside the port.

A programme that brings in the right organisational structure, clear processes, required skills and appropriate tools is critical to improve operational performance of Indian ports. Such a programme usually consists of four steps; determine the base line; do a diagnostic on improvement potential; generate ideas; and implement. The process might take months to complete, and its success requires a strong focus on the following key factors:

- Commitment from management: target setting and responsibility
- Clear transformation plan driven by the programme management office
- Incentives and disincentives based on performance

A sustained focus on all three key performance indicators can drive high operational efficiency at ports. All four major stakeholders must collaborate to ensure optimum utilisation of existing capacity. This can help our ports effectively manage ever-increasing freight traffic.

## SHIPPING

Indian tonnage must be increased and made more competitive. Most importantly, multiple policy changes are necessary to ensure that coastal shipping becomes a critical part of our overall logistics infrastructure.

### INCREASING NATIONAL TONNAGE

Increasing Indian tonnage will help spawn associated shore-based services, such as stevedoring, ship repairs, logistics, manning and cargo movement. It will provide higher employment opportunities for Indian seafarers: India has about 30,000 officers and 230,000 ratings. Having more ships under the Indian flag will also provide bigger opportunities for training of Indian seafarers. Higher tonnage will help alleviate national security concerns: national tonnage maintains the supply line for essential cargoes in emergency situations. For example, 100 per cent of the total crude imports from the Middle East during the Iraq war came on Indian ships.

Apart from direct acquisition of new tonnage with emphasis on adequate tonnage towards fulfilling energy security needs over a medium term, domestic tonnage can be augmented in the interim and short run through a combination of policies.

### CARGO ASSURANCE THROUGH LONG-TERM CHARTERS

Need for long-term charters by public sector enterprises for critical energy cargoes of crude oil, petroleum products and gas could be explored exclusively with Indian ship owners for Indian flag vessels, which will ensure a dedicated fleet of vessels at competitive rates on a long-term basis and will ultimately result in a win-win situation for charterers, ship owners and the economy at large, providing stability in freight costs and lowering input costs. For instance, Japan and Korea have developed strong LNG fleets on the basis of long-term contracts.

### MANAGERIAL AND ADMINISTRATIVE CAPACITY

While technical personnel like marine engineers and master mariners are formally trained for their job; administrative personnel are brought in to the Directorate for three to five years from other services. The sector loses their valuable experience and expertise when they are repatriated. It may be useful to identify ways to build and retain expertise within the system, such as building a subordinate cadre. At the same time, in order to build internal administrative capacity, introduction of an Indian Maritime Services (IMS) merits consideration.

### NEED FOR A LEVEL PLAYING FIELD

It is important that the Indian shipping industry be provided a level playing field for it to grow and compete globally with vessels under other flags. This will require rationalisation of restrictive policies, particularly related to imposition of a variety of direct/indirect taxes.

### INCENTIVES FOR COASTAL SHIPPING

The following steps merit consideration:

- According priority to coastal ships by setting up coastal terminals at the Major Ports and identifying and developing five or six Non-Major Ports on the east and west coasts as designated coastal ports.
- Providing adequate road and rail connectivity to these coastal terminals and designated Non-Major coastal ports.
- Ensure that certain minimum service levels are provided for the coastal fleet in new container terminals as part of the concession agreement to get parity treatment with international vessels. This will help avoid long waiting times for coastal vessels due to preference given by terminals for international cargo given that they pay 30-40 per cent more on a per container basis.

- Allow coastal ships to import bunker fuel as well as spare parts with the same concessions availed of by ocean going vessels. The diesel subsidy available to land transport—road and rail—should be completely phased out to even out the current price distortion and provide a level playing field across transport modes.
- Providing fiscal incentives to consignors who shift cargo from road and rail to coastal shipping on the lines of the incentives provided by the EU under the Marco Polo scheme.
- Develop separate wings in development financial institutions to fund coastal shipping.
- Suitably amend the Merchant Shipping Act or enact separate legislation for coastal shipping to provide different specifications and lower manning scales.
- Have absolute cabotage for import and export of crude, critical energy cargoes and defence equipment/parts. Relax cabotage to allow foreign vessels to carry bulk/general cargo and transhipped exim containers, including empty containers on Indian waters. This would help meet the principal objective of enhancing domestic mobility for Indian cargo while also contributing to reduce the strangulating stress on road transport.

