Final Report for Sagarmala (Vol. II)

Ministry of Shipping, Indian Ports Association

November 2016

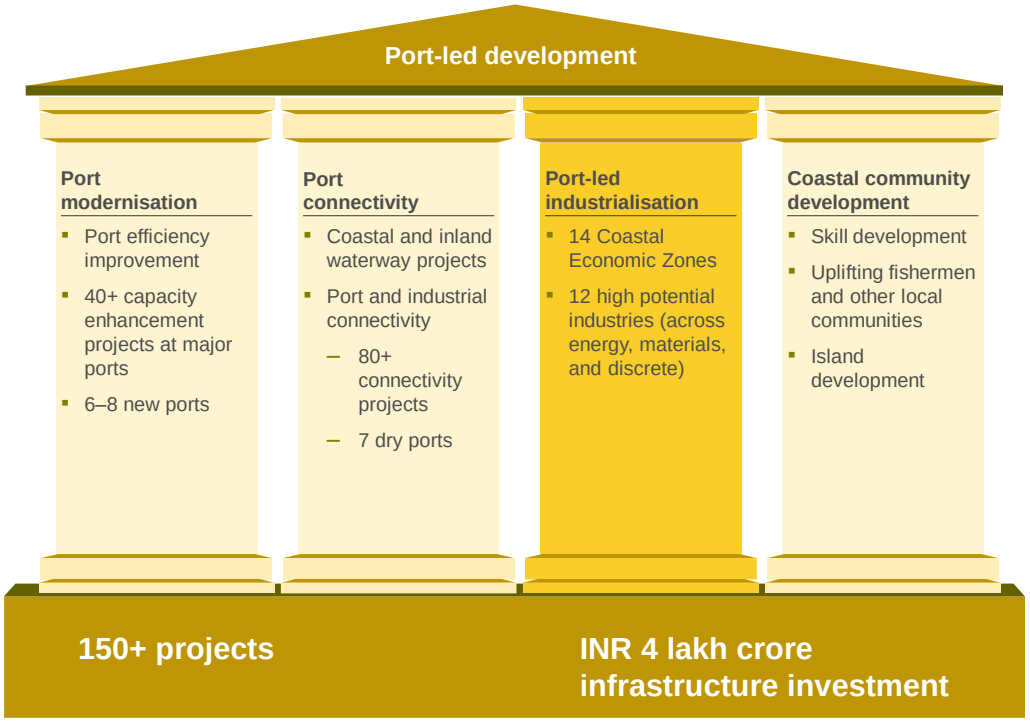
Perspective plan for port-led industrial development of the Coastal Economic Clusters

Perspective plan for the port-led industrial development of Coastal Economic Zones

Port-led industrialisation is the third pillar of the port-led development model (Exhibit 1.1). Ports play a crucial role in reducing domestic logistics costs and facilitate EXIM-oriented manufacturing by reducing logistics time and variability. Many countries with large coastlines, like China, have leveraged ports for aiding industrialisation.

EXHIBIT 1.1

Sagarmala: Port-led development



An integrated and comprehensive plan for port-led industrialisation has been developed, which combines the growth potential of port-linked industries with the competitive location for each industry. These locations have also been mapped to the relevant major and non-major ports in the region which can most optimally facilitate the movement of cargo from the industrial locations. Reduction in overall logistics cost has been the overarching rationale for shortlisting industries and locations for port-led industrialisation.

Overall, 12 major industries have been identified for port-led industrialisation, classified under three archetypes: energy, material and discrete manufacturing. Oil refining and thermal power plants are the main industries that come under

the energy archetype of port-linked industries. Similarly, under materials, steel and cement constitute the majority. After a three-step evaluation process, this study has identified six discrete manufacturing sectors (including automotive) as having high potential.

Invested capital, gross value added, and direct employment have been estimated using the Annual Survey of Industries. The investment required in land and supporting infrastructure (like roads, utility provision, etc.) for the proposed industrial parks is based on Indian benchmarks. The calculations (see below) indicate the potential to generate around 40 lakh new jobs and INR 7 lakh cr to 8 lakh cr in investments from the industry.

	Proposed industrial clusters	Investment in land (INR cr)	Investment in basic infrastructure (INR cr)	Potential industrial investment (INR cr)	Employment potential (lakh)	Incremental GDP (INR cr)
Energy	2 refinery and petrochemical clusters	7,200	1,200	45,000	0.1	20,000
	4 gas-based petrochemical clusters	1,500	250	16,000	0.3	5,500
	3 coastal power clusters	20,000	3,500	75,000	0.2	15,000
Material	2 steel clusters	18,000	3,000	1,35,000	2.5	80,000
	2 marine clusters	6,000	1,000	40,000	2.5	10,000
	2 cement clusters	1,300	200	50,000	0.1	9,000
	1 automotive cluster	4,000	700	55,000	2.5	25,000
Discrete	2 food processing clusters	4,300	700	50,000	3	9,000
	2 science and technology clusters (electronics, instruments)	6,000	1,000	1,40,000	7	60,000

	Proposed industrial clusters	Investment in land (INR cr)	Investment in basic infrastructure (INR cr)	Potential industrial investment (INR cr)	Employment potential (lakh)	Incremental GDP (INR cr)
	3 apparel clusters	8,500	1,500	50,000	10	20,000
	3 leather and footwear clusters	5,000	1,000	25,000	6	13,000
	3 furniture clusters	6,000	1,000	60,000	4.5	20,000
	Total	Around 85,000–90,000	Around 12,000–15,000	Around 7,00,000–8,00,000	Around 40	Around 3,00,000

The port-led industrialisation program will be delivered through Coastal Economic Zones (CEZs) and industrial clusters. The Coastal Economic Zone is an important aspect of the Sagarmala program and will be the main vehicle for kick-starting port-led industrialisation in India.

Each CEZ will consist of multiple industrial clusters categorised under energy, material and discrete industries. Competitive locations for these industries have also been shortlisted to reduce overall logistic costs. Other production factors 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 broadly aligned with state industrial plans. Similarly, existing and proposed ports that can most optimally serve the proposed industrial locations have been mapped.

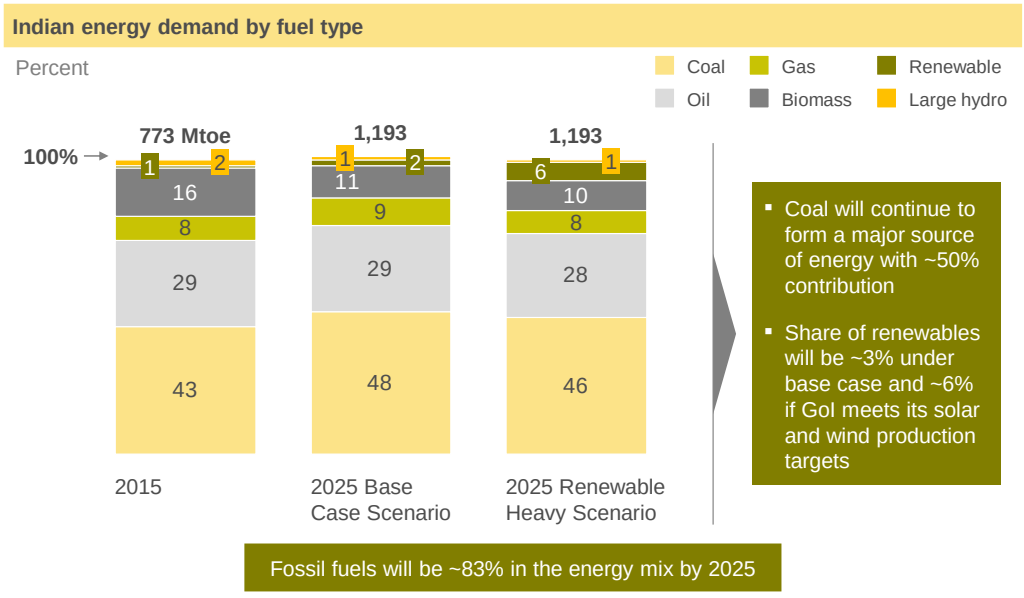
Major and non-major ports, industrial units and evacuation infrastructure have therefore been linked into a single system at the regional level through the concept of CEZs. A CEZ will typically comprise a few coastal or coast-proximate districts, and will constitute a planning unit to align various infrastructure elements within the CEZ. The exact districts covered under the CEZ could evolve.

1. ENERGY INDUSTRIES

India's energy demand is estimated to grow from 773 MTOE in 2015 to about 1,200 MTOE in 2025. Coal, oil and gas are expected to remain central to the energy supply mix, with coal at 46 to 48 per cent and oil and gas combined at 36 to 38 per cent (Exhibit 1.2).

EXHIBIT 1.2

Projections for India's energy supply mix over next 10 years



Nuclear is less than 0.5%
1 MTOE – mn tonnes of oil equivalent – The amount of energy released by burning one MT of crude oil
2 Renewables include small hydro, solar, wind and biomass

SOURCE: IEA website; bottom up forecast

1.1 Oil and gas

The opportunity for India

India's current oil refining capacity is around 219 MTPA. With refining expansion projects already announced, the capacity is estimated to increase to around 280 MTPA by 2025. Of this, 30 MTPA is earmarked for exports from SEZs, which means only 250 MTPA may be available for serving domestic demand.

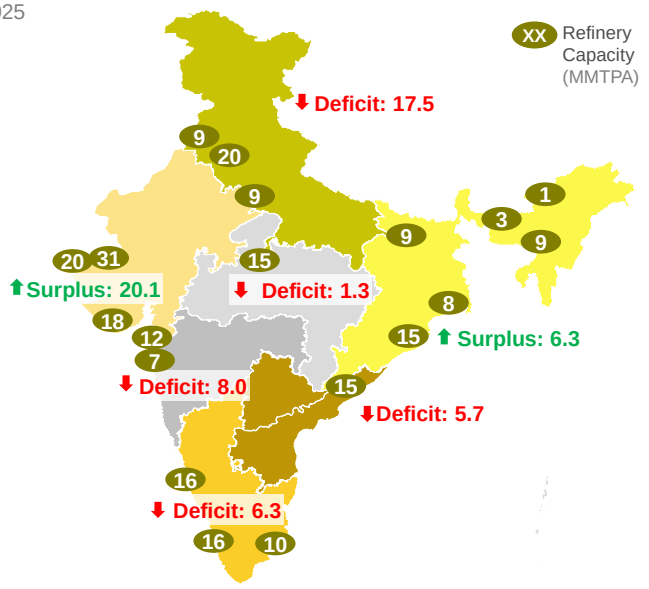
The demand for petroleum products is estimated to grow to around 270 MTPA, creating a shortfall of 15 to 20 MTPA for MS/HSD (Exhibit 1.3). Based on the analysis of regional MS/HSD flows, this deficit will primarily be in the North Indian states along with Maharashtra, Tamil Nadu and Andhra Pradesh. Gujarat and the eastern states will have net surplus and can serve the North Indian hinterland demand. Coastal shipping can also serve some parts of South India.

Two coastal refineries of around 10 MTPA may be required to serve the deficit in the country, one each on the West and East coast. These could be developed as port-based energy and petrochemical complexes. Prioritising coastal areas for setting up new refineries will help to reduce logistics costs as most of the crude processed in Indian refineries is imported through ports.

EXHIBIT 1.3

By 2025, India may face ~15 MMTPA MS/HSD deficit which may require construction of two greenfield refineries

2025



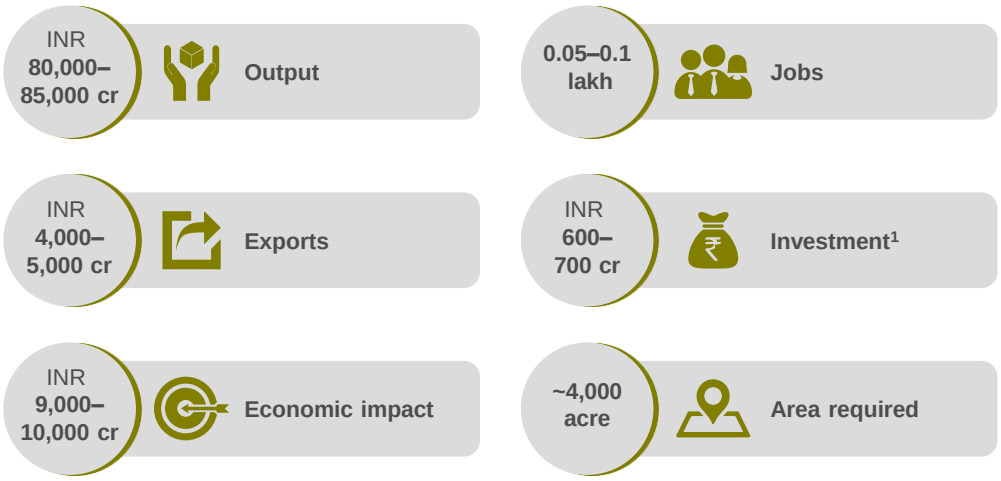
- In 2025, country is expected to face net deficit of ~15 MMTPA MS/HSD[1]
- This deficit will primarily be in the northern states and Maharashtra, Tamil Nadu and Andhra Pradesh
- Gujarat and the eastern states will have net surplus and can serve the North Indian hinterland demand
- Some parts of South India can also be served through coastal shipping
- There will be a requirement of two coastal refineries, one each on West and East coast

1 Assumes RIL Jamnagar and Essar Oil export nothing while Reliance SEZ exports 100% product

Coastal refineries will also enable setting up downstream petrochemical sectors as the naphtha produced from the refineries could be used as a feedstock for petrochemical production. While the deficit in Andhra Pradesh could be met through the product pipeline, greenfield refineries could come up in Southern Maharashtra and Southern Tamil Nadu. The potential impact from setting up a 10 MTPA greenfield refinery housing petrochemical manufacturing is shown in Exhibit 1.4.

EXHIBIT 1.4

Potential impact from each refinery and petrochemicals cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

1.2 Petrochemical clusters

The opportunity for India

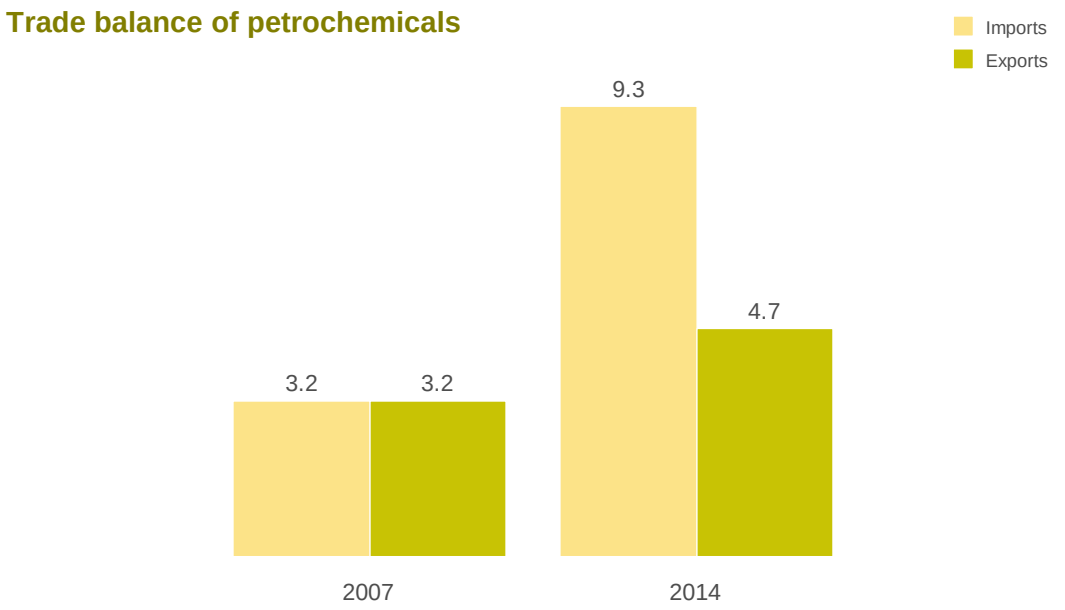
The consumption of petrochemicals has risen at a consistent rate of around 6 per cent in the last few years. Demand in 2006–07 was around 22 MTPA, which rose to around 33 MTPA in 2013–14. Polymers have been a mainstay of this demand, with a consistent share of around 25 per cent. The category has recorded a growth of 8 per cent over years. Performance plastics, although a small category, grew at the highest rate of 12 per cent in this timeframe

Petrochemical demand is strongly correlated to GDP growth in the country. If India's GDP grows by 6 to 7 per cent over the next 10 years, the demand for petrochemicals could be in the range of 60 to 70 MTPA by 2025.

