सत्यमेव जयते

MINISTRY OF SHIPPING
Government of India

पोत परिवहन मंत्रालय
भारत सरकार

SAGARMALA

National Perspective Plan Executive Summary


Port Modernisation


Port Connectivity


Port Led Industrialisation


Coastal Community Development

Executive summary

Potential for coastline development in India

India is richly endowed with natural maritime advantages, with a 7,500-km coastline covering 13 states and union territories, a strategic location on key international trade routes and 14,500 km of navigable and potentially navigable waterways. Maritime logistics has been an important component of the Indian economy, accounting for 90 per cent of EXIM trade by volume and 72 per cent by value. More than 1 bn tonnes of cargo was handled across over 200 ports in FY 2015.

A robust maritime logistics sector with modern and efficient port infrastructure can be a strong catalyst of economic growth. EXIM trade can become competitive through cost-efficient and timely logistics. Coastal and inland waterway transportation is energy efficient, eco-friendly and reduces logistics costs for domestic freight. However, the Indian coastline and river network has historically remained under-leveraged. Despite significantly lower costs, water transport accounts for only 6 per cent of total freight movement in India in tonne km terms. Industrial development has not fully utilised the structural advantages of efficient supply chains leveraging proximity to coast.

Logistics costs account for a large part of the Indian non services GDP compared to developed nations. EXIM containers in India travel a distance of 700 to 1,000 km between production centres and ports, compared to 150 to 300 km in China. Lack of seamless connectivity across various logistics modes and complexity in procedures contribute to high variability in transit times. As a result, container exports take 7 to 17 days from the hinterland to vessel, compared to 6 days in China. The high variability of transit time impacts the trade since exporters are not able to commit to tight delivery schedules and have to finance higher working capital.

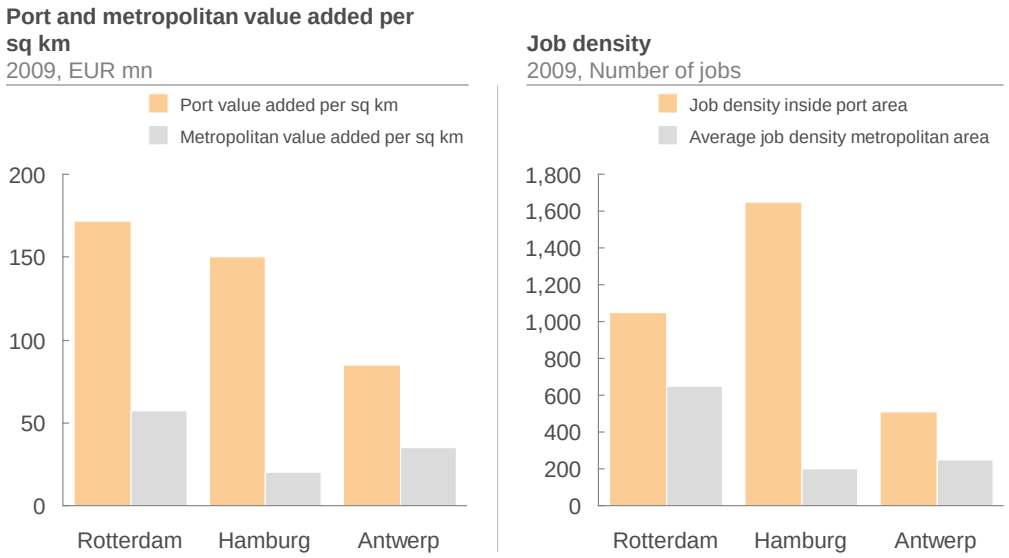
Adequate road and rail connectivity linkages to ports have not been developed in tandem with port development, resulting in instances of new ports with modern facilities being underutilised due to connectivity bottlenecks. For example, one of the factors impeding the utilisation of non-major ports of southern Maharashtra is poor connectivity between industrial centres and ports. Inadequate road and rail linkages through the Western Ghats constrain North Karnataka's development. Inadequate focus on developing coastal shipping and inland waterways for domestic (non-EXIM) logistics has skewed the modal mix of transport in India with a disproportionately high share of roadways.

The siting and master planning of industrial clusters and zones (often with high EXIM traffic) does not adequately take into account proximity to ports. The port land itself is inadequately utilised for setting up industries and manufacturing. Major ports have 2.71 lakh acre of land, of which 2.35 lakh acre is underutilised. Raw material often travels a large distance from coastal areas to the hinterland and then finished products travel back from the hinterland to the coast for exports. This reduces the competitiveness of Indian exports compared to other exporting countries.

Internationally, several ports have been successful in generating higher value-add and jobs inside the port area compared to the metropolitan area (Exhibit 1). Existing policies in India for usage of port land are focused on maximising rental yields, rather than the maximisation of overall economic value-add and job creation.

EXHIBIT 1

Value-addition and job density inside the port area



SOURCE: "The Competitiveness of Global Port-Cities" by OECD

Indian ports are often small, inefficient and lack the draft to accept larger sized vessels. As a result, no Indian port ranks among the global top 20 (Exhibit 2). In addition, some ports like JNPT are congested while others do not have sufficient cargo.

EXHIBIT 2

Comparison of India, China, US on a few port-related KPIs

	India	China	US
Port capacity stock *(% of GDP)*	1	3	10
Number of shipyards[2]	7	70	45
Number of ports in global top 20	0	9	2
Container traffic *(mn TEU)*	11	185	44
Average annual growth in container traffic[1] *(mn TEU)*	0.5	10	0.4
Contribution of waterways in domestic transportation[3]	~6%	24%	6%
Average turn-around time *(Days)*	4.5	1	1.2

1 Over 2008–2012
2 That can make more than 120 mts long ships
3 Includes both Coastal Shipping and Inland Waterways

SOURCE: Expert discussion; World Bank; Lloyd's list; OECD; Port technology; Clarksons

Port-led development opportunity for India

Industrialisation positively impacts per capita income and hence the prosperity of the region. However, for industrialisation to be competitive, it needs to have effective and efficient logistics. Proximity and/or adequate linkages to ports are important factors industry to be competitive. The opportunity from pursuing port-led development is immense in India, as evident from a comparative analysis with China (Exhibit 3). China leads India by a factor of seven times to 16 times on the measured parameters.

EXHIBIT 3

Comparative impact of port-led development on economies of India and China

			India	China	China/India
Size		**Land mass** (mn sq km)	3.3	9.6	3X
		GDP (USD trillion)	1.9	9.2	5X
Port-led develop-ment	Energy	**Cost of energy** (cents/kWh)	19	11	-42%
		Electricity production (bn kWh)	1,000	5,000	5X
		Petchem crackers (number)	07	46	7X
	Materials	**Steel production** (mn tonne)	87	823	10X
		Cement production (mn tonne)	280	2,480	9X
	Discrete Mfg	**Container traffic** (mn TEUs)	11	174	16X
		Merchandise export (USD bn)	317	2,343	7X
Services		**Mobile subscribers** (mn)	1,000	1,290	1X
		Internet subscribers (mn)	354	659	2X

The Sagarmala initiative was conceived by the Government of India to address the challenges and capture the opportunity of port-led development comprehensively and holistically. Sagarmala is a national programme aimed at accelerating economic development in the country by harnessing the potential of India's coastline and river network. Sagarmala was articulated by the then Prime Minister Shri Atal Bihari Vajpayee in 2003 and announced by the Prime Minister Shri Narendra Modi in 2014. It was approved by the Union Cabinet in March 2015.

Sagarmala vision

"The vision of Sagarmala is to reduce logistics cost for both domestic and EXIM cargo with minimal infrastructure investment." Studies under Sagarmala have identified opportunities for reducing overall logistics costs, thereby improving the overall efficiency of the economy and increasing competitiveness of exports. A multi-modal logistics optimisation model has been developed to identify the most optimal mode of evacuation to/from ports for both EXIM and domestic cargo. The model suggests substantial opportunities for logistics optimisation.

Based on these studies, Sagarmala can aspire to reduce logistics costs for EXIM and domestic cargo leading to overall cost savings of INR 35,000 to 40,000 cr. Some of this will be direct cost savings, while others are savings from inventory-handling costs resulting from time (and reduced variability) in transportation of goods, particularly containers. These cost savings apply to current industrial capacities as well as future coast proximate capacities for energy, material, marine and discrete industries that could come up through port-linked industrialisation. Four main strategies have been identified for achieving the overall vision of logistics cost-reduction (Exhibit 4), and their impact is depicted in Exhibit 5.