A few countries practice an absolute cabotage law while others practice a tailored one. China introduced absolute cabotage beginning January 2013. While it may be desirable to exercise absolute cabotage, given the current inadequacy of the Indian coastal fleet and the need to introduce competition and growth in containerisation, a certain degree of cautious relaxation in cabotage policy might be needed for next couple of years till coastal shipping grows sufficiently. Absolute cabotage might be imposed beyond a certain growth in national tonnage and achievement of desired outcomes.

Reforming the coastal shipping sector will enable India to leverage its coastal lines for logistics three to four times more, reduce dependence on imported fuel by 5-10 per cent, apart from reducing overall cost of cargo movement by over 25 per cent and carbon emissions by more than 50 per cent.

## INLAND WATER TRANSPORT

The key issues to be addressed in the IWT sector have already been outlined. However, it must be noted that IWT sector is unique in the sense that water is largely a state subject, though inter-state rivers could be brought under the control of the Union, as are the National Waterways. Success can only be achieved if multiple stakeholders come together and work towards a common objective.

Each river basin should be developed with total integration of multiple uses like irrigation, flood control, navigation, hydro-power, industrial/domestic water use, fishing, tourism, and ecology, instead of viewing the river use independently from each user point of view by different agencies.

## NAVIGATIONAL INFRASTRUCTURE

**Development of adequate depth (LAD)** Efforts should be made to develop deeper stretches of the rivers (at least 2.5 m, preferably 3 m LAD round the year). Several rivers in India meander, which results in increase in distance to be travelled on waterways as compared to road or rail. Technical feasibility of reducing the IWT route length by straightening the waterway, wherever feasible, to avoid bends, should be studied. While the problem of siltation would be overcome to some extent by adequate LAD, the long-term measure is river basin development.

Each river basin should be developed with total integration of multiple uses like irrigation, flood control, navigation, hydro-power, industrial/domestic water use, fishing, tourism, and ecology, instead of viewing the river use independently from each user point of view by different agencies

Central legislation of River Basin Authorities under the control of the Ministry of Water Resources will help total development of river basins instead of isolated interest shown by each organisation and each state government. This system is in line with that followed in several developed countries. Navigation authorities (IWAI and state IWT departments) should be well represented in this forum.

Such River Basin Authorities can plan storage of flood waters in the upper catchment area and release it during the lean season while generating hydro-power. This will control floods during the monsoon and save vast areas of land from erosion and prevent siltation at the downstream end of the river. The augmented lean season flow will help irrigation, navigation, industrial/domestic use, fishing, tourism and ecology.

Finally, it will lead to integration of river basins with one another and a total network of rivers and waterways, resulting in water balance in the entire region.

**Adequate air draft:** Funding may be made available through specific budget provisioning for raising the bridges to at least 5 m above high flood level (HFL) to make these canal systems navigable for commercial cargo carriers.



The Indian ports and shipping sector suffers from poor incentives, lack of clarity in the regulatory structure, coupled with overlapping jurisdiction of institutions charged with sector oversight and a debilitating prevalence of ad hoc and piecemeal decision making.

**Augmentation of cargo terminals and IWT vessels:** There is a case for provision of support at concessional terms for setting up cargo handling facilities and for the acquisition of vessels. Formation of a Special Purpose Vehicle—Inland Vessel Leasing Company—may be looked into, that can procure and lease out the IWT vessel based on market demand to lower entry barriers to IWT operators.

**Focus on North-East:** Given that the available draft in the waterways is low, the appropriate strategy would be to focus on the waterways in the North East. Terminals and cargo handling facilities should be set up at strategic locations and adequate connectivity to road and rail provided.

**Development of night navigation:** Infrastructure IWAI should develop this in all National Waterways with a clear plan and timelines. IWAI also needs to provide differential global positioning systems (DGPS), light buoys, river information services (RIS) and other advanced technology for night navigation on some stretches of waterways and subsequently to be extended to cover all NWs.

**Development of MRO facilities:** Private sector participation needs to be explored for development of MRO facilities in North Eastern states and other National Waterway corridors. In Goa, there is already interest from the private sector to develop repair yards, if the state government provides land. Finally, vessel repair facility could be considered for infrastructure status.