In 2013–14, the total installed capacity for petrochemicals production was around 33 MTPA. Operating at around 85 per cent capacity utilisation, the country produced around 28 MTPA of petrochemicals in 2013–14, an increase from 21 MTPA in 2006–07.

The rising gap between domestic demand and production of petrochemicals has increased India's dependence on imports. It is interesting to note that from zero trade balance in 2000, India's net trade balance in petrochemicals in 2014 was negative at around 4.6 MTPA (Exhibit 1.5).

EXHIBIT 1.5



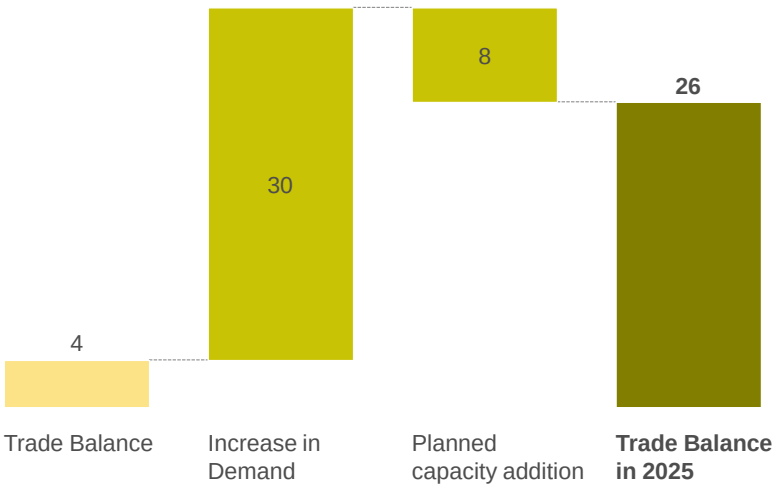
SOURCE: MLCPCSTAT14

Planned capacity expansion

It is expected that around 8 MTPA of petrochemical production capacity may be commissioned in the next 10 years. As mentioned earlier, the demand for petrochemicals might rise to around 60 MTPA and production might rise to 40 MTPA in the optimistic case. It is evident that India may require significant capacity addition, of around 25 MTPA, to prevent a further increase in import dependence for petrochemicals (Exhibit 1.6). The competitiveness of these plants will need to be carefully examined under various feedstock price scenarios.

EXHIBIT 1.6

Trade balance in 2025 with planned capacity addition



SOURCE: MLCPCSTAT 14

Feedstock for petrochemicals

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed.

Availability of naphtha: India produces around 18 MTPA of naphtha, which is around 8 to 10 per cent of refinery crude throughput capacity. Some of the domestic consumption of naphtha happens in petrochemical plants, with the balance being used as a feedstock for power generation, fertiliser plants and refineries. As Indian refineries expand capacity from the current around 220 MTPA to around 280 MTPA in 2025, the amount of naphtha produced domestically may grow to around 25 MTPA. Around 20 MTPA of that can be used for petrochemical production in the optimistic case. With additional petrochemical plants coming up, the export of naphtha seems unlikely, as most of it may be used in domestic production of petrochemicals.

Availability of gas: Domestic gas production was around 25 MTPA in 2013–14. No significant increase is expected in the near future in the supply from domestic sources. There is currently around 20 MTPA of operational terminal infrastructure for the re-gasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Upcoming projects of around 45 MTPA capacity have been announced for the next 10 years[1].

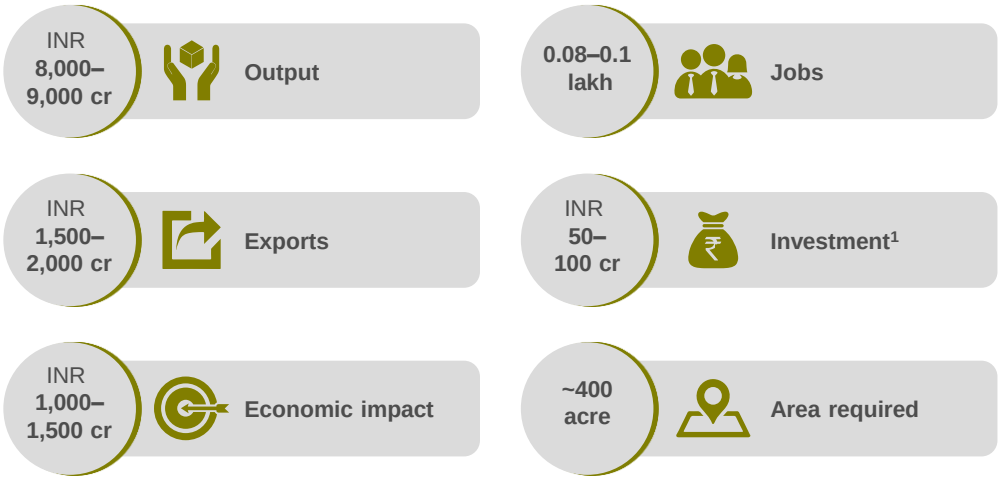
1 *Natural Gas Infrastructure in India,* 2030

Based on the above assessment, the incremental capacity of petrochemical plants could be set up in locations where greenfield refineries are coming up (Maharashtra, Tamil Nadu) and at locations where LNG import terminals are coming up (Mundra, Mangalore, Kakinada and Ennore).

The potential impact from a petrochemical plant of around 1 MTPA is shown in Exhibit 1.7.

EXHIBIT 1.7

Potential impact from each gas-based petrochemicals cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

1.3 Thermal power complexes

The opportunity for India

India's demand for coal in 2014–15 was around 850 MTPA, primarily from coal-fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent[2]. Power demand in the country could reach 280 GW by 2020. If the power reforms are successful and there is mass electrification, then "24x7 power to all" could further increase the peak demand. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal-based thermal power plants may still continue to meet more than 70 per cent of the country's power requirement.

Tamil Nadu and Maharashtra are both industrial states with high power demand. Maharashtra has the highest consumption in the country with around 138 bn units, while Tamil Nadu's consumption is around 93 bn units. As both the states continue to dominate the urban and industrial landscape of the country, the

2 CEA

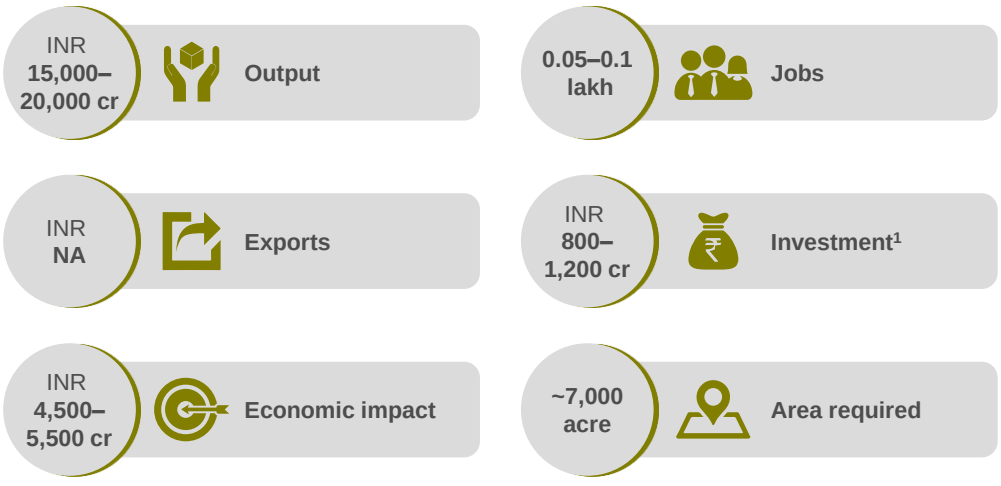
power demand is expected to witness steady growth for the next 10 years. Significant capacity expansion in these states may be required—power demand in Maharashtra is likely to reach around 400 bn units by 2025, while Tamil Nadu's demand may be close to around 300 bn units[3].

Pithead plants are more economical as it is cheaper to wire the power than transporting thermal coal from the minehead to plants near the demand centres. However, capacity may also be set up within the respective states with coal being transported. South Eastern and Mahanadi coalfields are expected to account for the bulk of the growth in coal production. Coastal power complexes can leverage the coastal shipping of thermal coal from MCL to significantly reduce the logistics cost, which could be as high as 30 per cent of the cost of power production.

Tamil Nadu is already a successful model, with plants at Tuticorin, Ennore, and Chennai leveraging coastal shipping. Southern Andhra Pradesh also leverages coastal shipping through its power complex in Krishnapatnam. The logistics cost of transporting thermal coal through the rail–sea–rail route is around 40 per cent cheaper than the rail only route. Power plants located at coastal locations benefit the most from the difference as the cost of last-mile transportation is minimal. Sirkazhi in Tamil Nadu, Vodarevu in Central AP and Wadhwan in Maharashtra could be the potential locations for building power complexes to support the power demand of these states. Coastal power complexes also have the natural advantage of access to water. The potential impact from a 5 GW power complex is shown in Exhibit 1.8. Some of these are already under planning.

EXHIBIT 1.8

Potential impact from each power cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

3 CEA data used for projections

2. MATERIAL INDUSTRIES

India could reduce logistics costs of serving the coastal demand of construction materials, e.g., steel and cement, by 25 to 30 per cent. While the traditional model of setting up capacity for these has been close to the hinterland, a part of the future capacity could be developed in coastal regions. Coastal steel clusters can have a multiplier impact on downstream sectors, e.g., shipbuilding and automotive.

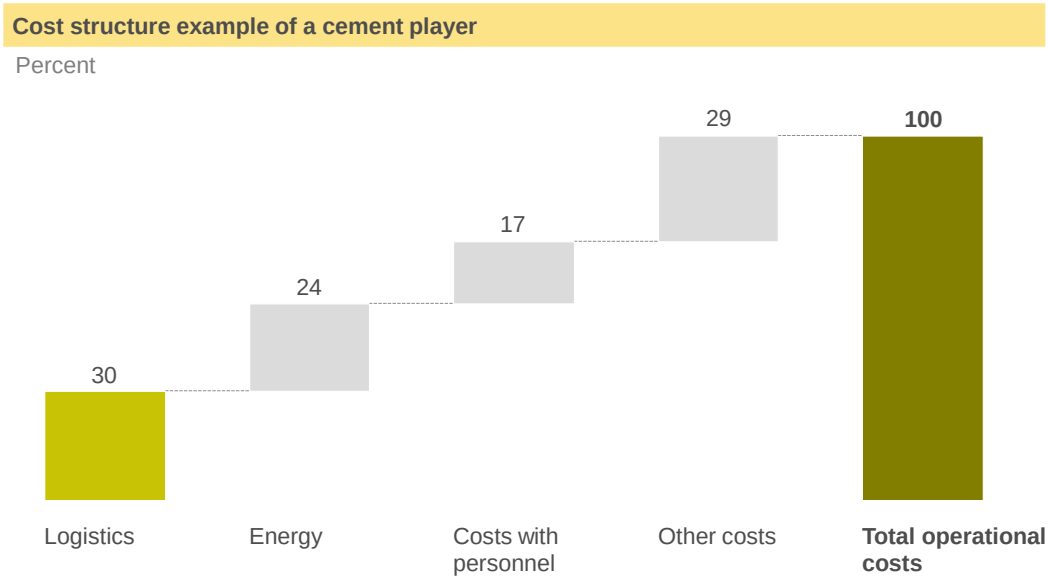
2.1 Cement clusters

Industry overview

India's cement industry has grown from 160 MTPA capacity in 2004 to 362 MTPA in 2014. India is now the second largest global producer of cement. While the global cement market is on a downturn, the cement demand in India is projected to grow to 700 to 800 mn tonnes by 2025 under the base case scenario of GDP growing at 7 to 8 per cent per annum. A tonne of cement requires 2 tonnes of raw materials. The volume of material to be transported for the cement industry may reach 1.6 bn tonnes by 2025. Logistics contribute about 25 to 30 per cent of the cost for cement, making efficient logistics critical to boost the competitiveness of existing capacity (Exhibit 1.9).

EXHIBIT 1.9

Logistics is the largest cost item in the cement industry

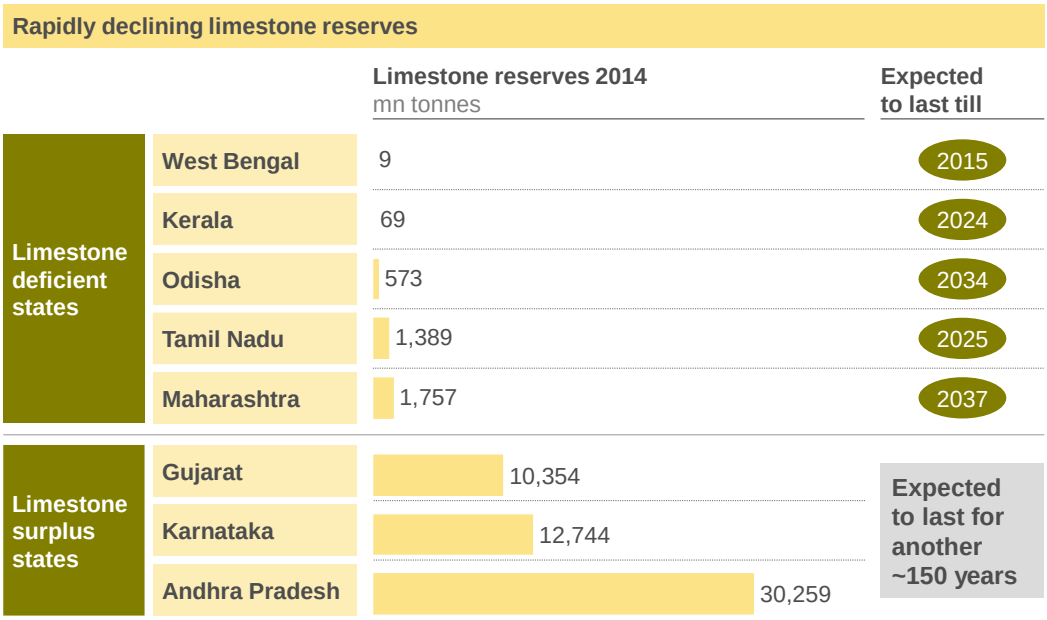


The opportunity for India

The traditional mode of setting up cement capacity in India has been inland plants located close to limestone reserves. Exhibit 1.10 shows that the five coastal of states West Bengal, Kerala, Odisha, Tamil Nadu and Maharashtra have limited and declining limestone reserves. On the other hand, Andhra Pradesh, Karnataka and Gujarat have excess limestone reserves that can support future capacity development.

EXHIBIT 1.10

Limestone reserve mapping for maritime states



SOURCE: International cement review, Planning commission report

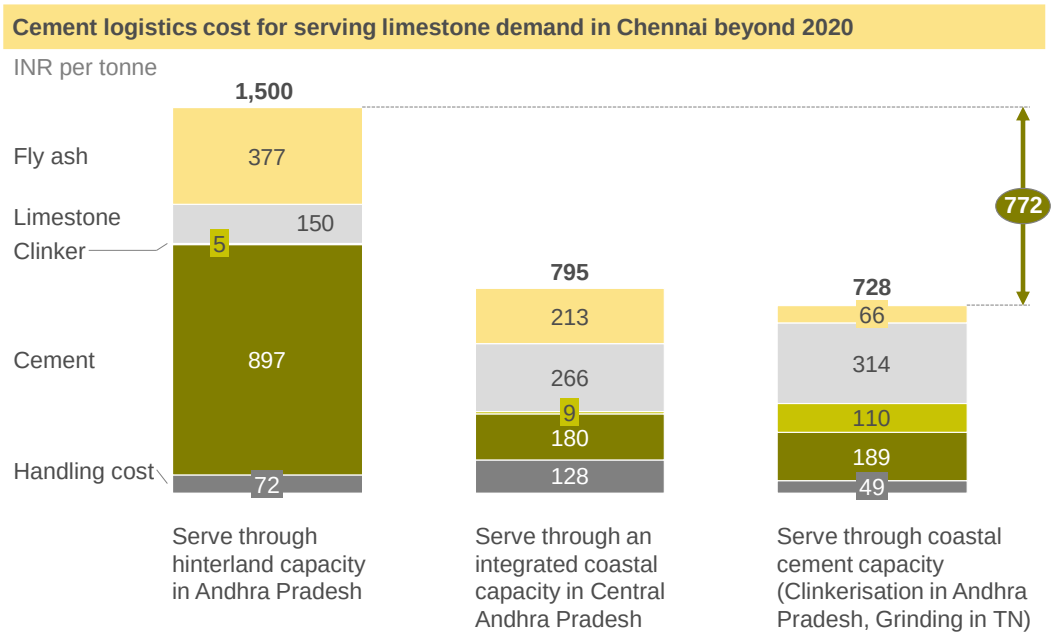
Cement demand in the limestone deficient coastal states is expected to grow to 190 mn tonnes in 2025 from the current 86 mn tonnes. Of the approximately 100 MTPA of additional capacity required, 40 MTPA could be through coastal clinkerisation clusters in southern Gujarat and central Andhra Pradesh, with grinding units at ports close to demand centres, e.g., Mumbai, Cochin, Chennai/Ennore, Kolkata, etc. This configuration could save INR 700 to 800 per tonne (10 to 15 per cent of total delivered cost of cement) compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by a lower cost of fly ash and cement transport to demand centres (Exhibit 1.11).