EXHIBIT 4

Sagarmala vision

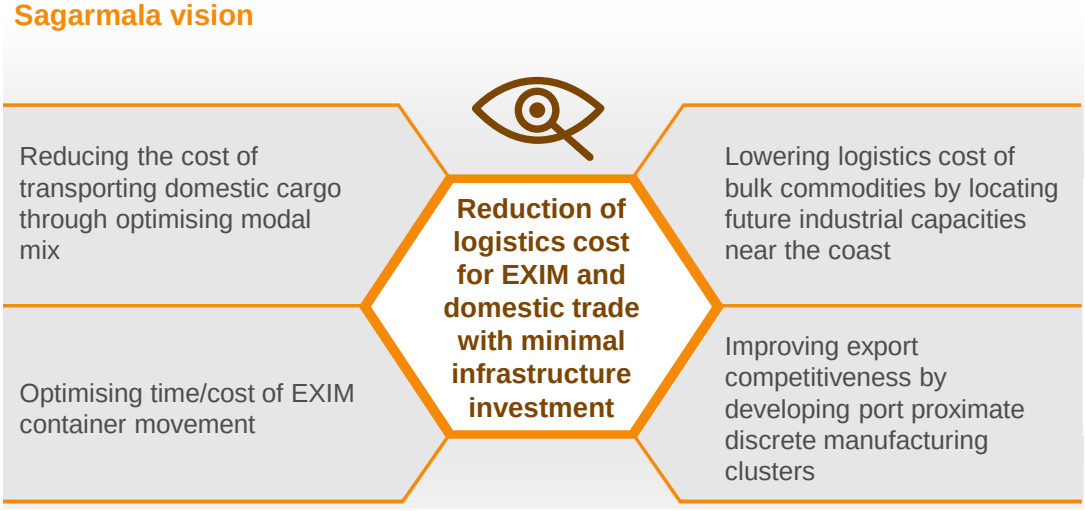
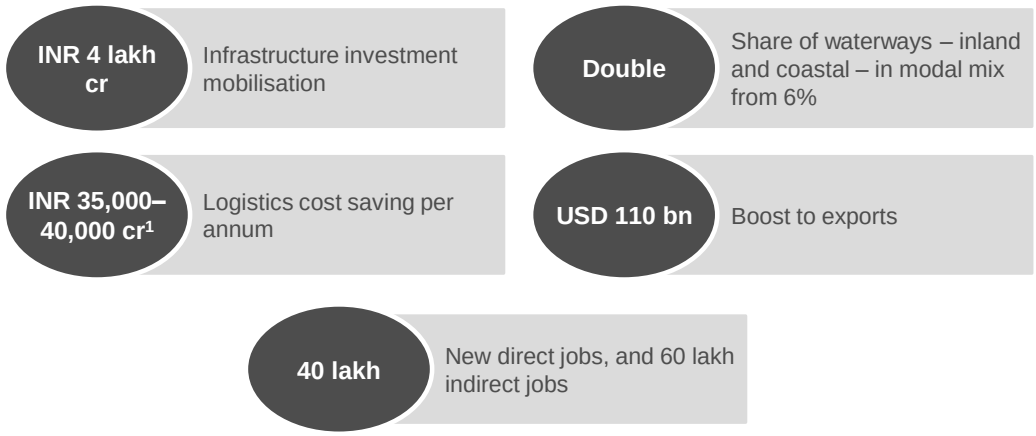


EXHIBIT 5

Impact from Sagarmala – 2025



1 Savings from coastal shipping of coal – 17,000 to 18,000 Cr
Savings from coastal shipping of steel, cement, food grains and fertilisers - 11,500 to 13,500 Cr
Savings from modal shift and time and variability reduction of containers - 7,000 to 9,000 Cr

1. Reducing the cost of transporting domestic cargo through optimising modal mix[1]

The cost per tonne kilometre of moving cargo by sea or inland waterway routes can be 60 to 80 per cent lower than by road or rail. However the modal share of coastal shipping and inland waterways remains low. Several production and demand centres in India lie close to the coastline and rivers, yet the waterways are underutilised. The study found significant potential for moving raw materials and finished products between these centres using coastal shipping and inland waterways instead of rail or road.

For example, coastal shipping can play a significant role in lowering the delivered cost of domestic thermal coal. It is estimated that for power plants located 800 to 1,000 km away from coal mines, the cost of coal logistics can contribute up to 35 per cent of the cost of power at the bus bar. Coastal power plants in Andhra Pradesh and Karnataka are currently receiving coal from Mahanadi Coalfields by railways, but could save significantly by taking coal on the rail-sea-rail (RSR) route. It is estimated that 100 to 130 mn tonnes of coal could move through the RSR route to these plants by 2020, resulting in annual savings of over INR 10,000 cr to the power sector. In addition, up to 50 mn tonnes could be moved coastally for non-power thermal coal users (for example, cement, steel, aluminium plants). This increases further in 2025 (Exhibit 6). Other commodities such as steel, cement, fertilisers and food grains could also be moved coastally to the extent of about 60 mn tonnes by 2025. Further, about 20 mn tonnes of petroleum products could be moved coastally from refineries in Gujarat and Odisha to demand centres in Tamil Nadu and Andhra Pradesh.

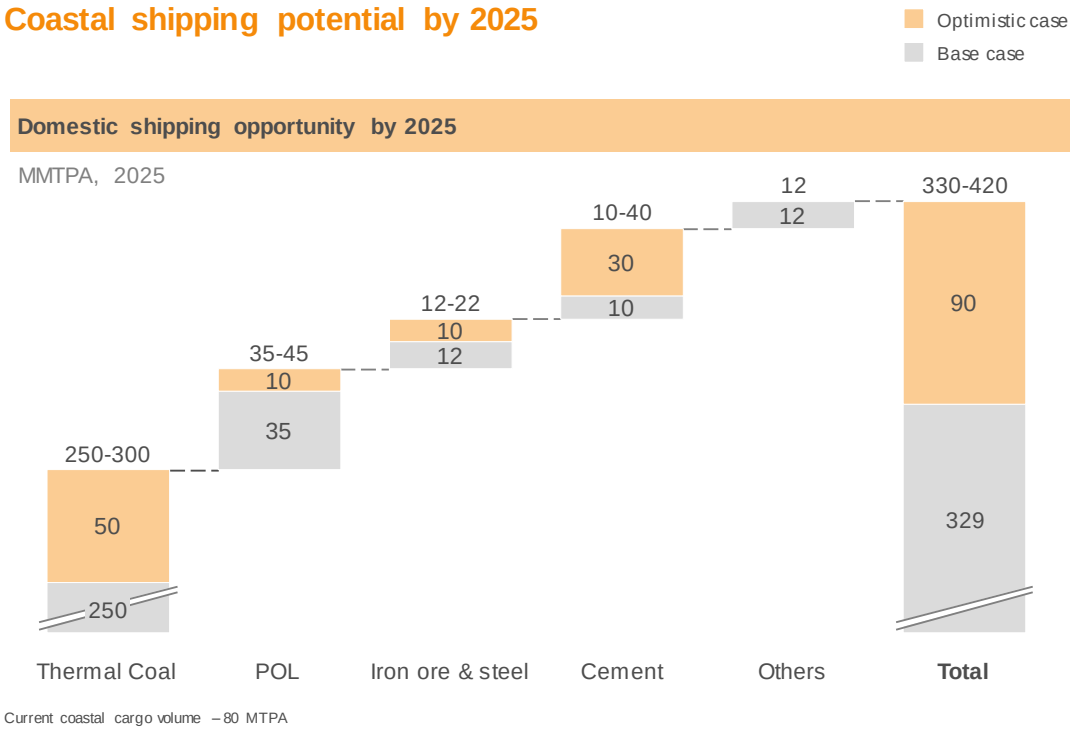
In addition, an estimated 60 to 70 mn tonnes of cargo can also be moved over inland waterways (with focus on NW1, NW2, NW4 and NW5) by 2025.

The change in modal mix could also lead of emission savings of about 3.5 per cent of total freight sector emissions.

1 Detailed methodology and sources in the subsequent chapters

EXHIBIT 6

Coastal shipping potential by 2025



Current coastal cargo volume – 80 MTPA

2. Lowering logistics costs of bulk commodities by locating future industrial capacities near the coast

For industries in which logistics costs of bulk raw materials, intermediates or finished goods form a significant component of the cost of goods sold, locating future capacities at or near coastal locations could be a lever for designing efficient supply chains. Some examples of such industries include oil refining (especially in India where 75 to 80 per cent of crude oil is imported), power, cement/clinker, steel (and raw materials like pellets). Future capacities could be developed in competitive coastal locations either close to end markets or close to raw material sources. This could reduce the overall logistics costs and eventually the cost of the end product.

As a result of this, coastal shipping volumes could grow to 5 times of current levels to about 330 to 420 mn tonnes by 2025. This would save logistics costs of about INR 23,000 to 25,000 cr per annum and free up over 2 to 2.5 lakh rail-rake days.

Unlocking the full potential of coastal shipping in India would require the execution of a set of coordinated projects across multiple stakeholders. For example, for realising the potential of coastal shipping of coal, required projects include expansion of port capacity in Paradip/Dhamra, expansion of railway capacity connecting Talcher/Ib Valley to Odisha ports and creation of end-to-end logistics service providers.