#### POLICY PARITY

Inland vessels could also be considered for inclusion in the tonnage tax regime. Fiscal incentives could be provided to consignors using inland water transport.

#### MODAL INTEGRATION

IWT terminals need to have sufficient connectivity with road and preferably with rail for last mile connectivity.

**Identification of potential multimodal corridors:** This requires detailed mapping of waterways and industrial clusters and analysis of origin and destination cargo. Existing NWs need to be extended

to their tributaries to connect important cargo hubs to enable connectivity at optimum cost.

**Develop IWT feeder routes:** There is a need to create feeder routes under the jurisdiction of states to NWs so that the entire channel can be developed on the 'fish bone structure'. This would involve development of feeder routes in the North East such as Subansiri, Dhansiri and Dibang, as well as major tributaries of Ganga such as Yamuna, Gandak, Kosi and Ghagra. Successful operations of these feeders will pave the way for development of barrages/weirs with navigational locks to ensure round-the-year operations.

In many stretches, IWT and coastal shipping operations could be integrated to accommodate hinterland, coastal and international traffic. Both modes are by nature inter-modal. At many places, these two modes provide seamless connectivity to the hinterland, for example, the region adjoining Kolkata and Paradip port; the Goa region, the Cochin port-West Coast Canal region, the proposed NW-4 and NW-5 linking East Coast Canal and Eluru. By combining inland terminals with an automated Roll on-Roll off (Ro-Ro) system, the cost of transshipment can be minimised to a great extent since ro-ro vessels offer an excellent alternative to road haulage on certain corridors/stretches. Also, such vessels will be able to reach certain inland locations via inland waterways; this could take some of the traffic load off the road network and bring about a better balance among various modes.

#### PUBLIC INVESTMENT

A choice was posed earlier about the relative priority of IWT against other transport modes, given the limited public investment available for the transport sector. That is the foremost question that needs to be answered before any avenues for development of IWT can be considered.

In case IWT is considered a priority, there ought to be a quantum jump in funding in the 12<sup>th</sup> Plan and beyond. In addition, the possibility of private sector participation in the development, maintenance and regulation of some stretches of rivers may be also looked into. Following pre-conditions need to be in place to encourage private participation:

- There is long-term cargo commitment from the user on both ways. In the initial years, when business volumes are lower, policy intervention is required to mitigate demand uncertainty. Such an intervention in identified routes may be similar to awarding concession for seaport/airport
- Freight through IWT is sufficient so that the private operator is able to recover his investment
- Freight subsidy is given on par with road and rail

## WATER TRANSPORT STATISTICS

Improving quality of water transport statistics to monitor trends and performance of the sector key to enabling the development of the sector.

These statistics include data about ports, shipping, ship building and ship repair, and inland water transport. Transport Research Wing (TRW), Ministry of Road Transport and Highways is the nodal agency for collection, compilation, dissemination and analysis of water transport statistics.

The following data gaps exist in port statistics in India:

- Data on country-wise break-up of origin and destination of cargo is frequently asked for by researchers. Shipping lines/companies generally provide information on the port of country from where the cargo is loaded or where the cargo is to be discharged, and not the actual country from where the cargo originated or is destined to.
- Container cargo is the fastest growing form of traffic at Major Ports. However, the commodity-wise data handled in containers is not being maintained.

Data on the shipping sector, disseminated through two annual publications—Indian Shipping Statistics and Statistics of India's Ship-Building & Ship Repairing Industry, was found to have the following gaps by the National Statistical Commission:

- Financial performance indicators of private shipping companies.
- Operational indicators voyages, cargo, capacity or space utilisation
- Freight rates for selected Indian import and export commodities for all shipping companies
- Safety statistics
- Environment pollution caused by shipping industry

Apart from the non-availability of timely data on inland water statistics, particularly from states, there are significant data gaps on IWT. IWAI provides cargo statistics for vessels which are registered and availing IWAI facilities on NWs. But numerous unregistered vessels/boats carry cargo and do not avail IWAI infrastructure facilities. This traffic is not being captured at all. Periodic surveys need to be carried out—perhaps once in five years—to assess the cargo carried by such vessels on NWs. Many state governments are unable to maintain the data/information on IWT due to lack of scheduled/systematic records on freight/passenger operations. Consequently, the data on IWT at the all-India level lacks full coverage.