By 2025, this 40 MTPA coastal cement capacity could be expected to save around INR 2,500 cr per annum in logistics costs. The mapping of limestone reserves in India yields two possible locations for setting up these clusters. In Gujarat, Kutch, Junagarh and Bhavnagar are districts with the highest limestone reserves. In Andhra Pradesh, the highest limestone reserves lie in Guntur, Nalgonda, Kurnool and Cudappah. These clusters could host the clinkerisation units while the

receiving ports could host the grinding units (Exhibit 1.12). The potential impact from a 20 MTPA cement cluster is shown in Exhibit 1.13.

EXHIBIT 1.11

Coastal cement plants provide logistics cost saving of ~INR 700–800 per tonne



SOURCE: DGCIS data – 2013-14

EXHIBIT 1.12

Gujarat & Central Andhra Pradesh are potential locations for coastal cement clinkerisation clusters, with grinding units near demand centres

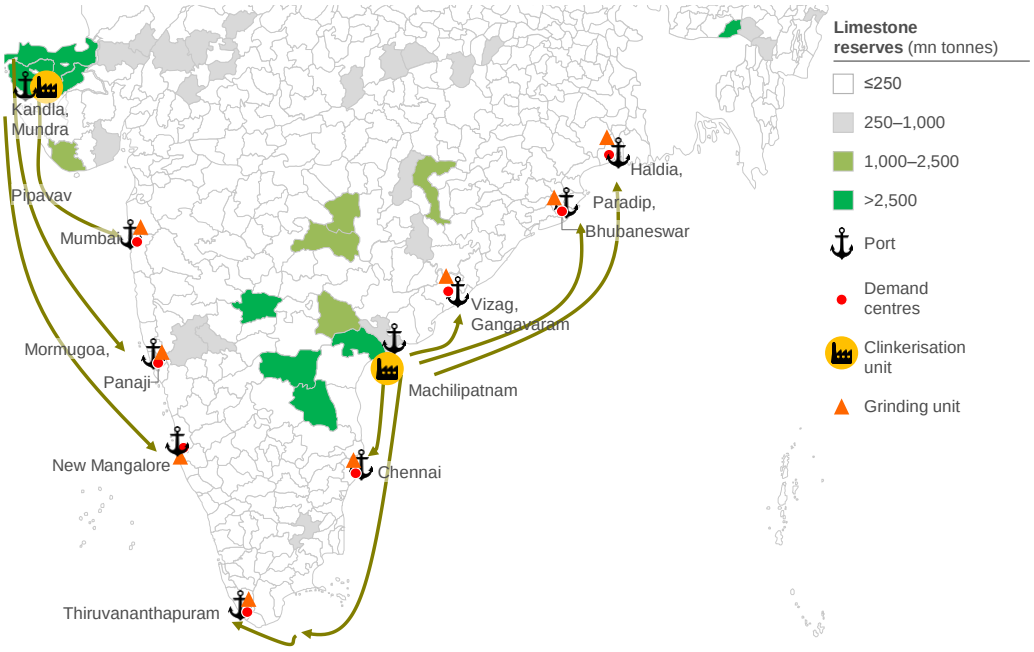


EXHIBIT 1.13

Potential impact from each cement cluster

INR 12,000–15,000 cr — Output	0.05–0.1 lakh — Jobs
INR 1,200–1,500 cr — Exports	INR 100–200 cr — Investment[1]
INR 4,000–5,000 cr — Economic impact	~700 acre — Area required

1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

2.2 Steel clusters

The traditional pattern of setting up steel capacity in India has been to locate hinterland plants close to iron ore reserves. Of the current 103 MTPA steel capacity, around 85 MTPA follows this model. About 16 MTPA capacity is coastal, of which 3 MTPA is located close to iron ore reserves (e.g., RINL Vizag) and 13 MTPA is located close to demand centres[4] (e.g., Essar Hazira and JSW Dolvi) (Exhibit 1.14).

International examples of large coastal steel clusters which benefit from logistics cost saving, flexibility in sourcing raw material, and better linkage with global markets include Pohang in South Korea. About 75 per cent of the total steel capacity in South Korea is coastally located. India could aspire for 25 to 30 per cent of its steel capacity to be coastal by 2025. This could entail setting up new coastal capacity of around 40 MTPA. Coastal steel plants located close to iron ore reserves connected via a slurry pipeline could, on average, save INR 900 per tonne. Coastal capacities near demand centres could be even more cost effective (Exhibit 1.15). Based on demand projections till 2025, two new steel clusters with capacity of 20 MTPA each could be developed and existing coastal clusters could be further advanced.

This 40 MTPA of coastal steel capacity could save around INR 3,500 cr per annum in logistics cost by 2025 compared to setting up new capacity close to iron ore reserves. These savings are on account of:

- **Minimised inland logistics for coking coal:** Saves INR 1.5 per tonne-km due to import of coking coal directly at steel plants
- Reduction **in steel transportation through coastal shipping:** Saves INR 1.30 per tonne-km in steel transportation due to coastal shipping
- **Use of new technology (slurry pipelines):** These offer a low cost method of transporting iron-ore fines from mine to coast—INR 0.70 per tonne-km compared to INR 1.50 per tonne-km for rail. In addition, pelletisation at the dispatch port location also leads to valuable iron-ore fines being utilised for domestic production

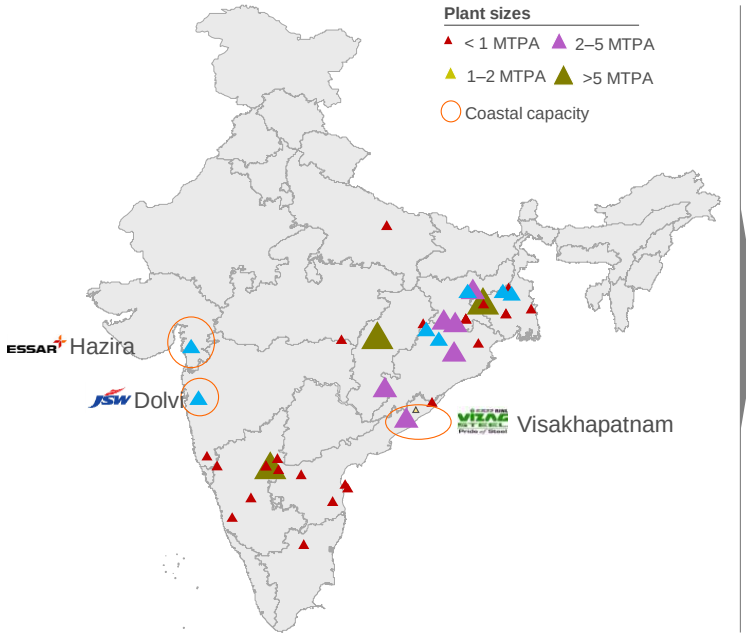
Specifically, two additional coastal steel clusters could be developed close to demand centres near Chennai and Dolvi (Exhibit 1.16), besides expanding the current coastal cluster in Visakhapatnam.

The potential impact from a 20 MTPA steel cluster is shown in Exhibit 1.17.

4 Ministry of Steel

EXHIBIT 1.14

Coastal steel capacity in India



Other maritime nations have >20% steel capacity at coastal locations

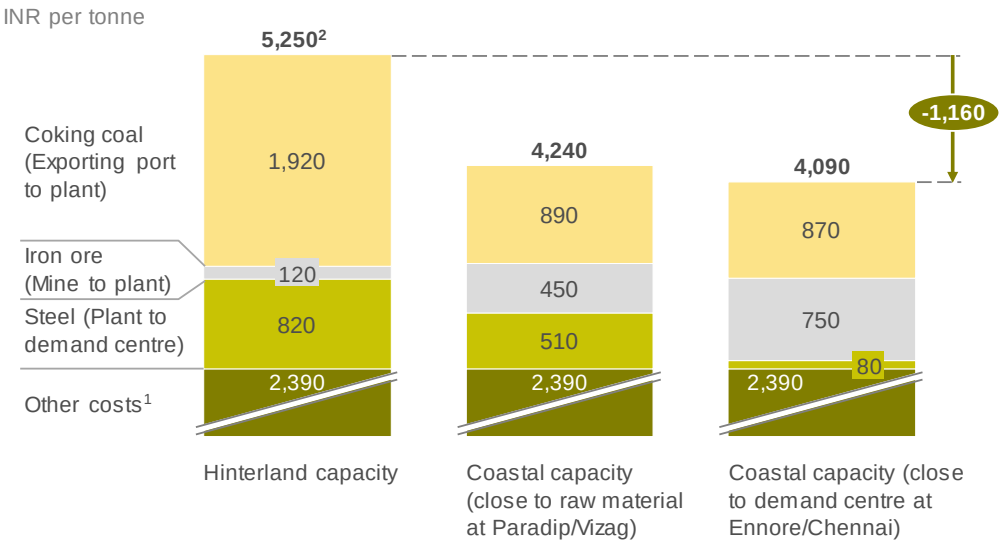
- China (25%)
- South Korea (75%)

SOURCE: Ministry of steel; VDEH plant facts

EXHIBIT 1.15

Coastal steel plants provide logistics cost saving of ~INR 1,000 per tonne

Steel logistics cost for serving demand in Chennai

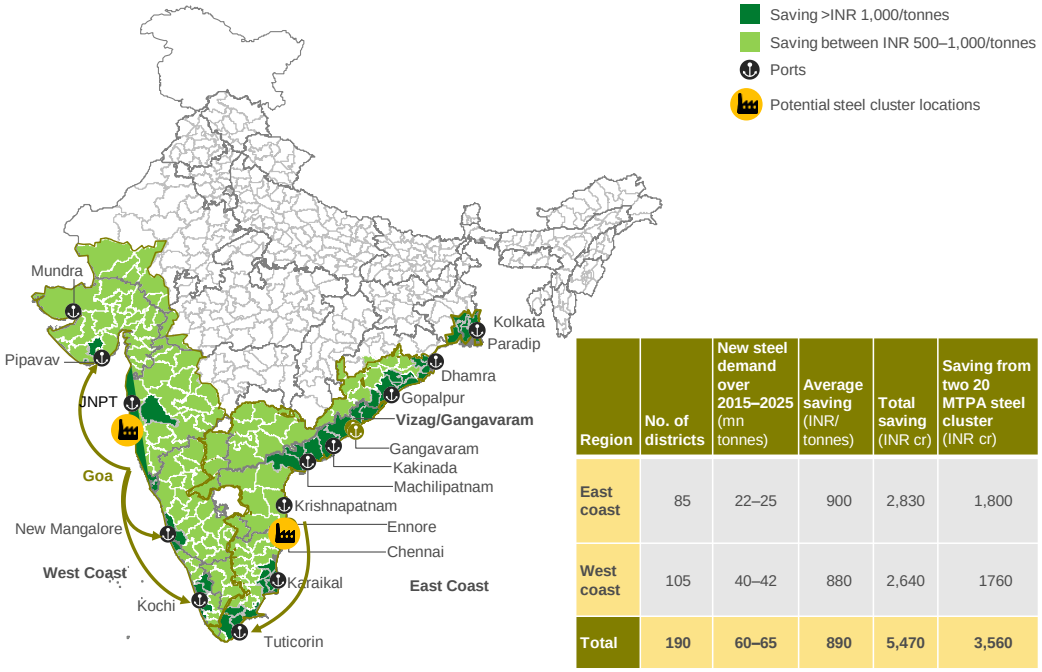


1 Other cost includes internal logistics cost and logistics cost for other materials such as refractory, spares, etc.
2 Base case logistics cost is estimated as 15% of total steel production cost

SOURCE: DGCIS data – 2013-14

EXHIBIT 1.16

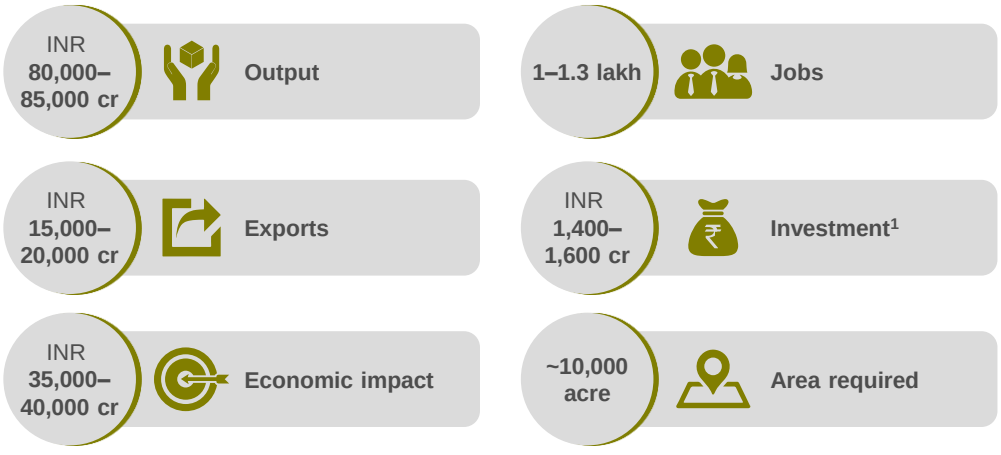
Two new proposed steel clusters (40 MTPA capacity) could annually save the economy ~INR 3,500 cr



Region	No. of districts	New steel demand over 2015–2025 (mn tonnes)	Average saving (INR/ tonnes)	Total saving (INR cr)	Saving from two 20 MTPA steel cluster (INR cr)
East coast	85	22–25	900	2,830	1,800
West coast	105	40–42	880	2,640	1760
Total	**190**	**60–65**	**890**	**5,470**	**3,560**

EXHIBIT 1.17

Potential impact from each steel cluster



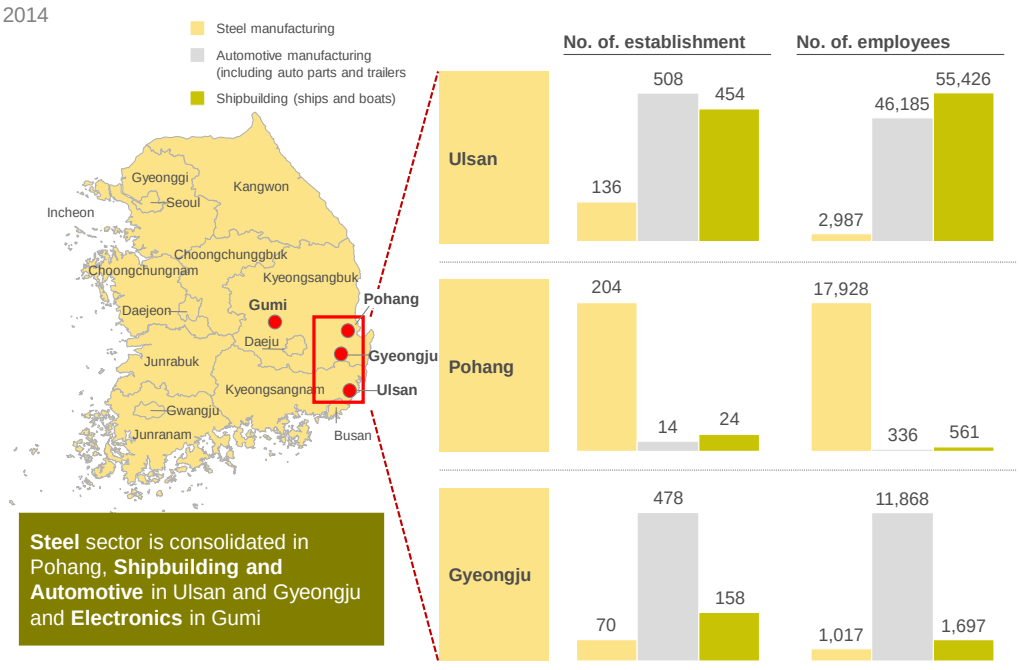
1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

2.3 Maritime cluster based on “steel-multiplier”

Over time, the coastal steel clusters in India could be expanded into steel-based manufacturing clusters focusing on shipbuilding, automotive and other ancillary activities. Logistics cost is a significant component of the overall costs in shipbuilding, automotive, etc., and steel is a major raw material for these downstream industries. Considering the port linkages, it is optimum for these industries to be co-located. There are strong synergies between the steel, shipbuilding and automobile industries. Steel contributes 25 to 30 per cent of the cost of a newly built ship while the engine contributes another 15 to 20 per cent. In automobiles, the cost of steel is 20 to 22 per cent.