3. Optimising time/cost of EXIM container movement

The total cost of EXIM container movement in India is significantly higher compared to other countries (Exhibit 7). The transit time is highly variable (seven to 17 days), making it difficult for exporters to plan container logistics and to commit to tight deadlines to their customers. The high transit time results in higher levels of inventory along the supply chain. Some of

the root causes of sub-optimal container movement include:

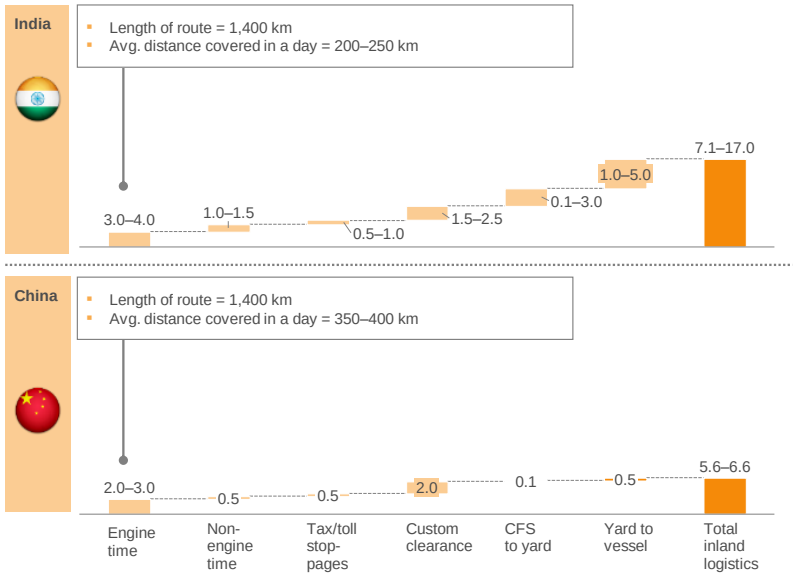
- Skewed modal mix: Container movement of above 500 km by road instead of railways. Road has more than 80 per cent share of traffic while railways has less than 20 per cent share
- Complicated and time consuming procedures for customs and interstate border formalities
- Infrastructure bottlenecks at ports, roads and Inland Container Depots (ICDs) resulting in overall lower speed of transit

EXHIBIT 7

Comparison of end-to-end time of transporting a container in India and China by road on similar routes

BOTTOM UP ANALYSIS FOR ROAD TIME

Days/TEU



- **Indian containers can take 1.5x more time than Chinese containers with the time being highly variable due to**
  - **Lack of automation of customs process**
  - **Lower speed of trucks**
  - **Congestion and inefficiencies at ports**

1 Ocean distance = 6,658 NM

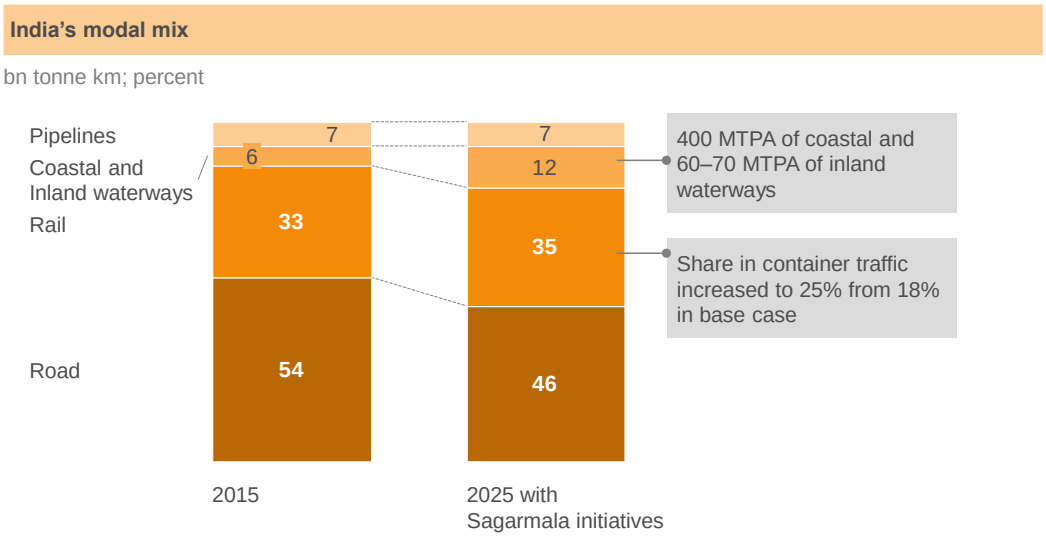
SOURCE: Expert discussions

Optimising time and cost for transporting export containers would improve the competitiveness of exports. A total of five days of export time and an average cost of INR 1,000 to 1,500 per container can be saved on container exports. The range of actions to realise this opportunity include:

- Increasing modal share of railways from current 18 per cent to at least 25 per cent through rationalisation of railway freight rates (Exhibit 8), to make rail movement economical relative to road movement for longer lead distances
- Extending the reach of Western Dedicated Freight Corridor (DFC) connectivity through building spur lines connecting additional ports in Gujarat and Maharashtra
- Expressways in select high volume road corridors
- Greater automation and streamlining of clearance procedures
- Creation of additional multimodal logistics hubs and ICDs
- Milk run railway services of container trains between ICDs.

EXHIBIT 8

Sagarmala could help in optimising India's modal mix



4. **Improving export competitiveness by developing port proximate discrete manufacturing clusters**

The weighted average of distance between the manufacturing hinterlands and the port for India is 700 to 800 km compared to 150 to 300 km in China. Even though India fares better than China in transportation cost for a comparable distance, the longer hinterland to port distance leads to higher costs for exporting/importing a container in India.

International experience suggests that India can leverage export-oriented/import-substituting discrete manufacturing for creating economic activity in coastal areas. Port-based or port-proximate manufacturing can play a pivotal role in supporting this initiative. This study identified focus sectors for port-based or port-proximate manufacturing. Six sectors—electronics, furniture, automotive, apparel, leather and footwear and food processing—offer high potential. These sectors can have strong port linkages in terms of value-to-weight ratio and time sensitivity.

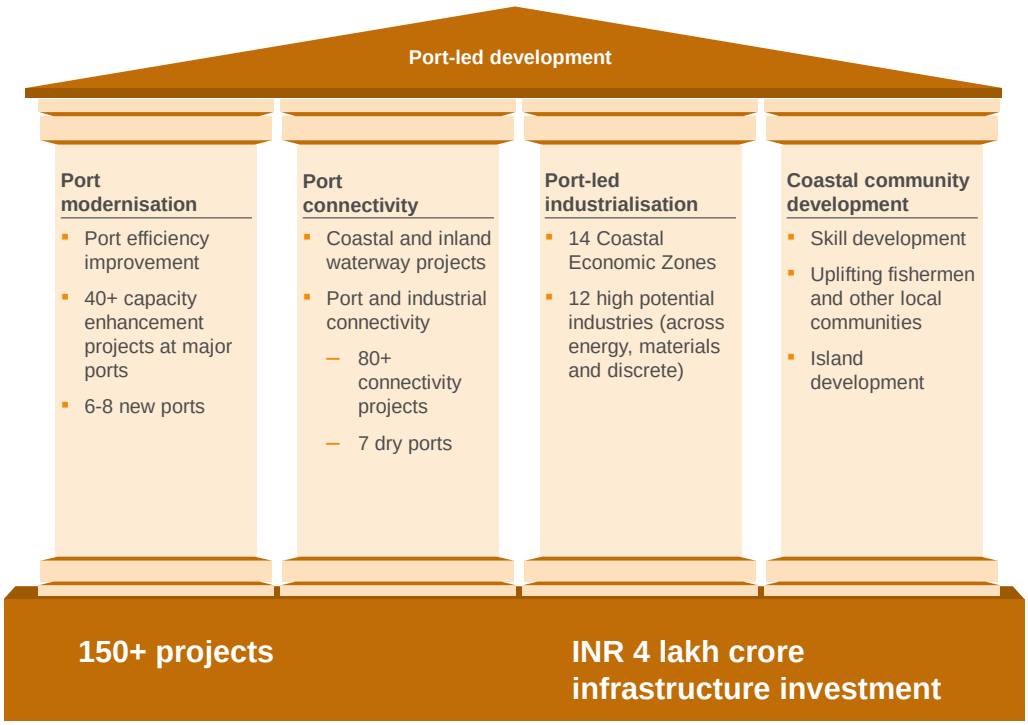
Projects identified under Sagarmala

The concept of "port-led development" is central to the Sagarmala vision. Port-led development focuses on logistics-intensive industries (where transportation either represents a high proportion of costs, or timely logistics is a critical success factor). These industries can be structurally competitive if developed proximate to coast/waterways. They would be supported by efficient and modern port infrastructure and seamless multi-modal connectivity. The population in adjoining areas would be sufficiently skilled to participate in the economic opportunities on offer. The synergistic and coordinated development of the above four components—logistics intensive industries, efficient ports, seamless connectivity and requisite skill base—leads to unlocking economic value.