## IMPROVING QUALITY OF STATISTICS

- Periodic review of water transport statistics is required to assess the system and identify the possible changes required for meeting user needs. Such reviews should be undertaken once every five years.
- At present, no system for training and sharing of experiences on water transport statistics exists. Training programmes/workshops for officials/staff involved in compiling statistics, particularly port statistics may be organised. The workshops should cover statistical concepts, definitions and issues of compilation, processing and Total Quality Management.
- The annual publication should be out in the year following end of the calendar/financial year, and the bi-annual publication within the three months, i.e., in June for the period ending March and December for the period ending September
- TRW may provide the metadata for water transport statistics in the form of a manual on the Ministry of Shipping website
- All regular publications of TRW on ports, shipping and IWT should be available online
- Concurrent audit of statistical activities is necessary for early detection of errors and mistakes during the progress of work, and their rectification in time is essentially an internal activity of the primary data compiling agency. It is suggested that assessment of quality of the data produced by the primary source agencies may be carried out through statistical audit by officers authorised by the Ministry of Shipping.

## THE ROAD AHEAD

The section below summarises the traffic projections and related investments in infrastructure for the ports and shipping sector for around next 20 years. Given the unusually long term assessment of the traffic and associated investments, it is only reasonable to suggest that these projections be reviewed and rationalised at specific intervals to factor in the socio-economic changes as they emerge overtime. The section concludes with a summary of key recommendations for the sector discussed in detail earlier. An indicative time plan, bucketed into short-term, medium-term and long-term targets, has been drawn at the end to guide decisions through the next 20 years.

## TRAFFIC PROJECTIONS

### PORTS

The cargo traffic at ports is expected to grow at a CAGR of more than 6 per cent to reach **3,068 MT** by

the end of the 15<sup>th</sup> Plan (2031-32) from the current levels of 914 MT. Higher annual growth rates of around 7-8 per cent are expected to be seen in case of coal, containers and general cargo. To meet this growth in cargo traffic, a capacity requirement of about **4,000 MT** including the major and non-major ports, is projected by 2031-32.

### SHIPPING

The growth in Indian shipping has been projected in terms of the desirable growth of Indian tonnage as percentage of the world tonnage, by end of the 12<sup>th</sup> Plan. This growth has been looked at from a business-as-usual perspective, i.e., if the Indian tonnage remains the same percentage of global tonnage. In addition, two rather aggressive growth scenarios, one with Indian tonnage reaching 2.5 per cent and other at 5 per cent of the world tonnage by 2016-17, have also been assumed. The tonnage projections are:

GROWTH SCENARIOS	TONNAGE (GT) - PROJECTED (BY END OF 12 <sup>TH</sup> PLAN)
Business as Usual (same percentage of world tonnage)	12.4M
Indian tonnage expands to 2.5 per cent of world tonnage	26.6M
Indian tonnage expands to 5 per cent of world tonnage	53.3M

Source: 12<sup>th</sup> Five Year Plan.

### INLAND WATER TRANSPORT (IWT)

Provided that the IWT infrastructure develops sufficiently, the cargo potential on the existing five national waterways is projected to increase to about 47 MMT by 2019-20 and to 92 MMT by 2031-32. The composition of projected cargo is expected to be similar to the current structure comprising of coal, agriculture & forest products and others with coal forming the bulk of the volume.

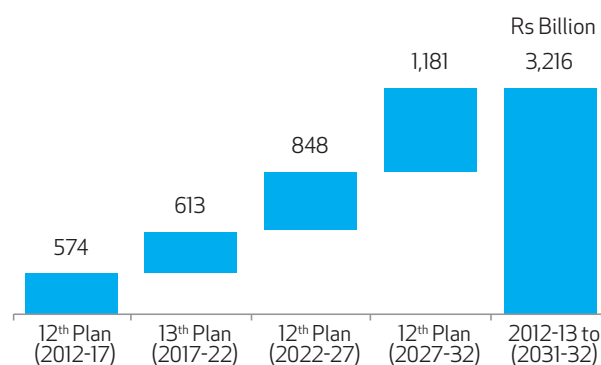
## INVESTMENTS

### PORTS

An estimated cumulative investment of over Rs 3 trillion shall have to be made to create the projected port capacities of about 4,000 MT by 2031-32. The Plan-wise break-up of projected investments (in Rs billion) in building port capacities including that for dredging, is shown in the figure below.