Global success story

South Korean maritime cluster: Pohang–Ulsan–Gyeongju



SOURCE: KOSIS

Steel and related downstream sectors contributed one-third of South Korea’s economic growth between 1980 and 2010. Steel in Korea is consolidated in Pohang, shipbuilding and automotive in Ulsan and Gyeongju and electronics in Gumi. All these locations are close to each other, reducing the logistics cost of input materials. The role of the government was instrumental in the growth of steel and downstream industries. The Government of South Korea selected Pohang as a location for building a national steel mill (POSCO) in 1967

considering the availability of land, port and other utilities. The development of Ulsan as a major industrial cluster came from the government's plan to foster heavy and chemical industries. From 1962 to 1966, the government developed infrastructure, including roads, civil works, harbours, etc., in the region. It attracted Hyundai motors to invest in Ulsan in 1968, Hyundai Heavy Industries (HHI) in 1972, Samsung in 1979 and Daewoo in 1981.

POSCO's growth was supported by multiple factors—the adoption of new technologies, capital and resource commitment to R&D, the development of deep water ports and JV investments in other countries. POSCO adopted new technologies and facilities from Japan and Europe like a larger scale blast furnace, continuous casting equipment, etc. The establishment of two of the world's leading research organizations—Pohang University of Science and Technology (POSTECH) and the Research Institute of Industrial Science and Technology (RIST) helped in the growth of POSCO. South Korea also replicated the Japanese strategy of using large bulk carriers coupled with international investments to secure long-term access to iron ore.

The shipbuilding sector's growth was also supported by a number of factors—a focus on advanced technologies, efficient operations and the use of external know-how. HHI obtained advanced shipbuilding technologies from European shipbuilders—dockyard designs from Scottish Naval architecture firm A&P Appledore; ship design and operating instructions from Scottish shipbuilding firm Scott Lithgow. Experienced European shipbuilders worked as employees of HHI for the first three years. HHI also obtained production know-how from the Kawasaki shipbuilding company of Japan. During the overcapacity and price competition of the 1970s, HHI altered its product mix away from VLCCs to smaller, high-value ships and branched into off-shore structures.

As of 2014, Pohang had 204 establishments for steel manufacturing, employing around 20,000 people. Ulsan and Gyeongju together have around 1,000 automotive and around 600 shipbuilding units, employing around 115,000 people.

2.4 Marine clusters

Global trade flows

The shipbuilding market is currently dominated by China, Korea and Japan which cumulatively account for around 90 per cent of the world's shipbuilding capacity. China and Japan are dominant in bulkers while South Korea dominates in container vessels, tankers and gas carriers (Exhibit 1.18).

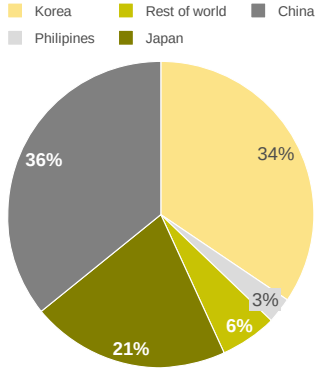
Shipbuilding is a cyclical industry and is currently on a downturn, with excess capacities globally. After the peak in deliveries in 2011, the industry's output is decreasing and reached 91.2 mn DWT in 2014. However, strong demand is expected in the long term, driven by shipping companies' move towards ultra-large vessels, demolition of the old vessel fleet and growth in global exports. This demand is expected to go up to around 150 mn DWT by 2025 and to around 300 mn DWT by 2035 (Exhibit 1.19).

EXHIBIT 1.18

MARKET TRENDS

China, Korea and Japan account for ~90% of the world's production; China and Japan specialise in bulk carriers, while Korea leads in container ships

4 countries dominate global vessel production



Deliverables of new buildings, major vessel types and countries where built (2014, thousands of GT)

	China	Republic of Korea	Japan	Phili-ppines	Rest of World	World total
Oil tankers	2,896	4,781	891	-	466	9,034
Bulk carriers	13,304	1,588	10,791	869	167	26,719
General cargo	585	329	199	-	372	1,485
Container ships	4,986	9,135	188	995	735	16,039
Gas carriers	119	3,528	666	-	14	4,328
Chemical tankers	113	185	188	-	57	543
Offshore	714	1,485	51	-	956	3,206
Ferries and passenger ships	92	5	27	-	787	892
Other	42	835	391	-	147	1,415
Total	**22,851**	**21,872**	**13,392**	**1,865**	**3,682**	**63,662**

India commands only ~0.5% of the global shipbuilding market share

Note: Propelled seagoing merchant vessels of 100 GT and above. More detailed data on other countries where vessels were built is available under http://stats.unclad.org/shipbuilding.

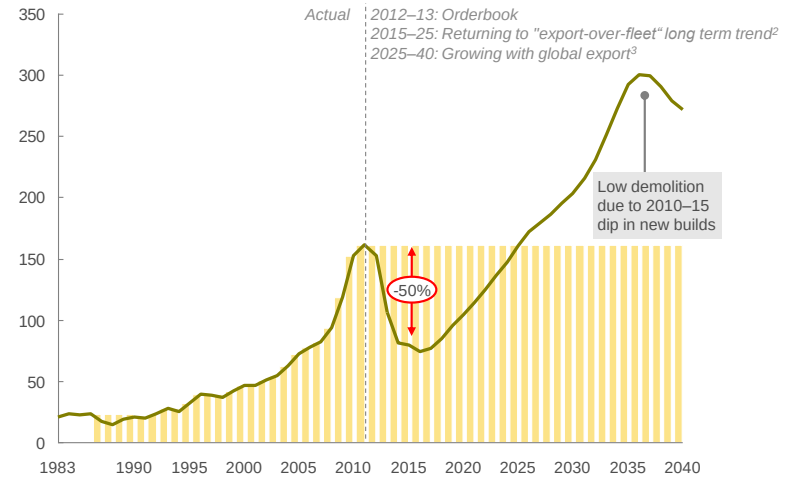
SOURCE: UNCTAD secretariat, based on data provided by Clarkson's Research

EXHIBIT 1.19

MARKET TRENDS

Globally, overcapacity at shipyards expected next years, however, strong growth in the longer term is expected

Supply and demand trends in global shipbuilding, DWT mn



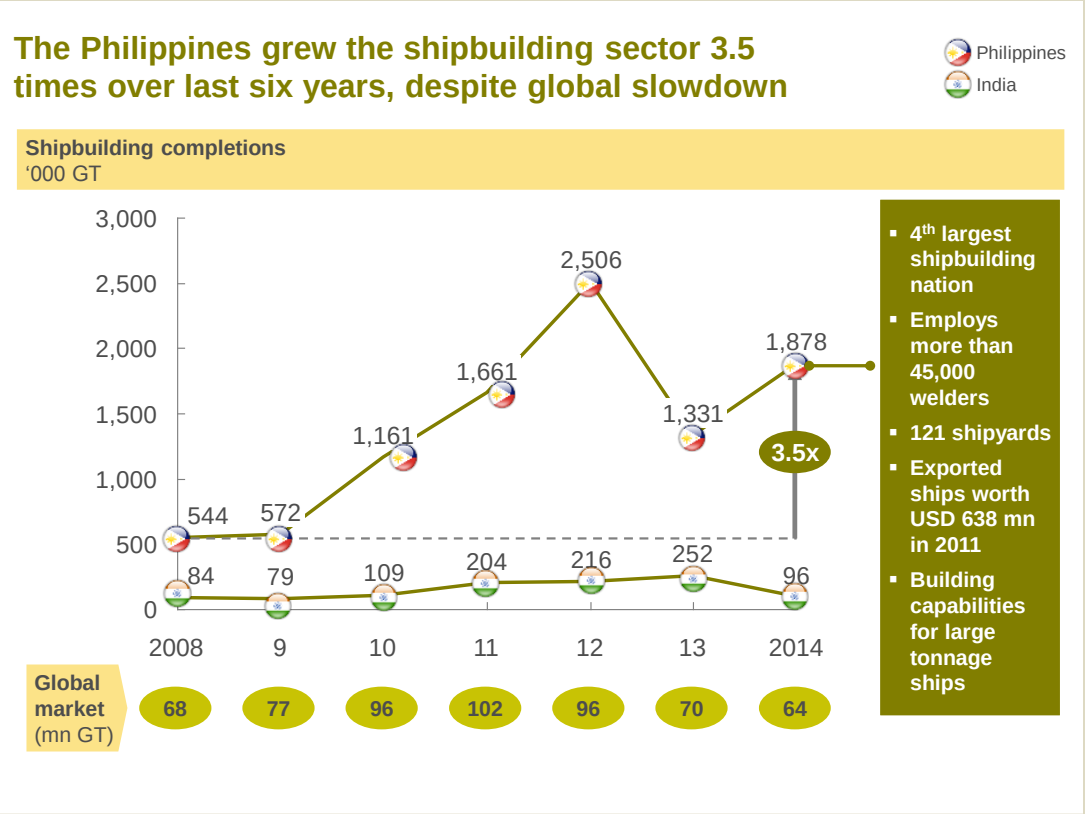
- **Current capacity sufficient to serve demand until ~2025**
- **Rationalisation of capacity expected, however, overcapacity at shipyards will persist for many years due to sunk cost investments**

1 Capacity measured as maximum output last 5 years. Capacity at 2011 level in forecast period
2 Oversupply eliminated and shipping market returning to supply-demand balance
3 Fleet growing with global export from 2015, demolition estimated using average 25 year lifetime and

SOURCE: Clarksons; Global Insight; expert interviews; team analysis

Global success story[5]

Despite the global slowdown, the Philippines has been able to grow its shipbuilding sector 3.5 times over the last six years and has become the fourth largest shipbuilding nation. The shipbuilding sector in Philippines, comprising 121 shipyards, employs more than 45,000 welders.



The shipbuilding industry in India

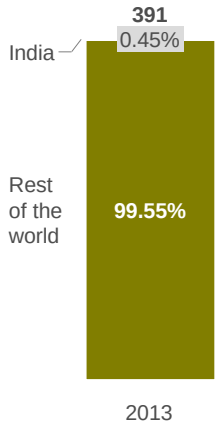
India currently accounts for only around 0.45 per cent of the global shipbuilding market. General cargo, bunkering and platform supply vessels accounted for most vessel deliveries (in DWT terms) in 2015. Drilling or production platforms and dredgers are the main exports from India and over 60 per cent of the shipbuilding in India is for entities based in Singapore and the UAE (Exhibits 1.20, 1.21, 1.22 and 1.23).

[5] Clarksons 2012

EXHIBIT 1.20

India currently produces only ~0.5% of the world's ships

World shipbuilding production capacity
mn, DWT



Indian shipyards[1]	Ownership	mn DWT	# of ships
ABG	Private	0.49	48
Pipavav	Private	0.30	4
Bharati	Private	0.22	31
Cochin	State owned	0.11	16
Chowgule	Private	0.08	18
Alcock Ashdown	Private	0.06	6
Others[2]	–	0.05	14

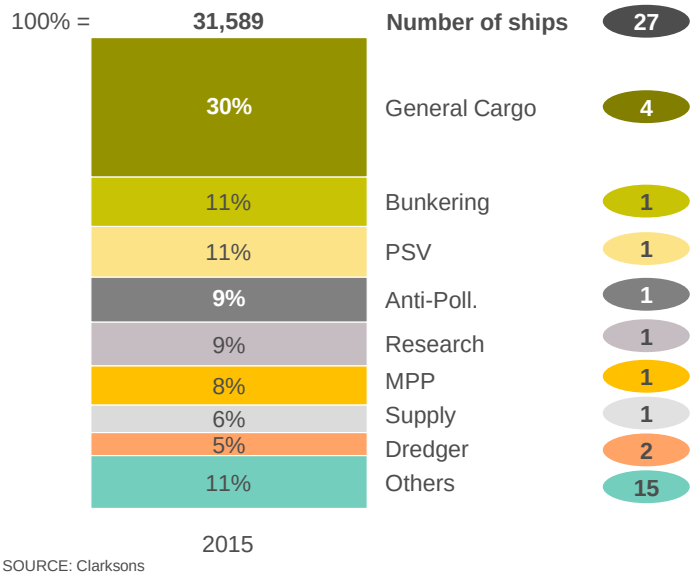
1 Top 7 by DWT production capacity
2 Includes L&T, Tebma, etc.

SOURCE: Drewry Maritime Services

EXHIBIT 1.21

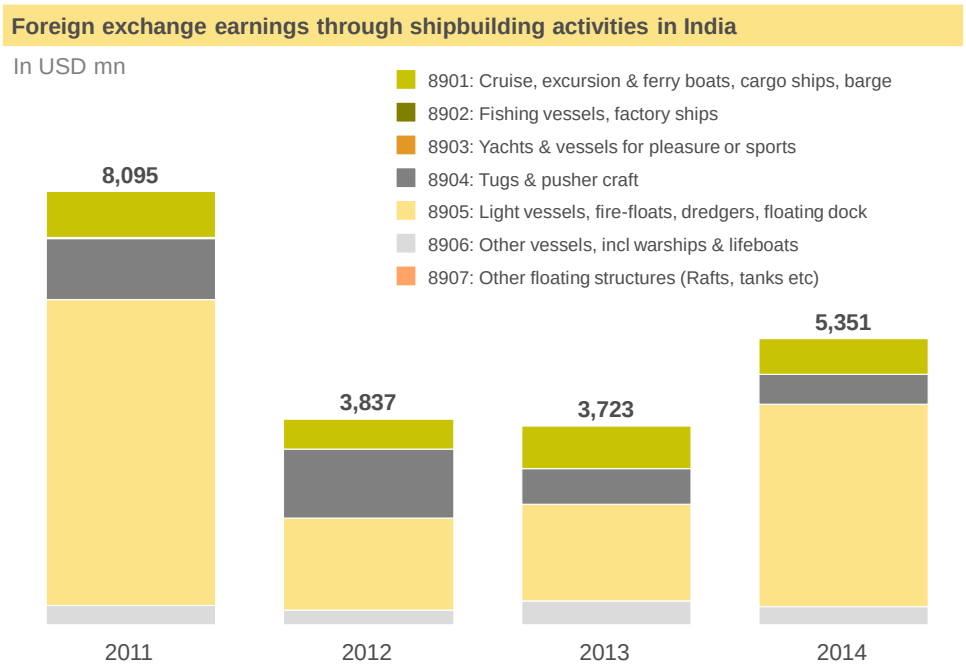
Shipbuilding deliveries in India – By type of vessel

DWT



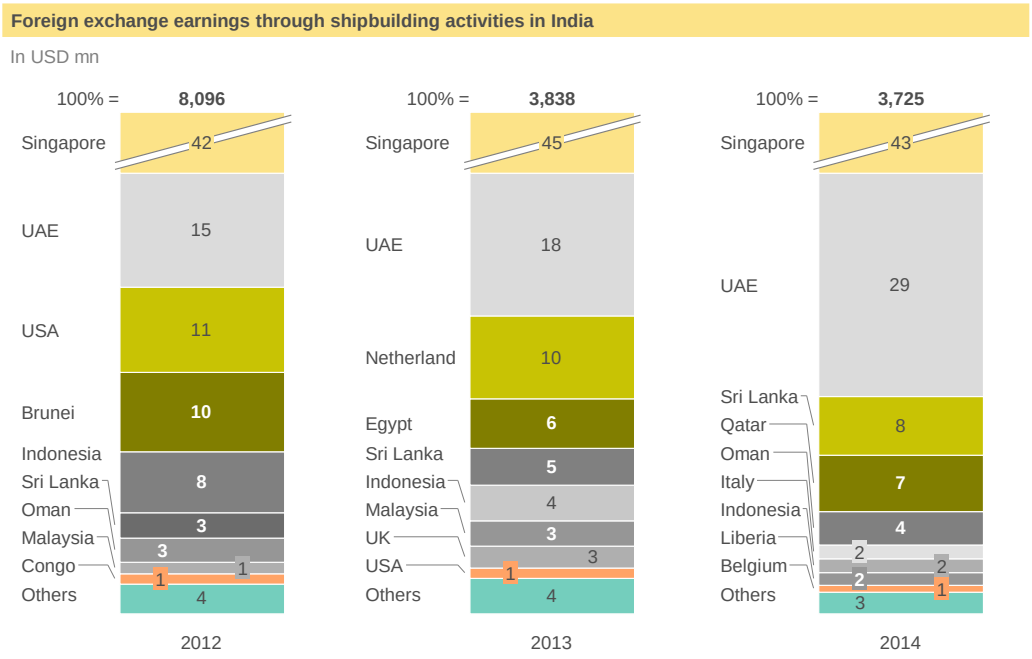
SOURCE: Clarksons

EXHIBIT 1.22



SOURCE: Ministry of commerce and industry, HS code: 89 ships, boats and floating structure

EXHIBIT 1.23



SOURCE: Ministry of commerce and industry, HS code: 89 ships, boats and floating structure

The opportunity for India

India could target developing a shipbuilding industry of 3 to 4 mn DWT by 2025, through a combination of some smart choices and government support. Indian shipyards are competent at building smaller size/ specialty vessels. They could focus on building specialty and coastal vessels less than 80 m long (e.g., offshore supply vessels, anchor handling tugs, etc.).