The Sagarmala National Perspective Plan (NPP) has identified a range of projects and enablers under these four pillars, which can unlock the opportunities for port-led development (Exhibit 9). The rest of this section summarises the key findings and projects associated with each pillar. Over 150 projects have been identified across these four pillars. Executing these projects could mobilise an investment of INR 4 lakh cr in the infrastructure sector. An additional investment of INR 7 to 8 lakh cr could be in the industrial and manufacturing sectors.

EXHIBIT 9

Sagarmala: Port-led development

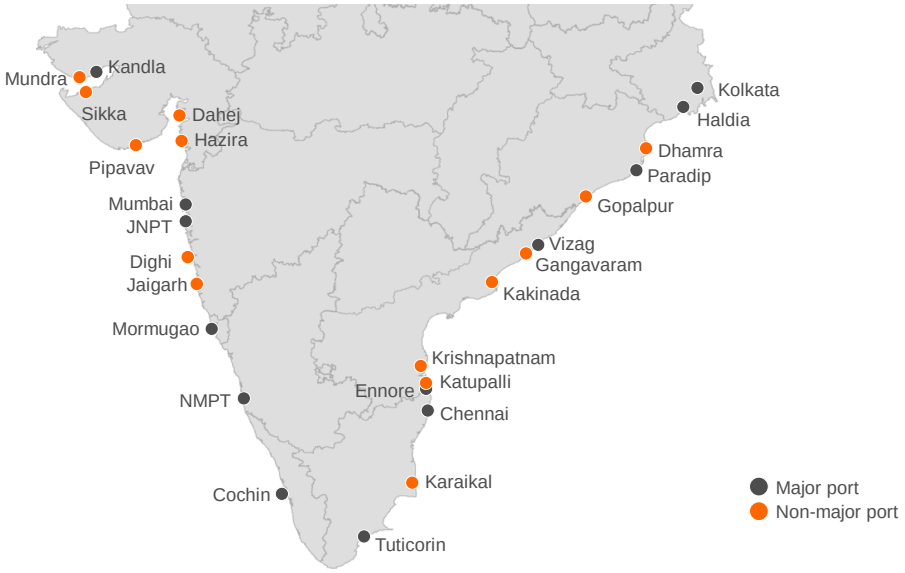


1. **Port modernisation: Build port capacity with world-class quality and right quantity**

Increasing port efficiency facilitates trade. India has a coastline of around 7,517 km with 12 major ports and around 200 notified non-major ports (Exhibit 10). The ports are important intermodal units, acting as the interchange point for two modes — sea and land (Exhibit 11).

EXHIBIT 10

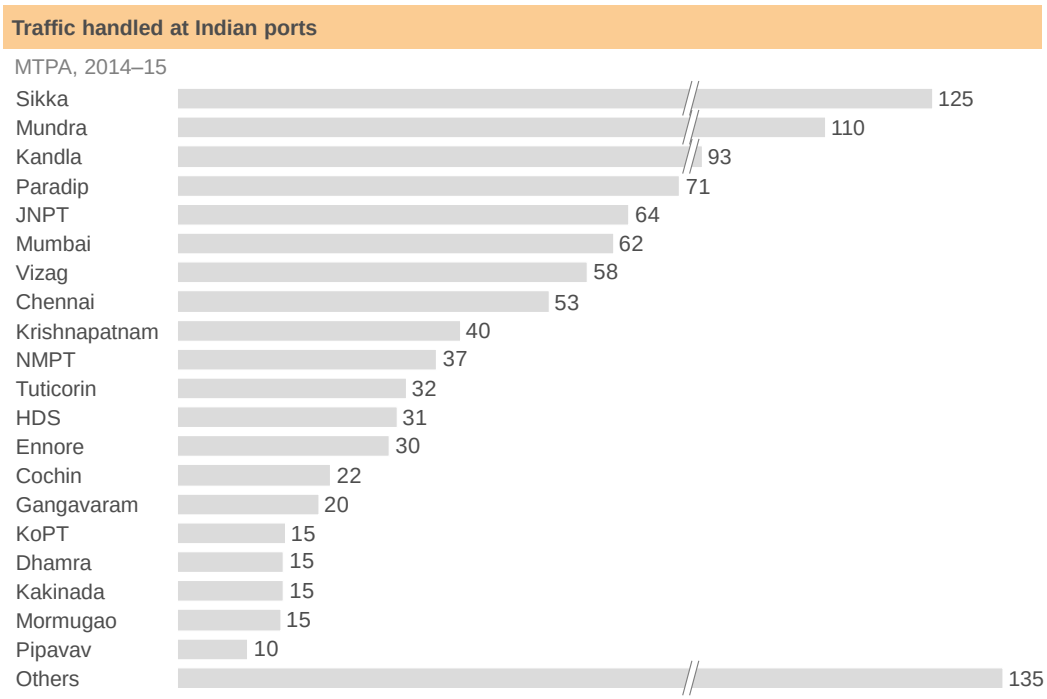
Prominent ports of India



SOURCE: IPA

EXHIBIT 11

Traffic handled at Indian ports



SOURCE: IPA

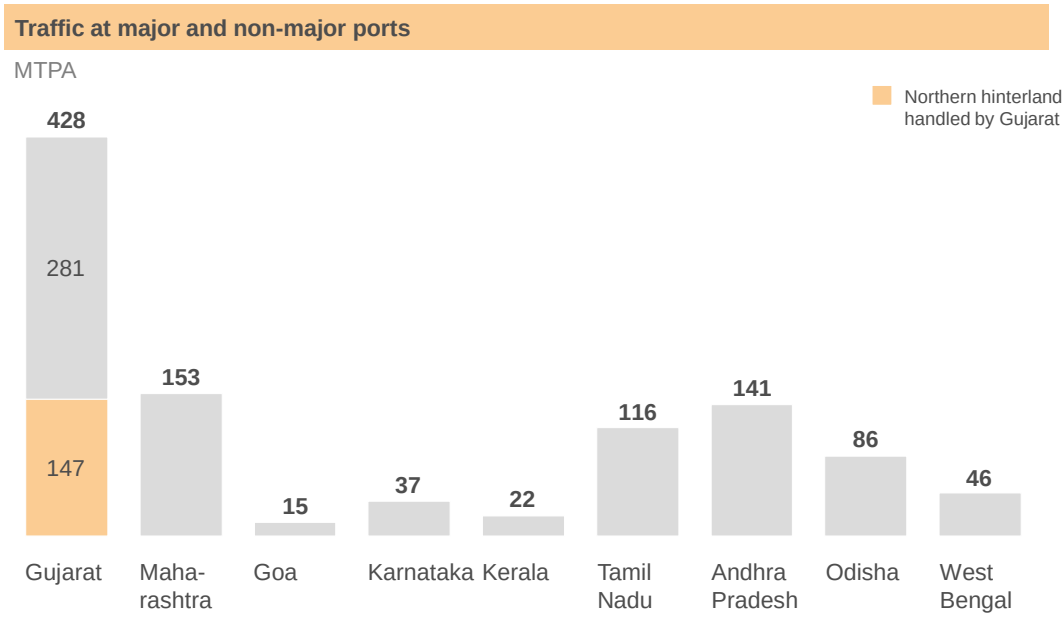
Indian ports are generally small—most lack the necessary draft to handle the largest (cape sized) vessels. The average size of a container vessel calling at Indian ports is around 5,000 TEUs[2] while for China it is around 12,000 TEUs. At JNPT—India's biggest container port—draft is 14 m while a cape size vessel requires upwards of 16 m. Around 25 per cent of India's container cargo is transshipped through international transshipment ports.

In 2014–15, Indian ports handled ~1,050 MTPA of cargo, growing at a rate of 4.5 per cent per annum. Western coast ports handle more than 60 per cent of the total cargo owing to the large northwest hinterland (Exhibit 12).

2 Ports data

EXHIBIT 12

State-wise cargo traffic in 2015



SOURCE: Updated basic port statistics

Projected cargo volume at Indian ports by 2025 is estimated at 2,500 mn MTPA (Exhibit 13). The detailed methodology for the cargo and port capacity projections is in the details of the NPP.

EXHIBIT 13

Cargo volume growth at Indian ports by commodities

MTPA

Commodity	2014	2025		
		Base	Optimistic	Total
POL	351	460	80	540
Coal	231	850	128	978
Containers	115	323	53	375
Others	275	527	80	607
Total[1]	972	2,160	341	2,500

1 Numbers may not add up due to rounding

Much of the growth may come from coastal shipping of bulk commodities. While EXIM cargo will double over the next decade to ~1,671 MTPA, the share of coastal shipping can increase five times, taking its share in port traffic from the current 15 per cent to over 33 per cent (Exhibit 14).