### SHIPPING

The projected investment towards Indian tonnage growth, basis the three scenarios considered, are placed hereunder. Even for a business as usual case, India will have to make an investment to the tune of Rs 25 billion during the 12<sup>th</sup> Plan on creating Indian tonnage which is consistent with its present share in the world tonnage.



Source: NTDP (2012b).

GROWTH SCENARIOS	TONNAGE (GT) - PROJECTED (BY END OF 12 <sup>TH</sup> PLAN)	ESTIMATED EXPENDITURE (RS BILLION)
Business as usual (same percentage of world tonnage)	12.4M	25
Indian tonnage expands to 2.5 per cent of world tonnage	26.6M	320
Indian tonnage expands to 5 per cent of world tonnage	53.3M	800

Source: 12<sup>th</sup> Five Year Plan.

### INLAND WATER TRANSPORT (IWT)

The volume of cargo moved through inland water transport remains very low, confined largely to the movement of iron ore in Goa and fertiliser raw material in the West Coast region. Development of inland water transport with adequate intermodal connectivity can help to reduce the congestion on roads and rail and reduce CO<sub>2</sub> emissions. In order to support the cargo growth expected by the end of the 15<sup>th</sup> Plan, an investment of about Rs 640 billion is projected for development of IWT, with about Rs 300 billion contributed by the government and the rest by the private sector.

A total investment of about Rs 4,000 billion<sup>8</sup> is projected for desired development of the ports and shipping sector till the end of the 15<sup>th</sup> Plan.

## KEY RECOMMENDATIONS

The Indian ports and shipping sector suffers from poor incentives, lack of clarity in the regulatory structure coupled with overlapping jurisdiction of institutions charged with sector oversight and a debilitating prevalence of ad hoc and piecemeal decision making. Neither the regulatory structure nor capacity has kept pace with the enormous growth in traffic witnessed in the last decade due to India's increased integration with the global economy. Coastal shipping as well as Inland water transport has grown far less optimally than what

8. Of the total sectoral investment projected, shipping investments have been projected only upto the end of the 12<sup>th</sup> plan (i.e., 2016-17).



would have been ideally desirable, given the low unit transportation cost and environmental impact.

The Committee is making the recommendations with the intent to provide a long term direction to the future development and governance of Indian ports while aiming to incentivise and integrate water based transport for it to play an increasing role in the national transport network. Needless to say, most of these recommendations shall bear fruit when their implementation results from well co-ordinated and planned integration between agencies at various levels so that the maritime capacities created complement one another in an integrated national network. Following is a summary of recommendations made, which are then followed by an indicative time plan mapped against the key recommendations.

## PORTS

There is a strong need to put in place an overarching long-term theme for national port development that prioritises and guides investments while also paving way for regulatory reforms and suitable governance structure.

### STRATEGIC VIEW ON PORT INVESTMENT

Indian ports will have to be adequately invested, efficient and cost effective to be globally competitive, particularly in terms of superior multi-modal hinterland connectivity and higher drafts of at least 17 metres at the major ports. One of the key government priorities should be to invest in four to six Mega ports over the next 20 years, with two to three on each coast to substantially cater to our foreign trade and the estimated requirement of raw material imports and exports by 2030.

These mega ports can be established either by transforming some of the existing major (or non-major) ports into mega ports, if feasible, by combining some major and minor ports, or by setting up totally new mega ports. This would call for close coordination with the maritime states. Contingent on such a decision, the location of these ports should be harmonised with plans for the NHDP and the upcoming dedicated freight corridors as well as those that are planned in future, so that there is efficient multi-modal connectivity.

An expert group needs to be expeditiously set up to study and identify potential locations for development of these mega ports while giving special consideration to the immense trade potential with the east.

#### **a) Strategic Institutional shift: Landlord Model of Port Governance**

The ports in India, essentially the major-ports, widely follow a hybrid format of the long obsolete service port model and the preferred landlord model. The

Based on the assessed levels of competition between ports and between similar cargo handling terminals in a region, tariff determination should be left to market forces. Only in cases of inadequate competition, or serious market imperfections, may some pricing control be required.

hybrid approach has resulted in a conflict of interest between the port trusts and the private sector, with the former acting both as port regulators and providers of commercial services in many instances.