The Government of India has recently introduced policies and initiatives to develop the sector. These initiatives are expected to reduce the unfavourable cost differential faced by the Indian shipyards (Exhibit 1.24).

The opportunity in the defence sector (Exhibit 1.25), expected growth in coastal shipping, and replacement of the existing vessel fleet could be the drivers of growth of the shipbuilding industry in India.

Given the cyclical nature of the shipbuilding industry, it is important to complement shipbuilding with ship-repair facilities.

India could develop two potential locations for marine clusters: Gujarat and Tamil Nadu. Pipavav, Dahej and Hazira ports in Gujarat have shipyards and Alang has a shipbreaking yard. The potential marine cluster could leverage the existing ecosystem with steel supplies from Hazira. Similarly, Kattupali in Tamil Nadu has a large shipyard and is near a proposed steel plant. The potential impact from the proposed marine cluster is shown in Exhibit 1.26.

EXHIBIT 1.24

Key government policies and initiatives instituted by the Union Government to develop the shipbuilding sector

	Initiatives	Description
1	Financial assistance for local shipbuilders	▪ **Introduction of INR 4,000 cr financial assistance policy for 10 years –** Financial assistance to be granted to Indian shipyards equal to 20% of the lower of "Contract price" or the "Fair Price" of each vessel built by them for a period of 10 years commencing 2015–16. Rate of 20% to be reduced by 3% every three years
2	Exemption from Customs and central Excise duty	▪ Exemption from Customs and Central Excise Duties on inputs used in Shipbuilding
3	Infrastructure status	▪ **Grant of infrastructure status to shipyards –** To help Indian shipyards avail flexible structuring of long term project loans, long term funding from infrastructure funds at lower interest rates and longer tenure equivalent to the economic life of their assets ▪ Shipyards to have access to relaxed External Commercial Borrowing norms, issuance of infrastructure bonds for meeting working capital requirements and benefits under IT Act, 1961
4	FDI in shipbuilding	▪ Permit for 100% FDI in shipbuilding
5	Revision of domestic eligibility criteria	▪ All Govt. departments and agencies shall undertake bulk tendering for their vessel related requirements with deliveries starting from 2016–17 and will grant a Right of First refusal for Indian shipyards for such orders till 2025. From 2025, only Indian built vessels are to be procured by these agencies

SOURCE: Ministry of Shipping

EXHIBIT 1.25

INDIA OPPORTUNITY

Defence: ~USD 23 bn orders under execution and ~USD 51 bn in pipeline

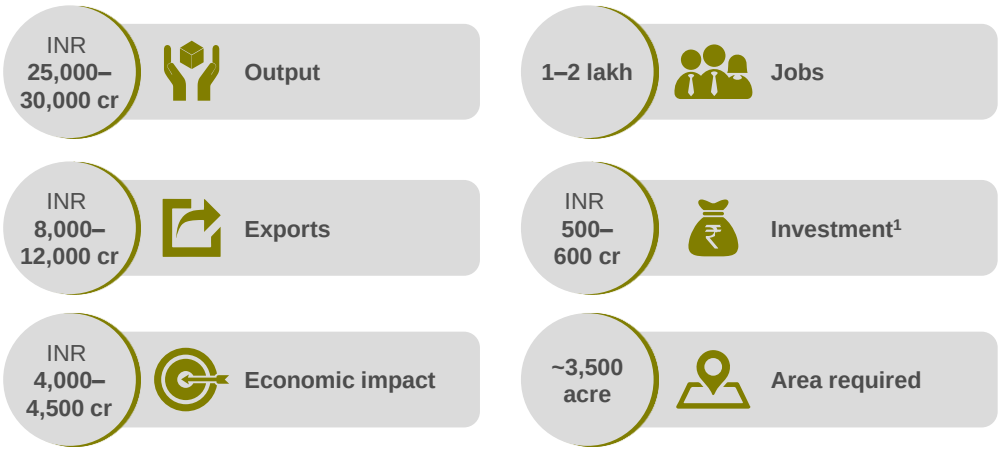
	Present orders		Future orders (3-5 years)[3]	
	Project	App. value INR cr	Project	App. value INR cr
Surface ships	P15B[1], P17 A[1]	55,000	16 ASW SWC	15,300
	6 CG OPVS, 2 SLOPVs, 2 FPV & 11 FICs, MCMV[2]	37,500	Next Gen Missile Boats	12,000
	4 ASW Corvette, 8 LCU MK-IV, 4 WJFACs, P17A[1]	28,500	Next Gen Corvettes	24,500
	IAC* , 20 CG FPV	3,100	Next Gen Frigates	35,000
	IPVs/Midget Submarines	4,000	Next Gen Destroyers	50,000
	5 NOPVs	2,500	04 Survey Vessels – Large	3,500
	3 Cadet Training Ships	485	Survey Vessel (trg)	2,500
	6 Survey Vessels	800	02+02 LPD Vessels	14,500
	15 Interceptor Boats	270	Fleet Support Ships/Other Support Vessels	9,000
	54 Interceptor Boats, 7 CGOPVs, Floating Dock	2,500		
	80 FICs	150		
	~ USD 20 bn opportunity		~ USD 25 bn opportunity	
Submarine	Project	App. value INR cr	Project	App. value INR cr
	P 75[1]	10,000	P-75 I	75,000
	Nuclear Submarine SSBN[1]	10,000	Other Submarine Projects	>10,000
	~ USD 3 bn opportunity		~ USD 26 bn opportunity	

1 EDC 2022; 2 EDC 2025 3 To be implemented from 2020–2030

SOURCE: Expert interviews; Ministry of Defence, Ministry of Shipping

EXHIBIT 1.26

Potential impact from each marine cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

2.5 Automotive clusters

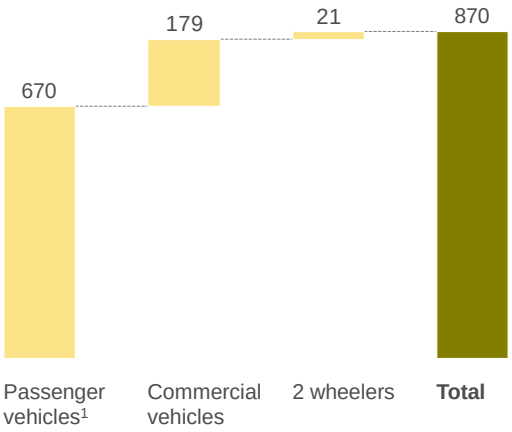
Global trade flows

Global automotive production across two-wheelers, commercial vehicles and passenger vehicles reached USD 2.5 trillion in 2013, recovering from a low of USD 1.4 trillion in 2009. Exports comprised 35 per cent of the global automotive production in 2013, recording a value of USD 870 bn. Passenger vehicles (including three-wheelers) formed the biggest share in global exports at USD 670 bn, followed by commercial vehicles and two-wheelers. Germany is the largest exporter, followed by Japan, the US, Mexico, South Korea, Canada and the UK (Exhibit 1.27).

EXHIBIT 1.27

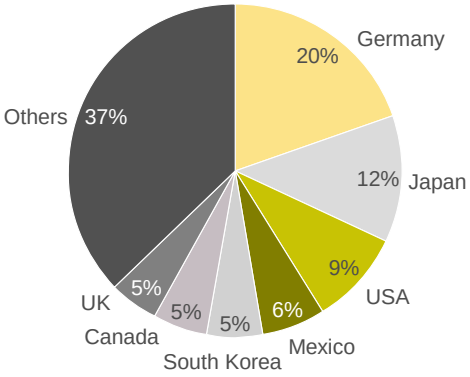
Passenger vehicles have the biggest share in global automotive exports

Global automotive exports, 2013, USD bn



Share of global automotive exports

Global automotive exports, 2013, Per cent



1 Including 3-wheelers

SOURCE: ITC trade map

Indian automotive industry

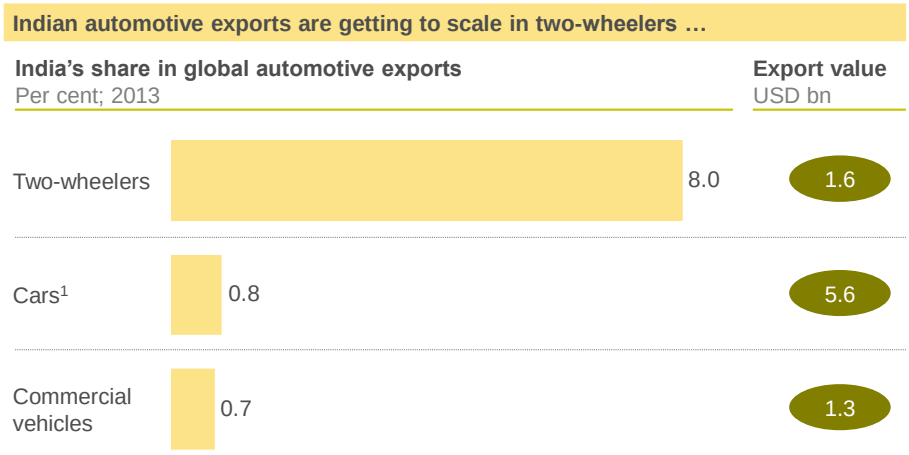
The Indian automotive industry has been growing at around 9.6 per cent between 2005 and 2015 while exports have grown at around 18.9 per cent. The industry achieved a gross turnover of USD 67.6 bn in 2012–13 and is projected to reach USD 300 bn by 2026 according to SIAM.

India accounts for 3 per cent of the global auto production but its share of global exports is only 1 per cent. Also, India's exports comprise just 12 per cent of its total production, suggesting huge potential to expand the global footprint. Exhibit 1.28 shows India's individual shares and the corresponding export value in the three auto segments, indicating a reasonable share in the export of two-wheelers.

The country produced 23.4 mn units of vehicles in the year 2014–15, serving a domestic demand of 19.8 mn units and exporting 3.6 mn units. The split of domestic sales and exports for the different automobile segments for 2014–15 is shown in Exhibit 1.29. South Africa, Sri Lanka, Nigeria, Bangladesh, the UK and Algeria are the top importing countries from India (Exhibit 1.30).

EXHIBIT 1.28

India has a significant share in global two-wheeler exports but minimal share in other product segments

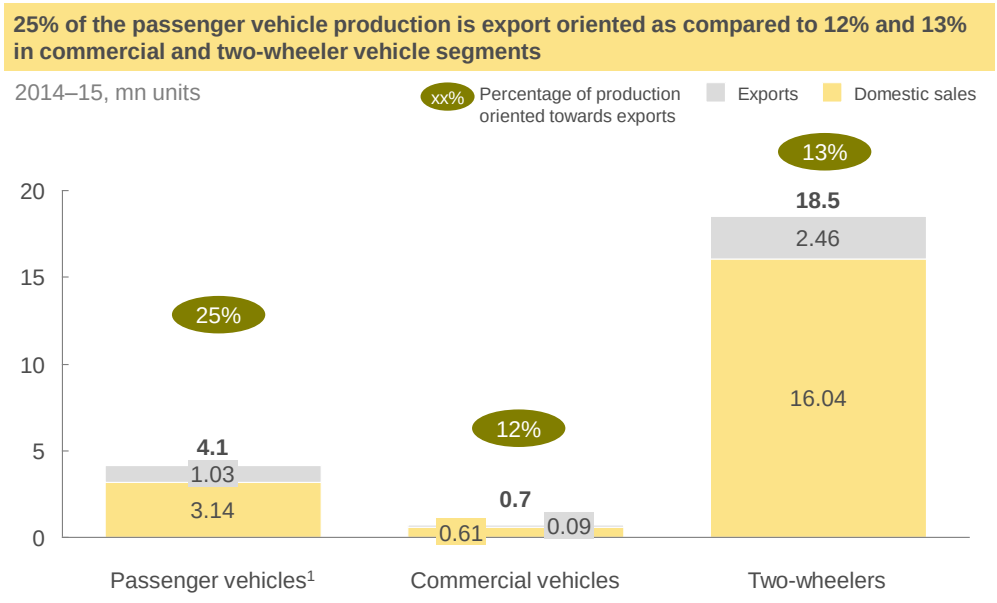


1 Including three-wheelers

SOURCE: Comtrade data

EXHIBIT 1.29

India's production and export volumes of different vehicle segments in 2014–15

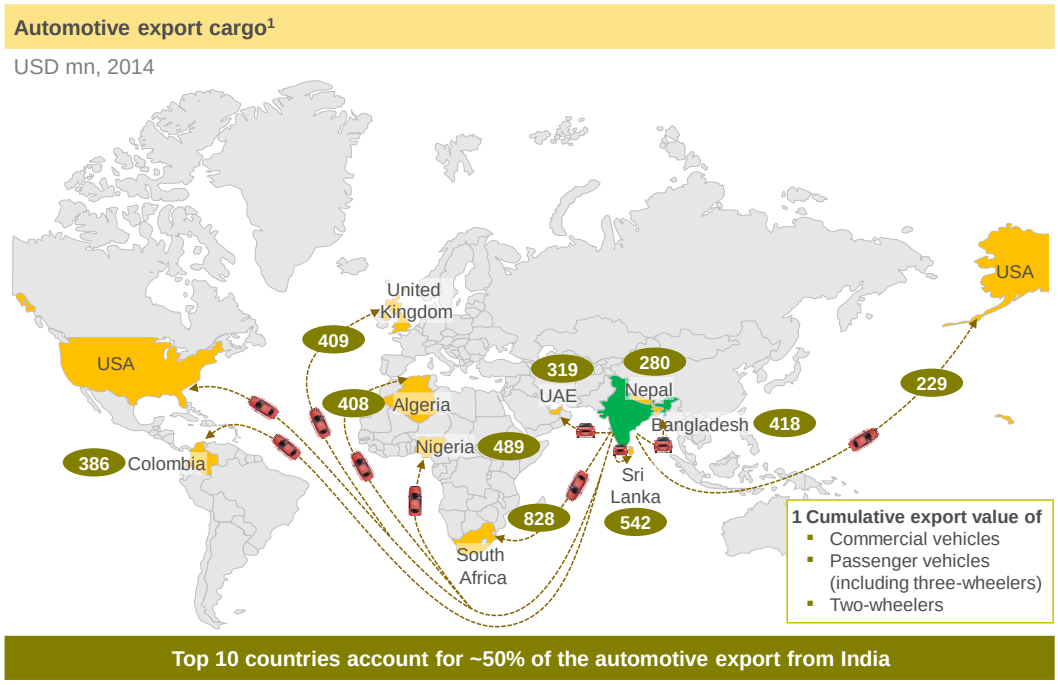


1 Including 3-wheelers

SOURCE: IHS data, Comrade data, SIAM

EXHIBIT 1.30

Automotive cargo flows from India



SOURCE: ITC Trade Map

Automotive clusters in India

India has five key automotive clusters which have significant export volumes:

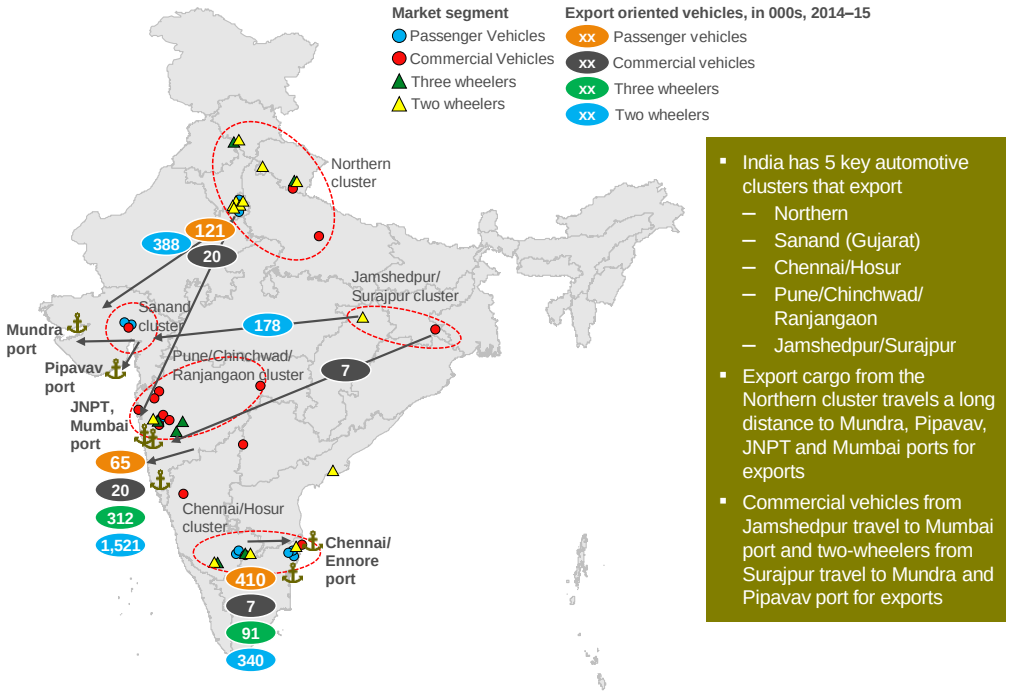
- **Northern India cluster:** It comprises Gurgaon, Manesar, Haridwar and Pantnagar and has many established automotive players including Hero, Maruti, TVS and Bajaj. This cluster primarily uses Mumbai, Pipavav and Mundra ports for exports. Despite being far inland, this cluster has a high share of exports
- **Sanand:** Ford, Maruti and Tata have set up manufacturing plants in this cluster for manufacturing passenger and commercial vehicles. The cluster has been developed recently
- **Chennai/Hosur:** This cluster is dominated by passenger vehicle manufacturers including Nissan, Ford, Toyota and Hyundai. Commercial vehicle manufacturers also have a presence. This cluster uses Chennai and Ennore ports for exports
- **Pune/Chinchwad/Ranjangaon:** This cluster has many manufacturing plants for commercial vehicles, with Tata and Mahindra the key players here. The cluster uses Mumbai and ports in Gujarat for export

- **Jamshedpur/Surajpur:** Tata currently manufactures commercial vehicles in Jamshedpur and Yamaha manufactures two-wheelers in Surajpur.