EXHIBIT 14

EXIM and domestic shipping cargo growth

MTPA

Commodity	2014	2025		
		Base	Optimistic	Total
EXIM	820	1,511	161	1,671
Domestic shipping	150	649	180	829
Total	970	2,160	341	2,500

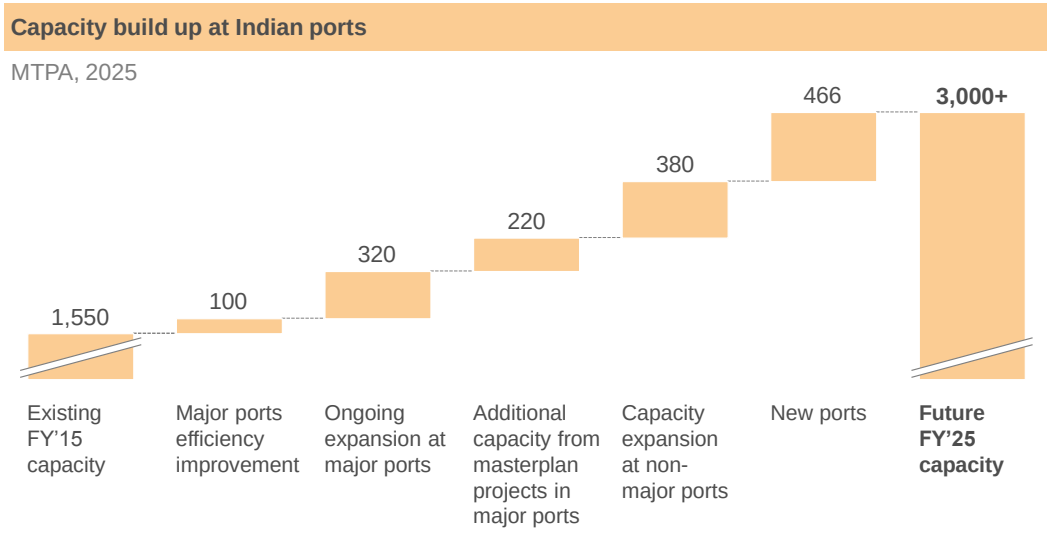
Catering to the increasing traffic over the next 10 years will require augmenting capacity. Cargo traffic at the ports is expected to be 1,650 MTPA in 2020 and reach 2,500 MTPA by 2025.

To cater to this demand, the ports will need to create additional capacity (Exhibit 15) by:

- Unlocking 100 MTPA capacity at existing terminals of major ports through improved efficiency
- Increasing capacity at existing major ports through mechanisation and building new terminals
- Increasing capacity at existing non-major ports through mechanisation and building new terminals
- Building six to eight greenfield ports.

EXHIBIT 15

Capacity build up at the ports to meet the 2025 demand



More than total capacity, it is critical to have adequate capacity at the right place

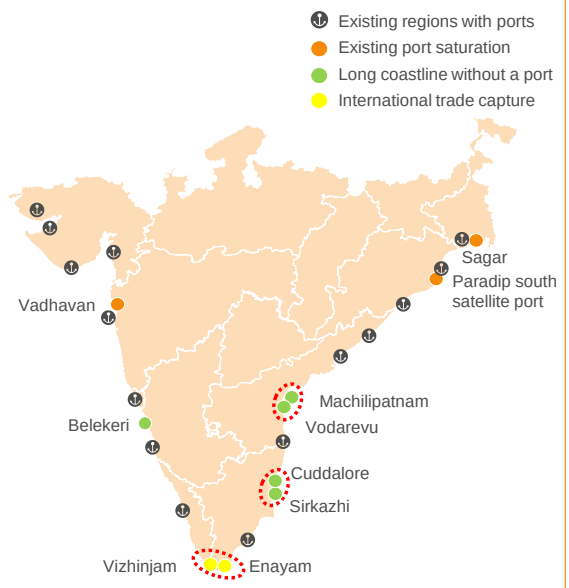
New ports could potentially be created at Sagar in West Bengal, Paradip Outer Harbour in Odisha, Enayam in Tamil Nadu and Vadhavan in Maharashtra. In addition, potential has been identified for new ports to come up in central Andhra Pradesh, south-eastern Tamil Nadu, and possibly northern Karnataka (Exhibit 16).

EXHIBIT 16

6-8 potential new ports based on three themes have been identified that could add upto 400 MTPA

Three themes for identifying new port locations	
Port saturation	▪ Vadhavan - JNPT (handling ~40% of container traffic) is saturated and requires a satellite port ▪ Paradip outer harbour - To handle 150-200 MTPA of coastal shipping of coal for power plants in Southern and Western India ▪ Sagar – Handle overflow traffic of Kolkata and bulk traffic from Hadia
Unavailability of ports	▪ Machilipatnam/Vodarevu – Potential for facilitation of cargo including thermal coal, cement and containers ▪ Cuddalore/Sirkazhi – Facilitate cargo movement of thermal coal
Strategic ports to capture international opportunity	▪ Enayam – ~25% of Indian EXIM container traffic is transshipped via Colombo and Singapore ▪ Potential for a mega transshipment port to capture the opportunity

New port locations



As part of Sagarmala, detailed masterplans have been developed for all major ports and capacity expansion projects have been identified (Exhibit 17).

EXHIBIT 17

Capacity expansion plan at major ports

Capacity expansion at major ports

S. No.	Name	Existing Capacity (MTPA)	Ongoing expansion	Additional capacity from Master Plan projects	Capacity (MTPA)
1.	Kandla	121.4	24.5	55.0	185.9
2.	Mumbai	44.5	29.5	4.0	48.5
3.	JNPT	79.4	60.0	45.0	124.4
4.	Mormugao	43.8	0.0	35.0	78.8
5.	Kamarajar(Ennore)	37.0	42.0	3.0	82.0
6.	Chennai	86.0	0.0	12.0	98.0
7.	V.O. Chidambaranar	44.6	38.9	30.6	75.2
8.	New Mangalore	77.8	6.7	5.5	90.0
9.	Cochin	49.7	4.1	2.0	51.7
10.	Visakhapatnam	96.8	38.8	8.0	143.5
11.	Paradip	119.8	65.6	10.0	195.4
12.	Kolkata Port Trust	70.9	10.8	12.0	82.9
Total capacity (MTPA)		**871.5**	**320.9**	**222.1**	**1,414.5**

2. Connectivity across pipeline, water, rail and road

Port connectivity is the second pillar of the port-led development model under Sagarmala. It aspires to provide the most optimal mode of evacuation to/from ports for both EXIM and domestic cargo. For example, the intermodal transportation network of rail, inland shipping, road, short sea and pipelines gives the Port of Rotterdam the best possible connections to the rest of Europe—transit times to most destinations is less than 24 hours. Superior connectivity has helped the Port of Rotterdam to become the largest sea port in Europe handling more than 450 MTPA of cargo.

Providing adequate connectivity to ports is a challenge in India. Even modern ports that have world-class equipment can have their turnaround times hamstrung because of poor connectivity. The main challenges to port connectivity are underleveraging of domestic waterways, severely constrained rail infrastructure along key routes, sub-optimal modal mix for container freight, poor connectivity to west coast ports through the Western Ghats, lack of coordinated end to end planning for bulk logistics and constrained last-mile connectivity between ports and key industrial hinterlands.

India's hinterland connectivity is mainly based on road and rail networks with domestic waterways, both coastal shipping and inland routes, playing a limited role. Pipelines are predominantly used for transporting crude oil, refined petroleum products and natural gas. Chapter 3 of the detailed National Perspective Plan talks about reinventing the modal mix through pipelines, waterways, roads and railways.

Pipelines are an effective means of transporting liquid cargo to and from ports; the cost of transporting the product by pipeline could be about 10 to 15 per cent of that by rail. Currently most of the pipelines are operating at utilisation levels of more than 90 per cent; therefore, any increase in refineries capacity has to be matched by pipeline expansion. With this in mind, potential pipelines projects have been outlined for capacity enhancement and expansion—expansion of Salaya–Mathura pipeline, new pipeline from Paradip to Hyderabad, etc.

Freight transportation by waterways is highly underutilised in the country as compared to the US, China and the EU. For example the Yangtze River system is one of the most developed inland waterways navigation systems with 13 waterways and 92 ports, and generates as much as 20 per cent of China's GDP. The Port of Shanghai is located in the vicinity of Shanghai, at the confluence of Yangtze, Huangpu and Qiantang rivers and handled 35 mn TEUs in 2014[3], most of which originates in the industrial clusters located in the Yangtze valley. Similarly in India, NW1, NW2, NW4 and NW5 can be developed to play an important role in cargo movement.