Whereas there has been consensus within the various echelons of the Government for moving to landlord model of port governance and corporatisation of major port trusts, there has been little progress towards its implementation. There is immediate need to make appropriate legislative and policy changes to expedite the move to the landlord model and to transform the port trusts to statutory landlord port authorities through specific legislation. All the terminal operations of port trusts would need to be corporatised as public sector corporations. Then, both private- and corporatised public-sector terminal operators would compete under the aegis of the landlord port authority. The corporatised public sector terminal operators could potentially be disinvested, listed, and possibly privatised at a later stage. The landlord port authority would carry out all public sector services and operations such as the award of bids for containers and other terminals, dredging etc.

Moreover, given that non-major ports under the management of maritime states have enjoyed more success as compared to major ports, any progressive regulatory shift should attempt to bring in the cooperation and participation of maritime states.

#### **• Role of TAMP**

Based on the assessed levels of competition between ports and between similar cargo handling terminals in a region, tariff determination should be left to market forces. Only in cases of inadequate competition, or serious market imperfections, may some pricing control be required. Accordingly, TAMP should be restructured under a new Major Ports Authority Act and allowed to regulate tariff setting on a normative basis till such time that it is found essential for lack of competition. TAMP could also act as the Appellate Tribunal for all tariff-related matters where tariff is determined by service providers. TAMP should naturally cease to exist with time as port operations become competitive and tariff regulation is no more required.

A new regulatory authority, Maritime Authority for Ports (MAP), should be constituted under a modernised Indian Ports Act, suitably empowered to

regulate competition and port conservancy across all the major and non-major ports in the country.

*The combination of strategic decisions on investment in Mega Ports and movement to a landlord port system would do much to accelerate the investment in and modernisation of Indian ports.*

#### **b) Strengthening Project Implementation**

The route to much-needed capacity addition to India's ports is through effective implementation of PPP port projects. Three initiatives have been identified for the government, regulators and nodal agencies to facilitate the implementation of PPP port projects in India.

- **High-power group for port projects**

Such a group can add transparency and force decisions to strengthen weak project implementation and enable progress. Its scope should cover a small number of larger projects. The group would essentially identify key projects required to be implemented on a time-bound basis, involving investments above Rs 5 billion and upto Rs 10 billion, or any other project identified to be critical by the Committee. It would escalate inter-ministerial bottlenecks that are impeding important projects (pre- or post-tendering) to relevant authorities, and push for decisions.

- **Capacity Building**

The capacity of port managers as well as officials at the ministry should be developed in structuring of PPP projects and managing private investments. This would help address delays in pre-tendering phase that ultimately affects project implementation schedule.

- **Consultant selection on quality-cum-cost basis**

Paid consultants help to prepare most DPRs and can impact the time and cost of project execution. It is important to select technical consultants using a quality-cum-cost based assessment (QCBA) instead of the traditional L1 based (lowest cost) approach. While QCBA is being increasingly adopted in India, the quality is typically ensured through quantum of past experience and not necessarily by the quality of that experience. For instance, evaluators can look at the magnitude of design changes during project execution in the past and the reasons for the same.

### **SHIPPING**

#### **a) Increasing national tonnage**

- **Cargo assurance through long term charters**

Need for long term charters by PSUs for critical energy cargoes of crude oil, petroleum products and gas could be explored exclusively with Indian ship-owners for Indian flag vessels, which will ensure a dedicated fleet of vessels at competitive rates on a long term basis.

- **A level playing field**

It is important that the Indian shipping industry be provided a level playing field for it to grow and compete globally with vessels under other flags. This shall require rationalisation of restrictive policies, particularly related to imposition of variety of direct/indirect taxes.

#### **b) Managerial and Administrative Capacity**

While technical personnel like marine engineers, master mariners, etc., are formally trained for their job; administrative personnel are brought in to the Directorate for three to five years from other services. The sector loses their valuable experience and expertise as they are repatriated. In this context, it may be useful to identify ways to build and retain expertise within the system, such as building a subordinate cadre. At the same time, in order to build internal administrative capacity, introduction of Indian Maritime Services (IMS) merits consideration.