Exhibit 1.31 shows the automotive export cargo flows from the different manufacturing clusters.

EXHIBIT 1.31

Key automotive production clusters in India



SOURCE: Interviews with key stakeholders

The opportunity for India

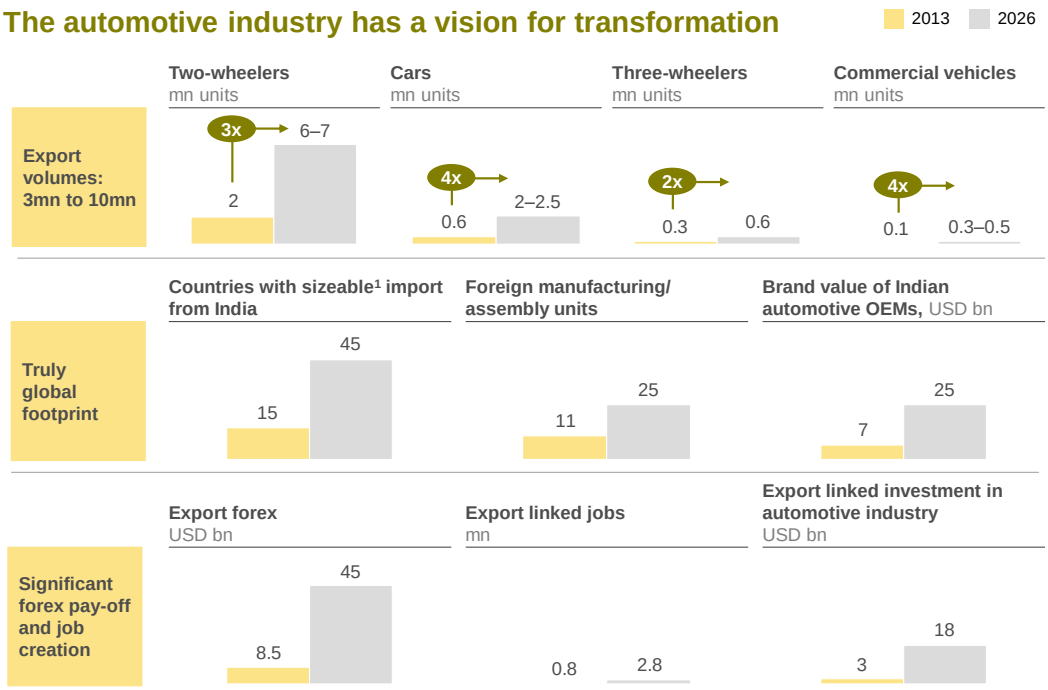
A mature industry ecosystem providing the best-in-class cost, quality and technology advantages positions India to capture a higher share of the global export market. While it needs to establish a strong hold in the passenger and commercial vehicles segment, India already has a significant share in the global export volumes of two-wheelers.

The industry has an export vision, to increase export volumes to about 10 mn by 2026. This may trigger significant and tangible positive pay-offs for the economy by:

- Generating foreign exchange of USD 45 bn (against the current USD 8.5 bn)
- Creating 2 mn new export-linked jobs

Attracting new investment of USD 15 bn to the industry (Exhibit 1.32)

EXHIBIT 1.32



1 Higher than target global average share of exports from India (i.e., 3%) by 2026

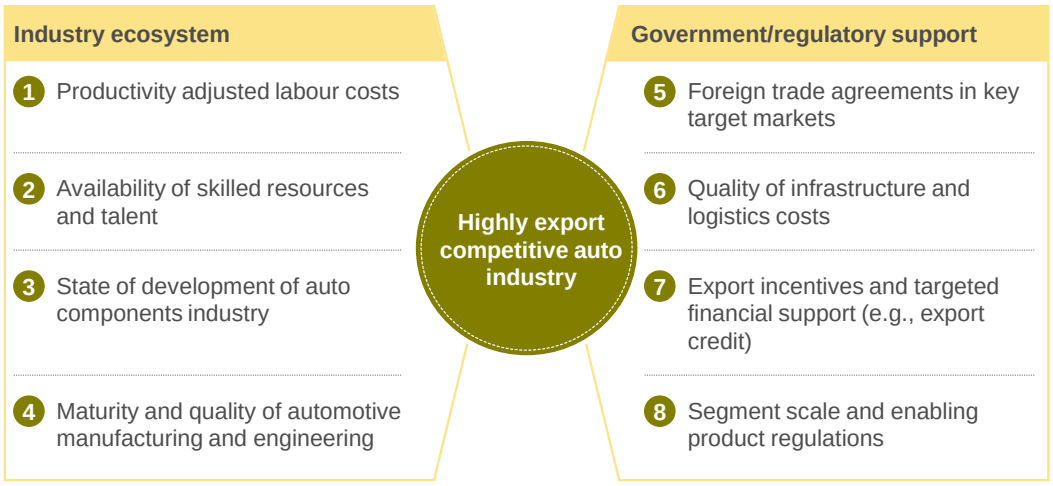
SOURCE: SIAM: Accelerating exports and globalizing the Indian auto industry

The challenges faced and the role of port-led industrialisation

India's 8 per cent share in the two-wheeler segment is a testimony to its potential in making a global mark in the sector. However, India faces tough competition from a number of other countries, including Mexico, South Korea, China, Thailand and Turkey, which are witnessing rapidly growing automotive exports. To identify the challenges for the Indian automotive sector, export competitiveness was benchmarked against key automotive exporting countries. The assessment was done in two parts—industry ecosystem and government/ regulatory support comprising eight factors (Exhibits 1.33 and 1.34).

EXHIBIT 1.33

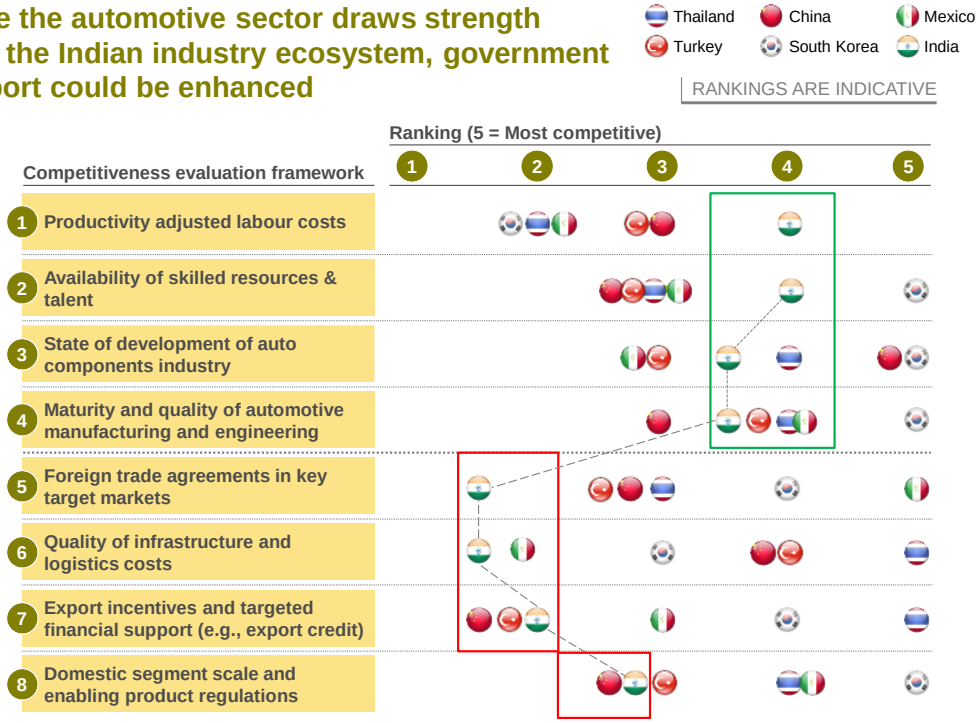
India's auto export competiveness was assessed on a set of eight success factors



SOURCE: SIAM: Accelerating exports and globalizing the Indian auto industry

EXHIBIT 1.34

While the automotive sector draws strength from the Indian industry ecosystem, government support could be enhanced



SOURCE: WIS; World Bank reports; press search; EIU; IHS database

The role of ports and logistics infrastructure

India scores poorly on the quality of infrastructure and logistics costs, which are at the core of driving export competitiveness. Export cargo moving from the manufacturing clusters to the ports, especially from the Northern cluster, is subjected to high inland logistics cost. The transit time of cargo, including processing time at the port, varies from 7 to 17 days for a distance of 1,400 km. This has implications on the time buffer that automotive manufacturers keep for planning the logistics of export-oriented cargo.

Logistics inefficiency impacts cost in two ways—direct freight cost and the inventory cost during transit. As described in Exhibit 1.35, freight and insurance contribute around 1 to 2 per cent to the export price of a passenger vehicle. For an industry where the OEM operates at a 6 to 7 per cent margin (on export price), the share of logistics cost is significant.

It is, therefore, important to develop a port-led industrialisation strategy for the sector. Some possibilities include:

- **Port linkages of existing clusters:** Due to the limited "Ro-Ro" handling capacity at Maharashtra ports, the automobile cargo from Pune cluster goes to Gujarat ports, travelling longer distances. Going forward, Wadhwan port could be developed with sufficient handling facilities for automotive cargo
- **Expansion of Sanand cluster in medium to long term:** Currently, a significant part of automotive exports happens from the inland Northern cluster. Even though Sanand has come up as a new cluster proximate to the Gujarat ports, it still has a small share in the total exports from India. Sanand could evolve as an export hub in the medium term, with adequate linkages to the ports of Mundra and Pipavav

The potential impact from the proposed automotive cluster is shown in Exhibit 1.36.

Global success story[6]

A large part of export-oriented manufacturing in other nations is port-based, e.g., the Samutprakarn cluster in Thailand has emerged as a world-class export hub hosting over 500 automotive players and directly employing close to 2 lakh workers. The presence of a deep-sea port in Rayong near the industrial estate hosting OEMs was one of the critical success factors for this cluster.

Another international example of a thriving port-based automotive manufacturing cluster is of Bremen in Germany which comprises the city of Bremen and the seaport city of Bremerhaven. Bremen is known as the car city, housing leading automobile manufacturers and automotive technology suppliers. Bremerhaven port is one of the largest car ports in the world, with storage and parking capacity for 1,20,000 cars. It is a port of call for nearly 1,500 automobile carriers. The cluster has also become a centre of scientific excellence that includes automotive research. There are various research and development institutions at the Bremen Technology Park. Automotive companies collaborate on technology creation with education and research institutions in the area, thereby creating an entire ecosystem for the automotive sector.

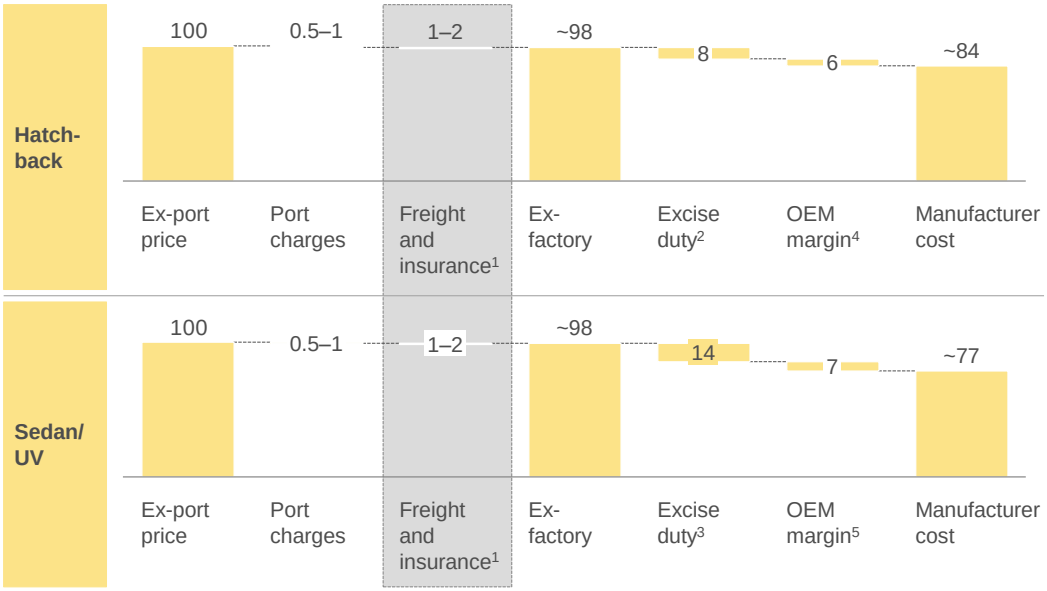
6 Press research

EXHIBIT 1.35

Breakdown of value chain cost for a passenger car

FOR EXPORT FROM INDIA

Per cent

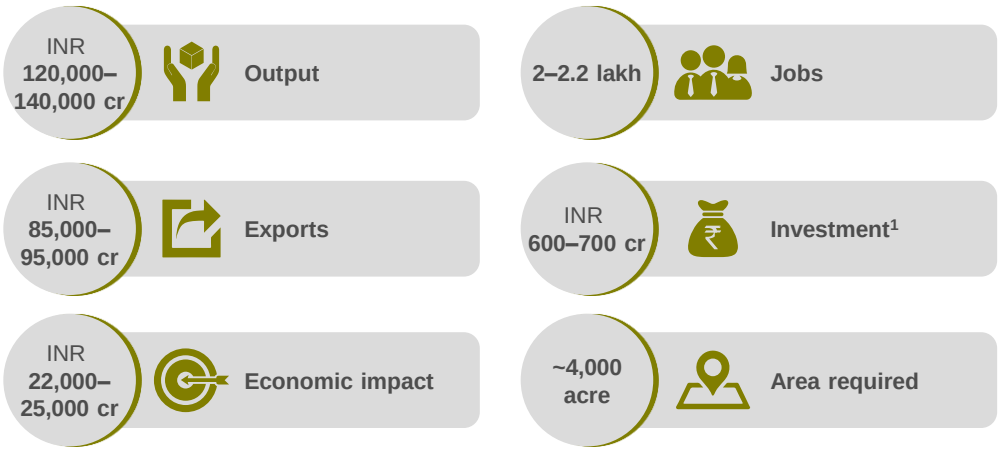


Note: Typical figures for India market; may differ substantially across brands and OEMs
1 Variable between 0–1% and location; 2 10% excise on manufacturer cost and margin
3 22% + INR 10,000 excise duty for cars >4,000 mm in length; 4 6–8% OEM margin on manufacturer cost
5 8–10% OEM margin considered on manufacturer cost and margin

SOURCE: Expert interviews

EXHIBIT 1.36

Potential impact from the automotive cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

3. DISCRETE MANUFACTURING CLUSTERS

Many countries have leveraged export-oriented/import-substituting discrete manufacturing to bridge the trade deficit. The "Make in India" programme of the Government of India will be instrumental in promoting discrete manufacturing in India. Port-based or port-proximate manufacturing could play a pivotal role in supporting this initiative. Ideally, ports could target sectors where they could take the lead and make manufacturing more competitive. This study identified high-potential sectors for port-based or port-proximate manufacturing. It evaluated 29 possible sectors using a filtering criteria comprising five dimensions and eight parameters. Six sectors—electronics, furniture, automotive, apparel, leather and footwear, and food processing—emerged as having high potential after the three-step filtration process (Exhibit 1.37 and 1.38).