Railways is the mainstay for carrying long lead distance and bulk cargo. Expansion of the rail network has not been able to keep up with the growing demand. In the last five years, the rail network has grown at ~0.7 per cent. Most of the routes carrying bulk cargo (like thermal coal) are constrained and running at high utilisation. The evacuation network in Odisha and Chhattisgarh is much lower than projected requirement, while the Western Ghats hamper connectivity of the ports to the main rail line. To transport the large volumes of thermal coal from MCL via coastal shipping to coastal power plants in southern India, a heavy haul rail line from Ib Valley/Talcher to Paradip/Dhamra port could be developed. Connectivity of Mormugao port to Hospet/Bellary could also be taken up on priority. Several

[3] Shanghai port

specific last-mile connectivity projects like spur lines to connect the ports to DFC, connectivity to Dhamra, Gopalpur, Krishnapatnam, Tuticorin ports are needed.

By investing in the short first- and last-mile rail connectivity projects, a sizeable investment in point to point rail network can be avoided. This will also unlock coastal shipping potential of bulk commodities like thermal coal. High freight rates due to cross-subsidisation and low priority for goods trains have made the railways uneconomical for container movement—shippers prefer moving long distance containers also on road. Right pricing of railways, last mile connectivity to DFC, additional inland container depots, and the prioritisation of container rakes could increase the share of rail in the modal mix of containers and also reduce the transit time by five to six days, making Indian trade more competitive.

Road is economical compared to rail for covering distances up to 1,000 km from the port, but the current condition of highway stretches is inconsistent. Moreover, the Indian coastline does not have a coastal road network. To make roads more effective as a mode of cargo movement, 10 potential highway stretches have been identified as freight friendly expressways. In addition to this, the Government of India has undertaken the Bharatmala programme which will also help in joining coastal regions through road links. Close to 70 road projects have been identified to improve connectivity to the ports. These include road connectivity of JNPT to industrial hinterland, last-mile connectivity to ports on the Western Ghats, connectivity to new potential port locations like Enayam, Vadhavan, Sagar, Central Andhra and Central Tamil Nadu ports (Exhibit 18).

Additionally, as part of a logistics efficiency enhancement programme, multiple initiatives could be explored to improve India's logistics performance—logistics park development, corridor upgradation, procedural complexity reduction, 3PL service to provide ecosystem development, etc.

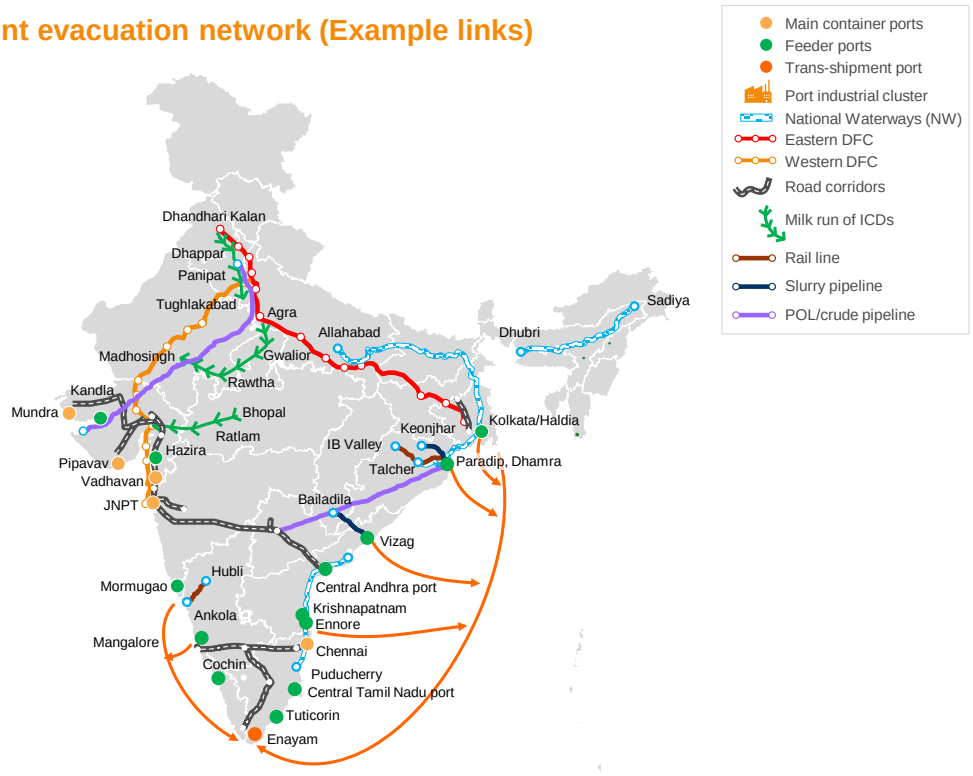
Customs procedures at ports could also be made more efficient by facilitating online submission of documents and forms; simplifying the process to become an accredited importer/exporter; a specialised clearance system for accredited importers/exporters; obtaining more scanning equipment and different treatment of coastal and EXIM cargo.

With the proposed connectivity projects and initiatives, there can be a significant change in the modal mix of cargo with minimal investment. These connectivity projects will require an approximate investment outlay of INR 2 lakh cr.

EXHIBIT 18

Efficient evacuation network (Example links)

FY 25



3. Port-led industrialisation to support Make in India

Port-led industrialisation is the third pillar of the port-led development model. Ports play a crucial role in reducing logistics costs and facilitate export-oriented manufacturing by reducing export time and variability. Several countries with large coastlines have leveraged ports for aiding industrialisation.

A comprehensive plan for port-led industrialisation has been proposed as part of Sagarmala which combines the growth potential of specific industries that have port linkages with the competitive location for each industry. These locations have also been mapped to the relevant major and non-major ports in the region that can most optimally facilitate the movement of cargo from the industrial locations.

Twelve major industries covering energy, material and discrete manufacturing have been identified on the basis of suitability of ocean mode of transportation for imports of raw materials or exports of finished products. Competitive locations for each of these industries have also been shortlisted with the aim to reduce the overall logistics costs. Other factors of production that impact competitiveness like availability of raw material and skills, supporting infrastructure and existing industrial agglomeration have also influenced the selection of locations. This has been aligned with state industrial plans. Similarly, existing and proposed ports have been mapped which can most optimally serve the proposed industrial locations. Major and non-major ports, industrial units and evacuation infrastructure have hence been linked into a single system at a regional level through the concept of Coastal Economic Zones (CEZs).

The port-led industrialisation programme will be delivered through the CEZs, which will be the focal point for development along India's coastline. 14 CEZs (Exhibit 19) have been identified along the coastline of the country, with each coastal state having one or more CEZs. These CEZs have been geographically mapped covering one or more districts, and specific

industrial clusters relevant for each CEZs have been proposed.

The industrial clusters within the CEZ fall into one of three archetypes of energy, materials and discrete manufacturing. In each archetype the underlying logic is that lower cost of movement by waterways can increase the competitiveness of manufacturing if located proximate to ports.

Energy clusters: To meet India's projected long-term energy needs, three coastal power clusters and one to two coastal refinery clusters could be developed by 2025. In addition, there is potential for 3 to 4 new petrochemical clusters with the target of reducing import dependence through domestic petrochemical production.

Bulk clusters: Similarly in bulk materials such as steel and cement, Sagarmala has identified the potential for setting up medium to long term incremental capacity in coastal regions. An estimated 40 MTPA of steel and 40 MTPA of new cement capacity can be coastally located by 2025. This will help to save logistics costs by up to INR 1,000 per tonne and make domestic manufacturing more competitive.

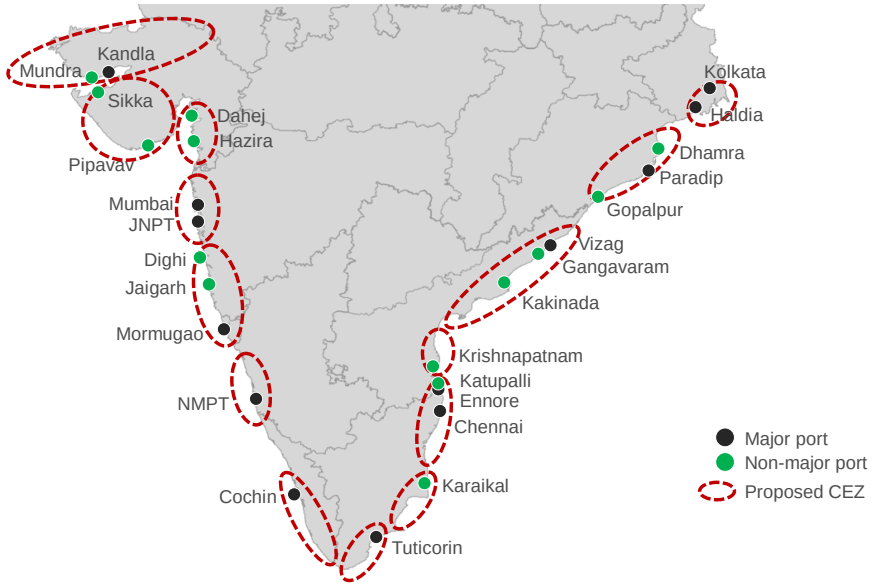
Discrete manufacturing: India has set itself a target of boosting exports from USD 465 bn in 2014–15 to USD 900 bn by 2020. Merchandise exports would continue a form a significant share of total exports. Discrete manufacturing clusters aim to support this aspiration with strong linkages between existing and announced clusters and corridors, e.g., Vizag–Chennai Industrial Corridor being developed by DIPP. Based on an analysis of global and domestic trade flows, India's competitiveness and linkages with ports, six discrete manufacturing sectors (including automotive) can promote port-based/port-proximate manufacturing. These are food processing, automotive, electronics, apparel, leather products and footwear, and furniture.