#### **c) Incentives for Coastal Shipping**

Multiple policy changes can help increase penetration of coastal shipping leading to a cleaner, cost effective and sustainable alternative to rail and road. The following steps merit consideration:

- According priority to coastal ships by setting up coastal terminals at the major ports and identifying and developing five or six non-major ports on the east and west coasts as designated coastal ports.
- Providing adequate road and rail connectivity to these coastal terminals and designated non-major coastal ports.
- Allowing coastal ships to import bunker fuel as well as spare parts with the same concessions availed of by ocean-going vessels.
- Providing fiscal incentives to consignors who shift cargo from road and rail to coastal shipping on the lines of the incentives provided by the EU under the Marco Polo scheme.
- Develop separate wings in development financial institutions to fund coastal shipping.
- Manning scales and vehicle specifications for coastal ships should conform to near ocean-going vessels, which are currently related to ocean going vessels.
- Cabotage—While it may be desirable to exercise absolute cabotage in India, given the current inadequacy of Indian coastal fleet and the need to introduce competition and growth in containerisation, certain degree of cautious relaxation in Cabotage policy might be needed for next couple of years till coastal shipping grows sufficiently. To clarify, the more desirable absolute cabotage might be imposed beyond a certain growth in national tonnage and achievement of desired outcomes.

Accordingly, the following is suggested:

- Absolute cabotage for import and export of crude, critical energy cargoes and defence equipment/parts
- Relax cabotage to allow foreign vessels to carry bulk/general cargo and transhipped EXIM containers, including empty containers on Indian waters. This would help meet the principal objective of enhancing domestic mobility for Indian cargo while also inducing competition led efficiency and reduced load on road transport.

#### INLAND WATER TRANSPORT

- **Development of adequate depth (LAD):** Efforts should be made to develop deeper stretches of the rivers for IWT/navigational purposes (at least 2.5 m, preferably 3.0 m LAD for round the year navigation).
- **Focus North-East:** Given that the available draft in the waterways is low, the appropriate strategy would be to focus on the waterways in the North East Region (NER). Set up terminals and cargo handling facilities at strategic locations in the north-east and provide adequate connectivity to road and rail.
- Provide support at concessional terms for setting up cargo handling facilities and for the acquisition of vessels
- Provide fiscal incentives to consignors using inland water transport
- **Modal integration:** IWT terminals need to have sufficient connectivity with road and preferably with rail for last mile connectivity, on lines of bi-modal and tri-modal concept of developed waterways of other countries. Following are proposed:
  - **Identification of potential multimodal corridors:** This requires detailed mapping of waterways and industrial clusters and analysis of origin and destination cargo to undertake development of suitable waterways as well as multimodal transport hubs in IWT Corridors.
  - **Develop IWT feeder routes:** There is need to develop the feeder routes on the water under jurisdiction of State, to National waterways so that the entire channel can be developed on the 'fish bone structure'.
  - In many stretches, IWT and coastal shipping operations could be integrated to accommodate hinterland, coastal and international traffic.

## THE ROUTE

RECOMMENDATION	OBJECTIVE	SHORT-TERM	MEDIUM-TERM	LONG-TERM	EXPECTED GAINS
		1-5 YEARS	5-10 YEARS	10-20 YEARS	
PORTS					
Drafts at Major Ports	Accommodating larger mother vessels	Draft at major ports needs to be increased <b>to at least 17 metres</b> , by the first half of 13 <sup>th</sup> Plan			Economies of scale - Increased cost competitiveness
Develop 4-6 Mega-ports	Strategic and efficient Investments for superior multi-modal hinterland connectivity, substantial improvement in available drafts and port capacity	Initiate technical studies			- Economies of Scale - Economies of Scope - Growth in Containerisation - Growth in Coastal Shipping - Strategic gateway to the emerging East
		Identify potential locations			
		Harmonise with planned and future Highways/Rail Freight Corridors	Harmonise with planned and future Highways / Rail Freight Corridors	Harmonise with planned and future Highways / Rail Freight Corridors	
			Develop 2-3 Mega Ports		
			(Consider Port for connectivity to ASEAN)	Develop 2-3 Mega Ports	
Shift to Landlord Model of Port Governance for Major Ports	Adoption of suitable port governance model that encourages private investments and efficiency through competition	Corporatise Landlord Port Authorities			- Private Investments - Competition - Operational Efficiency - Government disengagement from operations
		Unbundle Terminal Operations and Corporatise			
		Induce Competition			
		With competition, deregulate tariff and restructure TAMP			
			Competition Regulation		
SHIPPING					
Cargo Assurance	Increasing National Tonnage	Possibility of long term charter contracts with PSUs for critical energy cargoes could be explored			- National Fleet - Alleviate National Security concerns - Create jobs - Stable freight cost
Coastal Terminals and dedicated Ports	Promote Coastal Shipping	Set-up Coastal terminals at Major ports			- Reduced congestion on roads and railways - Reduced CO <sub>2</sub> emissions
		Identifying 5-6 Non-Major ports on east and west coasts as designated coastal ports			
		Develop 2-3 of such ports	Develop 2-3 of such ports		
		Provide Rail / Road Connectivity to Terminals and ports			
Cabotage	Improve mobility while protecting coastal shipping	Absolute cabotage for EXIM crude, critical energy cargo and defence related			- Competition led efficiency - Reduced cost
		Relax cabotage for Bulk/General cargo and trans-shipped EXIM containers (including empty containers)			
				Absolute Cabotage	