EXHIBIT 1.37

Summary of the selection process

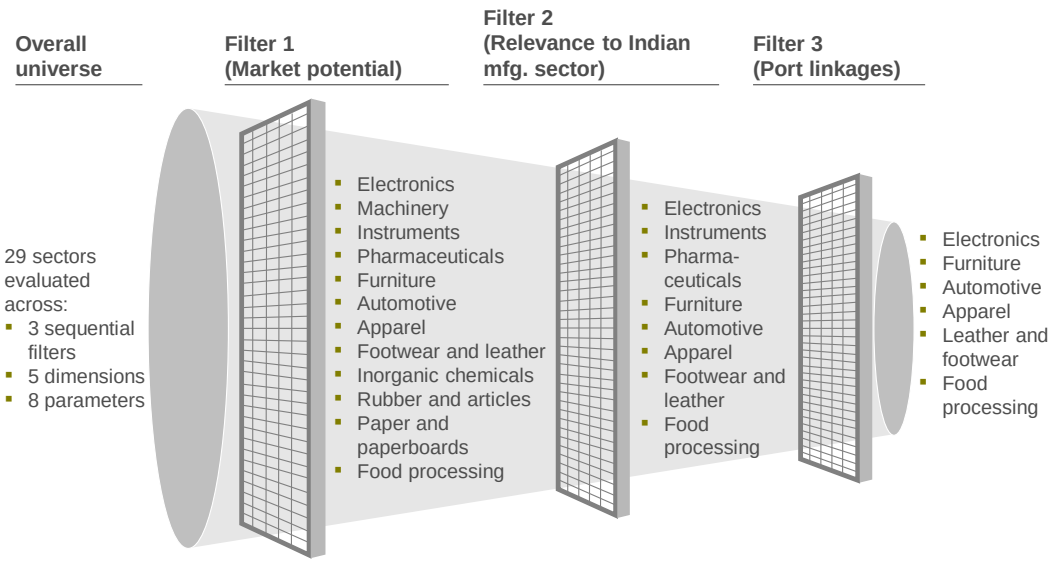
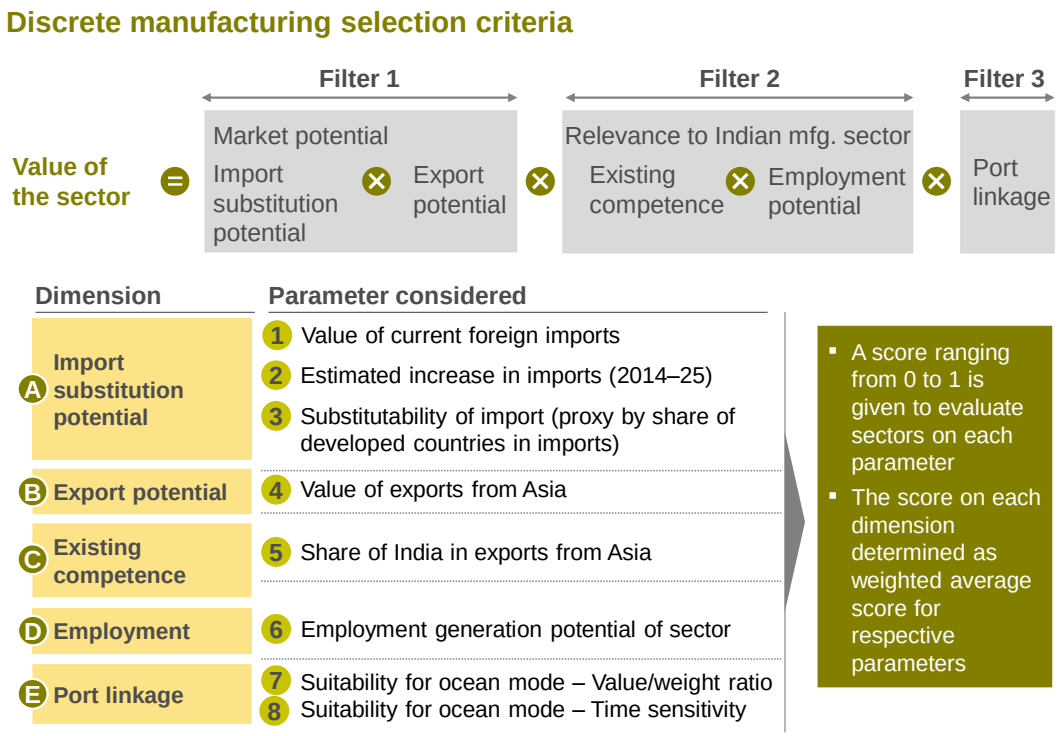


EXHIBIT 1.38



The value of a sector to be selected for port-based or port-proximate manufacturing may be defined and evaluated in terms of three factors—market potential, relevance to Indian manufacturing and linkages to the port:

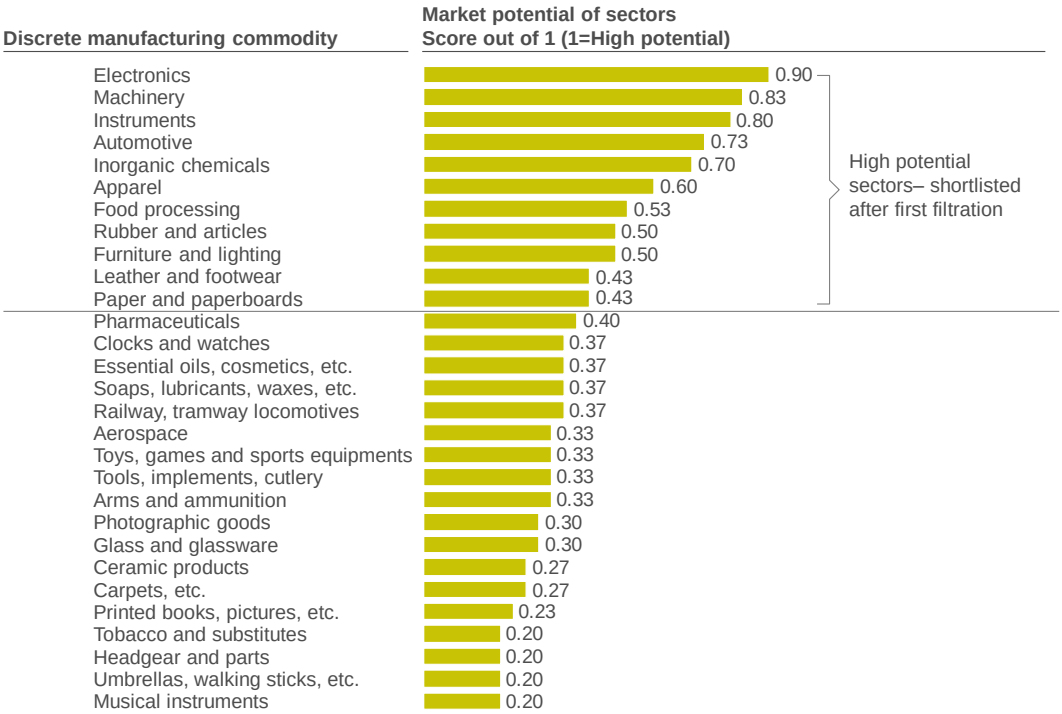
Market potential: Any sector selected for port-based or port-proximate manufacturing would need to have the potential to substitute current imports and generate exports. The study considered four parameters across these two dimensions:

- **The import substitution potential** of a sector has been assessed on three factors—the quantum of current foreign imports, the estimated increase in import requirement over the next 10 years (assuming past growth rate) and the possibility of substituting imports (proxy indicator of share of developed economies in imports into India used for this)
- **The export potential** of a sector has been assessed based on the quantum of exports from Asia. This may serve as an aspirational benchmark for India

Eleven high-potential sectors were shortlisted after the first filter. These were then evaluated for their relevance to the Indian manufacturing sector (Exhibit 1.39).

EXHIBIT 1.39

Scoring of discrete manufacturing sectors: Market potential (filter 1)



Relevance to Indian manufacturing: Two factors were examined to establish the relevance of sectors:

- **The existing competence** of India in a sector has been assessed based on its share in exports from Asia
- **Employment generation potential:** The employment intensity of the sector, measured in terms of the direct employment per INR cr of value added, has been used as an indicator.

Eight sectors were shortlisted after the second filter, and then evaluated for their linkages to ports (Exhibit 1.40).

Linkages to ports: If a sector has adequate linkages to a port, it is considered suitable for port-based or port-proximate manufacturing. This has been assessed based on the suitability of the ocean mode of transport by using the value-to-weight ratio and time sensitivity index as proxies. These explain whether the cargo generated by a sector is suitable for the ocean mode of transport as compared to other modes (Exhibit 1.41).

The following six industries were shortlisted for port-led manufacturing:

- **Labour-intensive sectors:** Apparel, leather and footwear, furniture, food processing

- **Skill/knowledge intensive sectors:** Electronics, automotive.

EXHIBIT 1.40

Scoring of discrete manufacturing sectors: Relevance to the Indian manufacturing sector potential (filter 2)

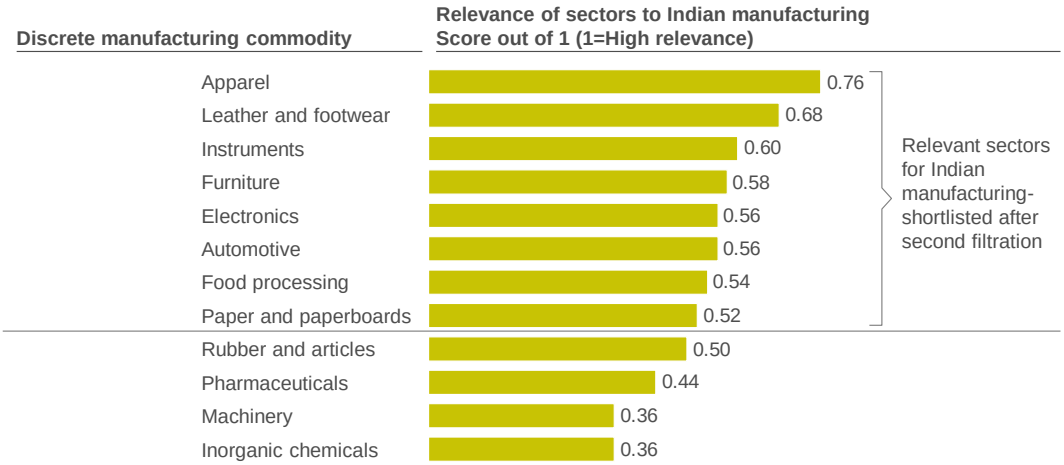
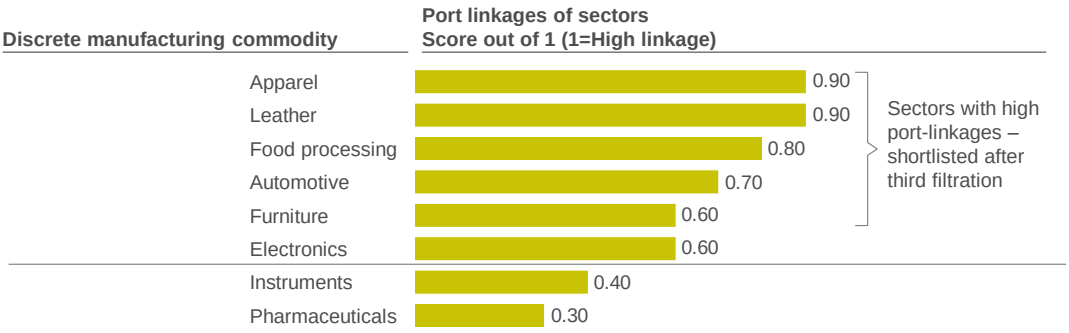


EXHIBIT 1.41

Scoring of discrete manufacturing sectors: Port linkages (filter 3)



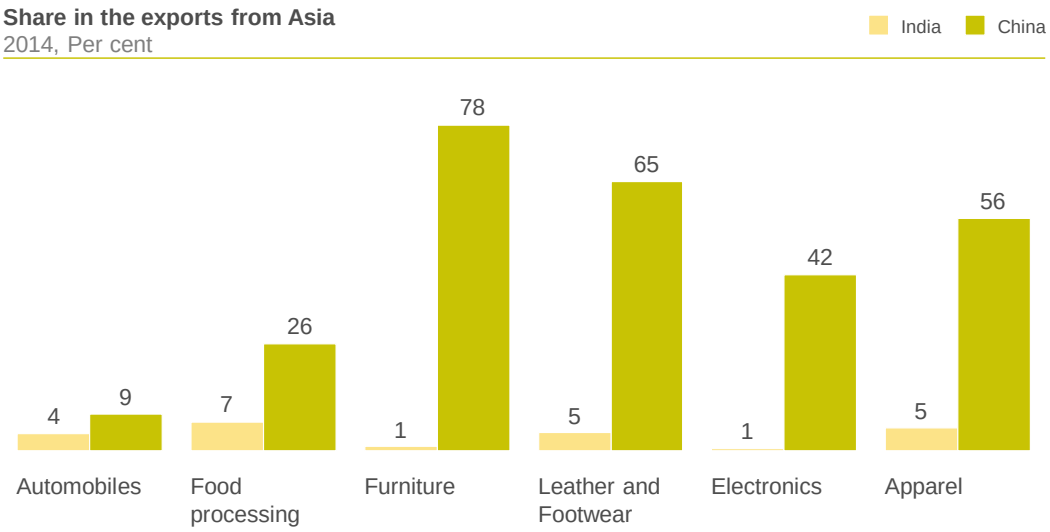
India exported goods worth around USD 317 bn in 2014. The largest share belonged to apparel, at around 7 per cent. Cumulatively, the six sectors contributed around 18 per cent to the total goods exports. India has set itself a target to increase the exports of goods and services to USD 900 bn by 2020[7]; goods may continue to contribute around 60 to 70 per cent of the total mix.

[7] DIPP

Exports from these six sectors could grow from USD 60 bn currently to USD 210 bn by 2025. Exhibit 1.42 shows the comparison of India's share in exports from Asia vis-à-vis China for the shortlisted sectors.

EXHIBIT 1.42

Share of India vis-à-vis China in Asia's exports



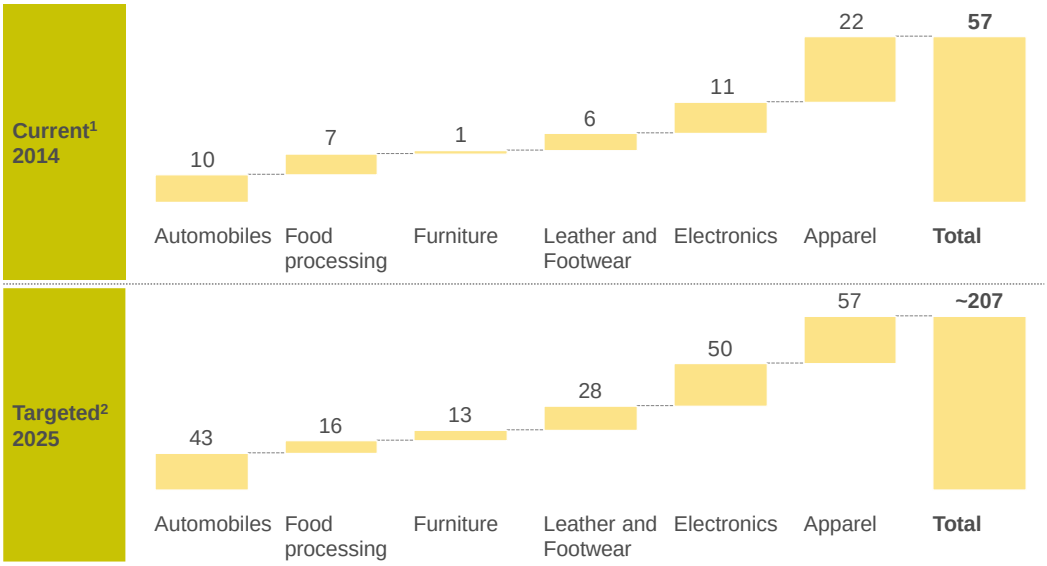
SOURCE: ITC trade map

India could aspire to increase the share of exports for these sectors and emerge as one of the top five exporting countries in Asia. These sectors may then have a cumulative contribution of around 20 per cent in the export basket, leading to exports of around USD 200 bn by 2025. Exhibit 1.43 shows the current (2014) and the targeted export value from these sectors in 2025.