List of high potential industrial clusters

S No	Proposal	Investment in land (INR cr)	Investment in basic infrastructure (INR cr)	Potential industrial investment (INR cr)	Employment potential (lakh)	Incremental GDP (INR cr)
1	2 refinery and petrochemical clusters	7,200	1,200	45,000	0.1	20,000
2	4 gas-based petrochemicals clusters	1,500	250	16,000	0.3	5,500
3	3 coastal power clusters	20,000	3,500	75,000	0.2	15,000
4	2 steel clusters	18,000	3,000	1,35,000	2.5	80,000
5	2 marine clusters	6,000	1,000	40,000	2.5	10,000
6	2 cement clusters	1,300	200	50,000	0.1	9,000
7	2 food processing clusters	4,300	700	50,000	3	9,000
8	2 science and technology clusters (electronics, instruments)	6,000	1,000	1,40,000	7	60,000
9	3 apparel clusters	8,500	1,500	50,000	10	20,000
10	1 automotive cluster	4,000	700	55,000	2.5	25,000
11	3 leather and footwear clusters	5,000	1,000	25,000	6	13,000
12	3 furniture clusters	6,000	1,000	60,000	4.5	20,000
	Total	**~85,000–90,000**	**~12,000–15,000**	**~7,00,000–8,00,000**	**~40**	**~3,00,000**

EXHIBIT 19

Proposed coastal economic zones



Each of these CEZs is also mapped to the nearby ports. The table below gives details of the geographical coverage, port linkages, potential industries as well as sample projects in the CEZ.

List of Coastal Economic Zones

	CEZ	Potential districts	Port	Possible industries	Sample projects
1	Kachchh – Gujarat	Kachchh	Kandla, Mundra	Petrochemicals, cement, furniture	LPG import terminals, container and bulk terminals at Kandla port
2	Saurashtra – Gujarat	Junagarh, Amreli, Bhavnagar, Ahmedabad	Pipavav, Sikka	Apparel, automotive	Connection of western DFC to Pipavav, expressway from Sarkhej to Pipavav
3	Suryapur – Gujarat	Bharuch, Surat, Navsari, Valsad	Dahej, Hazira	Marine clusters	Connection of western DFC to Hazira, Ro – Pax Ferry Services between Gogha and Dahej
4	North Konkan – Maharashtra	Nashik, Thane, Mumbai, Pune, Raigarh	JNPT, Mumbai	Power, electronics, apparel	Vadhavan port, Expressway from Ahmedabad and Dighi to JNPT, terminals in Nhava Creek
5	South Konkan – Maharashtra	Ratnagiri, Sindhudurg, North Goa, South Goa	Dighi, Jaigarh, Mormugao	Refining, steel, food processing	Upgradation of SH164 to connect Jaigad port to NH17, Connectivity of NH17 to north and south banks of Dighi port
6	Dakshin Kanara – Karnataka	Udupi, Dakshin Kannada, Kodagu, Mysore	Mangalore	Petrochemical	Railway line from Belekeri port to Ankola, food grain and fertiliser handling facility in NMPT
7	Malabar – Kerala	Ernakulam, Alappuzha Kollam, Thiruvananthapuram	Kochi	Furniture	Food grain import terminal, fertiliser bagging facility
8	Mannar – Tamil Nadu	Kanyakumari, Tirunelveli, Thoothukudi	Tuticorin	Apparel, refining	Enayam port, Expressway to Enayam, road to Hare island, container berth at Tuticorin

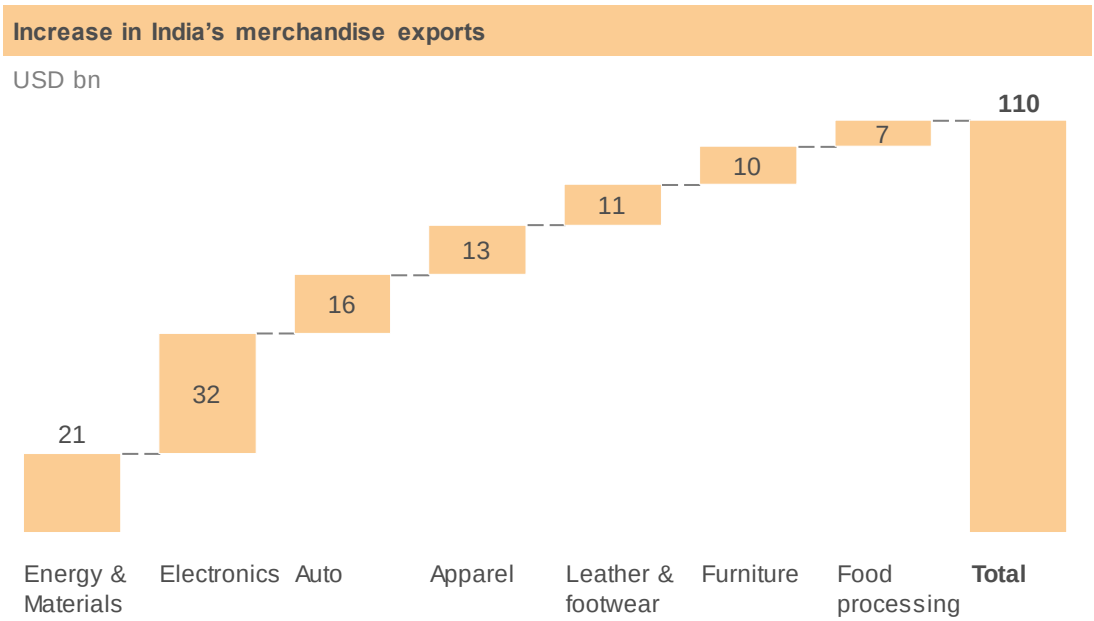
	CEZ	Potential districts	Port	Possible industries	Sample projects
9	Poompuhar – Tamil Nadu	Cuddalore, Perambalur, Ariyalur, Tiruchirappallu, Thanjavur, Thiruvarur, Nagapattinam	Cuddalore	Leather processing, power, refining	Sirkazhi/Cuddalore port, road connectivity to Cuddalore port
10	VCIC South – Tamil Nadu	Thiruvallur, Chennai, Kancheepuram	Chennai, Ennore and Katupalli	Petrochemicals, electronics, steel, shipbuilding	LNG import terminal, rail link to KPL, MLT-2 at Ennore
11	VCIC Central – Andhra Pradesh	Chittoor, Nellore	Krishnapatnam	Electronics	Upgradation of road connecting Krishnapatnam port to Nellore city, road to Krishnapatnam Port from Naidupeta
12	VCIC North – Andhra Pradesh	Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram, Srikakulam	Vizag, Kakinada	Petrochemicals, cement, apparel, food processing	Machilipatnam/ Vodarevu port, Oil jetty at Vizag, road from Machilipatnam to NH-SH-46
13	Kalinga – Odisha	Puri, Jagatsinghapur, Cuttack, Kendrapara, Jajapur, Bhadrak	Paradip, Dhamra	Petrochemicals, marine processing	Paradip outer harbour, IWT terminal, heavy haul, LPG import terminal
14	Gaud – West Bengal	Purba Medinipur, South twenty Parganas	Kolkata, Haldia	Leather processing	Sagar port, ICD, LPG import terminal, expressway from Durgapur to Haldia

All 14 CEZs come under the influence area of one or more major or non-major ports. The influence area is considered flexible and districts covered under the CEZ could change.

These CEZs are also demarcated to align with the planned industrial corridors (e.g., DMIC, VCIC, CBIC, BMEC, AKIC). CEZs can add over USD 110 bn to Indian merchandise exports only through the identified high potential industries (Exhibit 20). It is envisaged that of the 14 CEZs, a few could be taken up as early pilots with learnings from these replicated across other CEZs. These early pilot CEZs should be shortlisted on the basis of availability of large contiguous land parcels, existing industrial base, access to urbanisation and supporting infrastructure, strong industrial potential for high-potential industries, availability of deep draft container terminals and strong state support and participation.