RECOMMENDATION	OBJECTIVE	SHORT-TERM 1-5 YEARS	MEDIUM-TERM 5-10 YEARS	LONG-TERM 10-20 YEARS	EXPECTED GAINS
Inland Water Transport					
Develop Adequate Depth	Improve Navigational Infrastructure	Initiate technical studies for optimal route length			<ul style="list-style-type: none"> <li>- Improved carrying capacity</li> <li>- Reduced land congestions</li> </ul>
		Develop deeper stretches of the rivers (at least 2.5 m, preferably 3.0 m LAD)			
Focus on North East	Address low draft available in the waterways	Set up terminals and cargo handling facilities at strategic locations in the North-East			<ul style="list-style-type: none"> <li>- Exploit the natural draft at NER</li> <li>- Strengthen opportunities for Strategic linkages for the region</li> </ul>
Incentivise Vessel Acquisition and Cargo Handling Facilities	Encourage investments in IWT infrastructure	Consider Inland vessels in the Tonnage tax regime			<ul style="list-style-type: none"> <li>- Increase private participation</li> <li>- Improved infrastructure</li> </ul>
		Provide concessions for setting up cargo handling facilities			
Multi-modal Integration	Provide last mile connectivity	Initiate studies for mapping of waterways and industrial clusters	Develop suitable waterways and multi-modal transport hubs in IWT Corridors		<ul style="list-style-type: none"> <li>- Efficient inland movement of cargo</li> <li>- Economies of scale</li> </ul>
			Develop IWT Feeder routes (Fish-bone structure)		<ul style="list-style-type: none"> <li>- Integration with coastal operations</li> </ul>
OTHERS					
Improve water Statistics	Address current gaps in data	Periodic review of Water Transport statistics (once every 5 yrs)			Improved monitoring of trends and performance of the water transport sector for effective decision making
		Training of officials			
		Concurrent audit of statistical activities			



## Annex 4.1

### Draft Available at Major Ports

PORT	LENGTH OF ENTRANCE CHANNEL (KM)	DRAFT (METRES)	DRAFT AVAILABLE AT BERTHS (METRES)	
			MIN.	MAX.
Kolkata	232	7.2	7.2	13.7
Haldia	115	7.2 13	Subject to tidal variations	
Paradip	500	(17 m by June, 2012)	11.0	21.0 (SPM)
Visakhapatnam	IH-2.0 OH-3.1	IH-11.0 OH-20.0	8.0	17.0
Ennore	3.775	16.0	15.0	15.0
Chennai	6.7	IH-18.6 OH-19.2	8.5	17.4
V.O. Chidambaranar	4.0	12.8	5.85	12.8
Cochin	10.5	14.5	9.14	22.5(SPM)
New Mangalore	14.0	14.0	7.0	12.5
Mormugao	4.6	14.4	12.0	14.1
Mumbai	9.6	10.7	7.0	12.0
JNPT	10.0	11.0	5.0	13.5
Kandla	25.0 OOT-8.0	11.6 OOT-23.5	9.1	30 (SBM)

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