EXHIBIT 20

Sagarmala projects could add USD 110 bn to India's merchandise exports

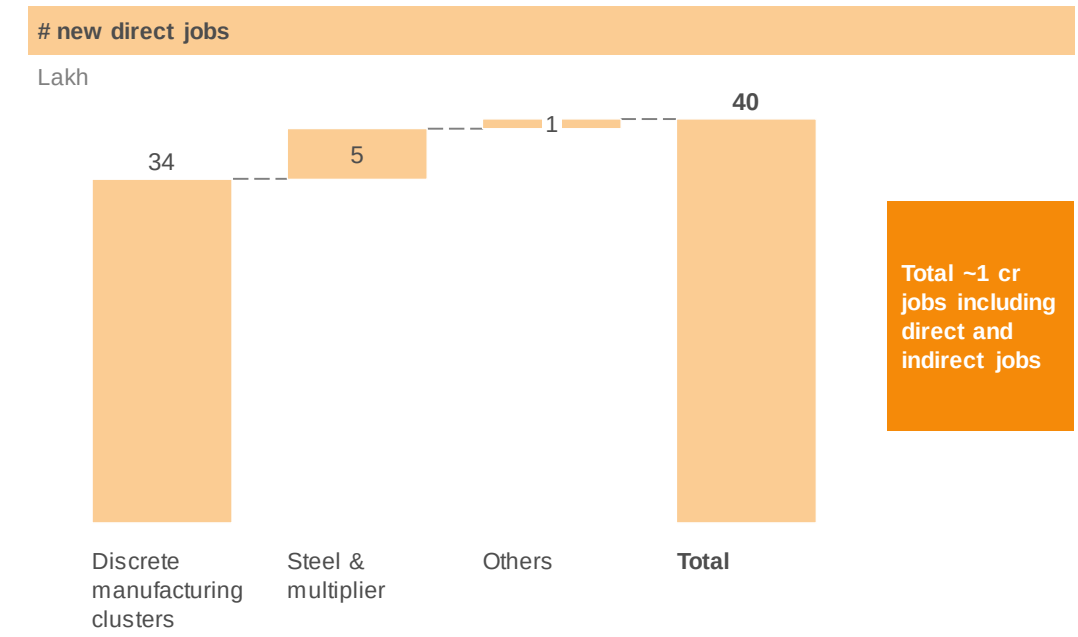


SOURCE: ITC trade map – 2015 base data used for projections

These clusters, put together, could generate 40 lakh direct jobs and about 60 lakh indirect jobs (Exhibit 21). Setting up the manufacturing clusters would require an infrastructure investment of about INR 1 lakh cr to develop the basic infrastructure in the CEZs. The proposed industries would require an additional industrial investment of about INR 7 to 8 lakh cr.

EXHIBIT 21

40 lakh potential new direct jobs through Sagarmala



SOURCE: ASI data used for projections

4. Development of coastal communities and matching skills with opportunities

Approximately 18 per cent of India's population[4] lives in the 72 coastal districts[5] that comprise 12 per cent of India's mainland. Since these people are critical stakeholders in the Sagarmala Programme's "port-led development" agenda, ensuring their socio-economic well-being is one of the programme's key objectives. However, the pace of socio-economic development among the maritime states has not been uniform in terms of per capita income, poverty, and infrastructure. Hence, there is a need for holistic and sustainable development of coastal communities.

Port-led industrialisation can be the engine of sustainable development of coastal communities and provide direct and indirect benefits to the coastal region. An OECD report[6] estimates that one tonne of port throughput is on an average associated with USD 100 of economic value addition, and an increase of one million tonnes of port throughput is associated with the generation of 300 new jobs in the port region in the short-term.

A "Community Development Fund" (CDF) is being created to fund projects and activities related to coastal community development under Sagarmala. The CDF will fund projects related to value addition in fisheries, aquaculture, cold chain development, skill development, local tourism and recreational facilities, etc. which would be beneficial to the livelihoods of the coastal communities. The projects considered would be specific time-bound local interventions not covered under existing central/state government schemes.

4 Census 2011

5 Districts covering all maritime states and union territories; Mumbai City and Mumbai Suburb considered as separate districts

6 The Competitiveness of Global Port-Cities: Synthesis Report, OECD

To ensure sustainable development of coastal communities, the environmental and social impact of the projects, considered under Sagarmala, will be analysed and the requisite clearances will be obtained before the commencement of the projects.

Skill development for coastal communities: In addition to the new jobs expected to be generated from port-led industrialisation, substantial manpower will be required for constructing infrastructure.

Challenges still exist in closing the skill demand–supply gap in India. The need is not only for fresh skilling but also for up-skilling/re-skilling the existing labour force to make it compatible with the changing industry needs.

Considering the above factors, a three-pronged approach for skill development in coastal regions is proposed to be adopted under the Sagarmala Programme. The first area of focus will be to promote skill training programmes for job roles related to the ports and maritime sector. The second focus area will be to promote skill training and livelihood generation programmes (not related to the maritime sector) in the coastal districts to expand employment and livelihood generation opportunities for the coastal communities and to support development of human capital for the proposed industrial clusters. The third focus area will involve providing access to the training facilities of major ports for third-party skill training programmes in the coastal districts, which will reduce the need to develop new training infrastructure in the coastal areas. The Ministry of Shipping, as part of the Sagarmala Programme, is already undertaking multiple activities/projects across the above mentioned focus areas.

Marine fishermen community development: The marine fisheries sub-sector, impacting the nutrition availability in the country and accounting for approximately 0.5 per cent of India's total GDP[7], is vital for the coastal districts. And the 3.9 mn fisherfolk[8] (as of 2010), living in 3,288 marine fishing villages spread across the Indian coastline, form a critical component of the coastal communities.

A concerted effort is required to help improve the status of the marine fishermen community on human development indices, ensuring uniform access to basic infrastructure such as housing, electricity, transport accessibility and healthcare and for promoting sustainable fishery management. As part of the Sagarmala Programme, the CDF and the Sagarmala Development Company (SDC) will provide funding grants for marine fishermen–related social welfare projects, projects for generating livelihood opportunities within the fisheries sector (e.g., new fish processing and value-added product development, etc.) or outside the fisheries sector (e.g., training in new skills and trades in small business development, agriculture, or handicrafts, etc.) and projects related to the promotion of sustainable marine fisheries management (e.g., sustainable fishery practices, promoting aquaculture, spreading fish quality literacy among fishermen, as well as developing facilities for fish landing and handling).

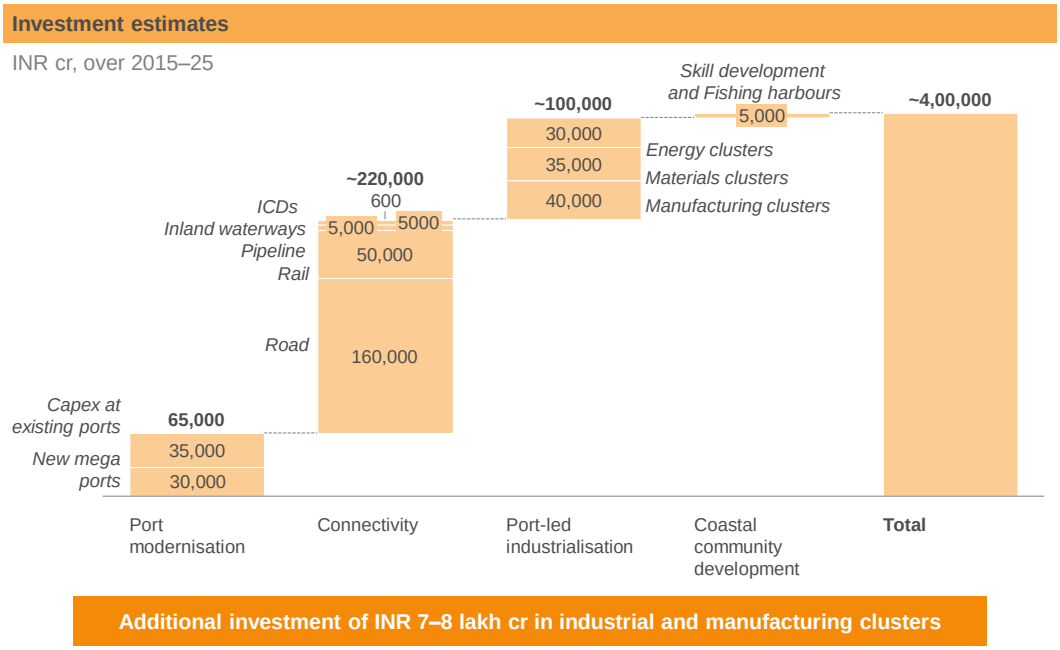
7 "Indian Marine Fisheries – Issues, Opportunities and Transitions for Sustainable Development", World Bank Report, 2010

8 Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

Exhibit 22 shows the total investment requirement for Sagarmala.

EXHIBIT 22

Sagarmala could mobilise investment[1] of about INR 4 lakh cr in Indian infrastructure sector over next ten years



1 From currently envisaged projects
SOURCE:Port masterplanning, Maritime boards and port department of respective states

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Sagarmala is an ambitious programme, geared towards making domestic manufacturing and EXIM more competitive and uplifting coastal communities. The programme will have a profound impact and could act as a model for India's development.

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