EXHIBIT 1.43

Current and expected share of shortlisted discrete manufacturing sectors

Value of exports from India
2014, USB bn



1 India's total goods export in 2014: ~ USD 320 bn
2 India's target to capture position amongst the top 4–5 exporting countries from Asia by 2025, Asia's exports from these sectors expected to grow at past CAGR
SOURCE: ITC trade map

Assuming the business-as-usual growth of hinterland clusters, a significant part of increased exports (around USD 90 bn) from these sectors could come from port-based or port-proximate manufacturing clusters.

Sector	**Exports (2014),** USD bn	**Targeted exports (2025),** USD bn	**Estimated exports under BAU,** USD bn	**Estimated increase in exports from new clusters,** USD bn
Automobiles	10	43	27	16
Food processing	7	15	8	7
Furniture	1	13	3	10
Leather and Footwear	6	28	17	11
Electronics	11	50	18	32
Apparel	22	57	44	13

3.1 Apparel clusters

The opportunity for India

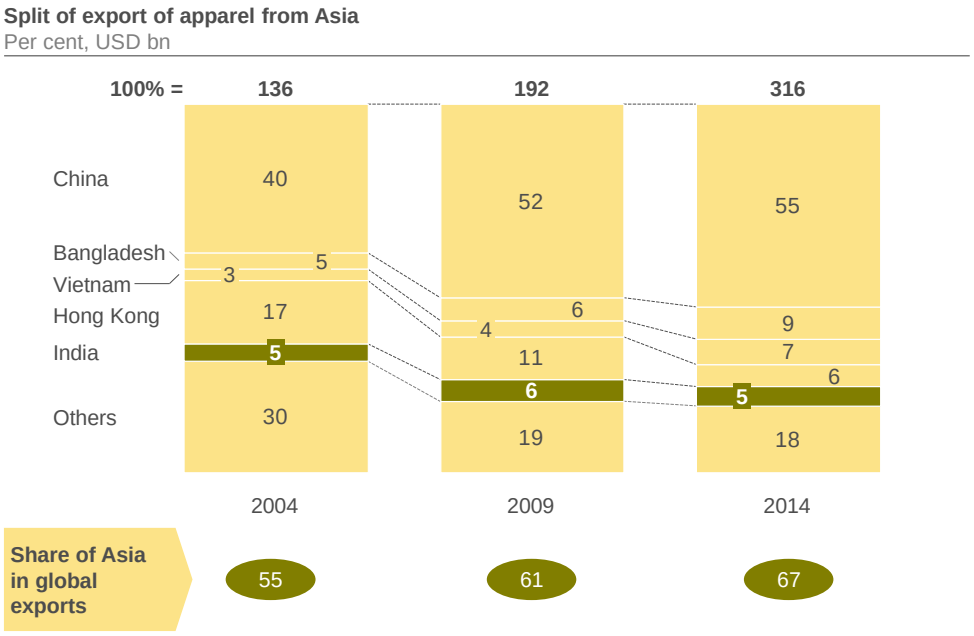
India has raw material-based competitive advantage in apparel manufacturing. It is the third largest cotton producer in the world. The downstream activities of converting cotton to textile and then to apparel are highly labour-intensive.

India's share in exports from Asia has remained stagnant at 5 per cent (Exhibit 1.44). An analysis of global trade flows reveals that while China has consolidated its position, Bangladesh and Vietnam are emerging as the next "hot spots" for export-oriented apparel manufacturing.

In 2013, a survey of 29 chief procurement officers (CPO) of leading apparel companies indicated that around 72 per cent planned to decrease sourcing from China in the next five years. However, Bangladesh and Vietnam were the immediate substitutes, with India ranked a distant third (Exhibit 1.45).

EXHIBIT 1.44

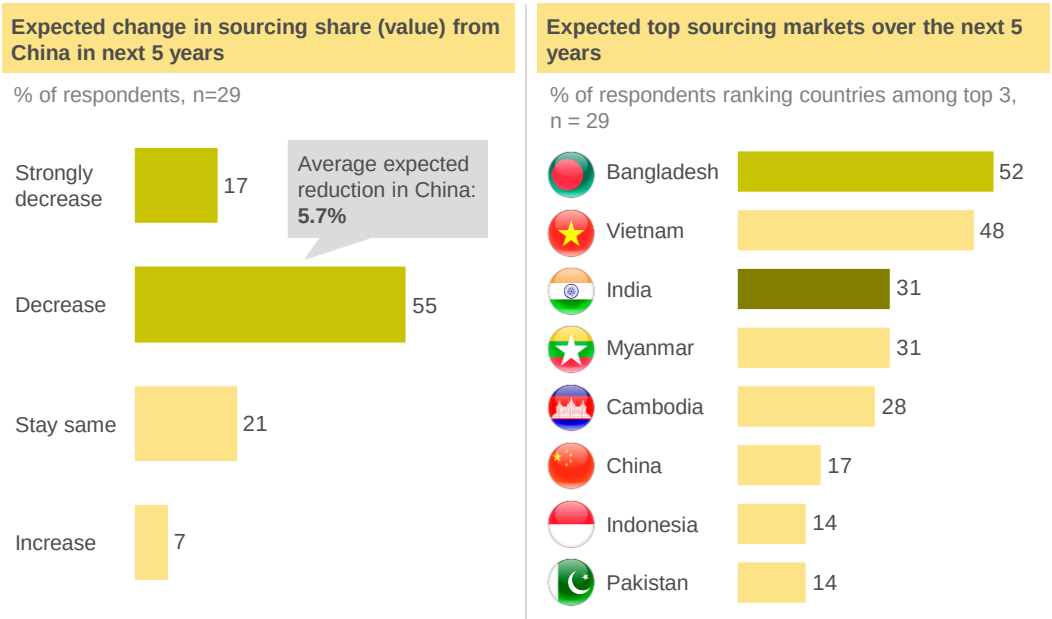
India's share of apparel exports from Asia has remained stagnant at ~5%



SOURCE: International trade database by ITC

EXHIBIT 1.45

Chief purchasing officers plan to move some of their sourcing out of China over the next 5 years, Bangladesh top emerging sourcing market



SOURCE: Public report - What's next in apparel sourcing

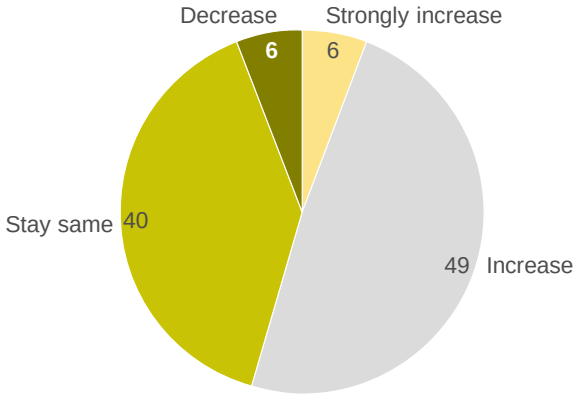
Eighty per cent of sourcing companies are present in India, even though India's share of their wallet is only about 6 per cent. More than half of the CPOs based in India would like to increase sourcing from here (Exhibit 1.46). India could grow to around USD 60 bn by 2025 if it targets a 10 per cent share in apparel exports from Asia (close to Bangladesh's current share) by that year.

EXHIBIT 1.46

More than 50% of CPOs want to increase their sourcing share from India

How do you expect your sourcing value share to develop during the next years until 2020?

Per cent of respondents per category, n = 40



SOURCE: Public report – What's next in apparel sourcing

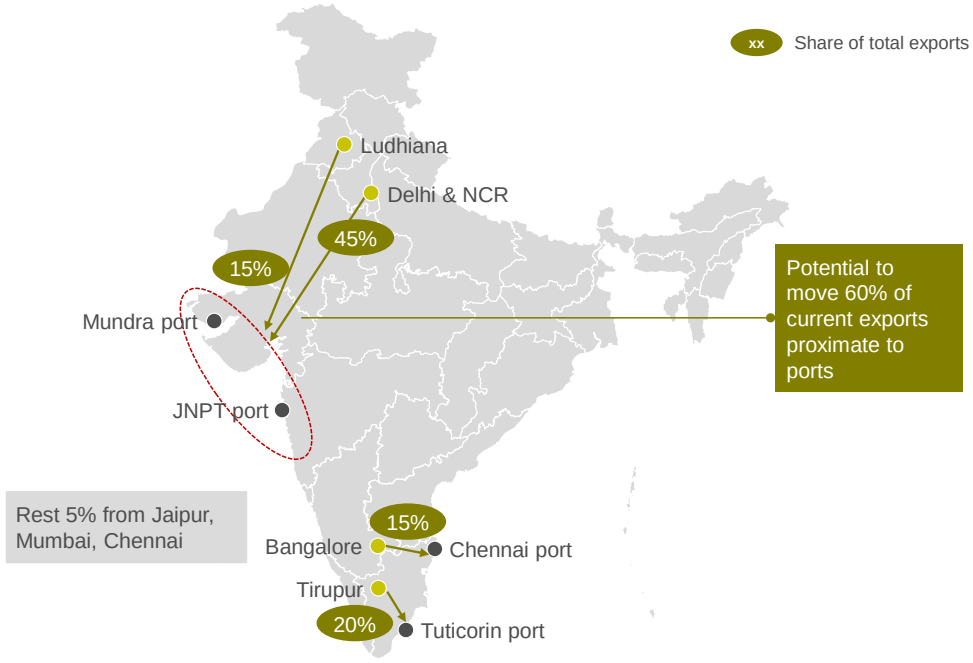
The challenges faced and the role of port-led industrialisation

Port-based manufacturing could help the industry overcome two key impediments in India's rise as an export hub:

- **Long lead times:** Buyers have identified the responsiveness of the supply chain and low and predictable lead times as their primary selection factors. For India, the logistics lead time is longer than the manufacturing process, creating a major disadvantage. A significant portion of Indian apparel exports are transported by air (at five times the logistics cost compared to shipping) due to unreliable road, rail and port infrastructure against short and fixed turnaround times. Based on the analysis of "origin–destination" pairs of apparel, nearly 60 per cent of the current production is located far from the ports (Exhibit 1.47).

EXHIBIT 1.47

Origin–destination pairs for apparel exports in India



SOURCE: Discussions with industry

- **Sub-scale operations:** Apparel manufacturing in India is dominated by small-scale, stand-alone firms that are not able to compete with other low-cost nations. India has about 11,000 apparel manufacturing firms, compared to around 18,000 firms in China, which produce 20 times more apparel by volume.

In addition to these port-related factors, restrictions on importing man-made fabric in India also put export-oriented manufacturing at a disadvantage with respect to other competing nations. Man-made fabrics could cut down wastage from 8 to 9 per cent to 1 to 2 per cent, thereby improving the overall competitiveness of the industry.

Setting-up port-based or proximate manufacturing clusters could help to address these issues and significantly increase the competitiveness of apparel manufacturing. Welspun is a good example of setting up an at-scale facility (800 acres, 14,000 workers, own power supply) and a close-to-port location (50 km away from India's largest container port, Mundra).

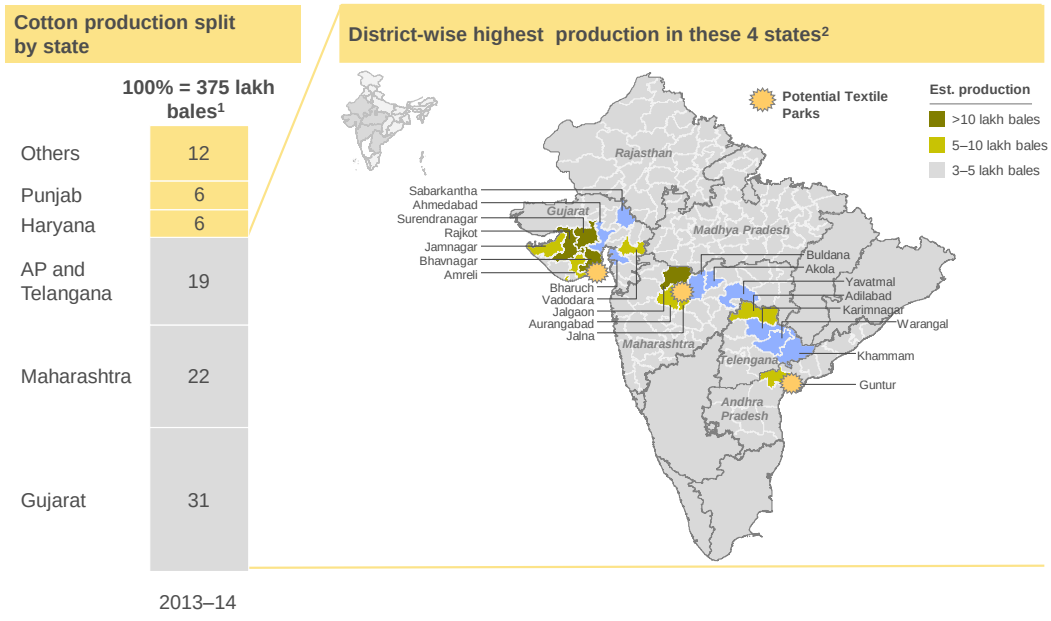
To replicate the Welspun success model, three or four "apparel parks" could be set up in the country, linking cotton-producing regions with ports. A mapping of cotton-producing regions in India shows three possible locations for setting up these clusters (Exhibit 1.48):

- Saurashtra region in Gujarat: Amreli, Bhavnagar, Jamnagar, Rajkot, Surendranagar and Ahmedabad are among the highest cotton-producing districts in this region
- Central Andhra Pradesh: Guntur is a key cotton-producing district. This cluster can also tap into cotton being produced in Khammam, Warangal, Karimnagar and Adilabad districts in Telangana
- Vidarbha region in Maharashtra: Jalgaon, Aurangabad, Jalna, Buldana and Akola are the key cotton-producing districts in this region

The potential impact from a proposed apparel park is shown in Exhibit 1.49.

EXHIBIT 1.48

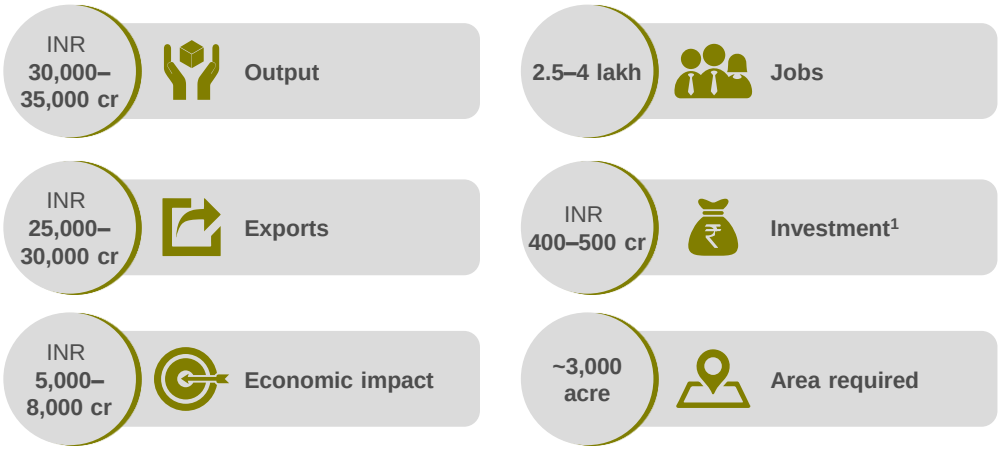
Three clusters of cotton production in India that can be linked to port-based apparel clusters



1 of 170kg
2 Based on "Cotton statistics at a glance" published by Directorate of Cotton Development & National Centre for Integrated Pest Management

EXHIBIT 1.49

Potential impact from each apparel park



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

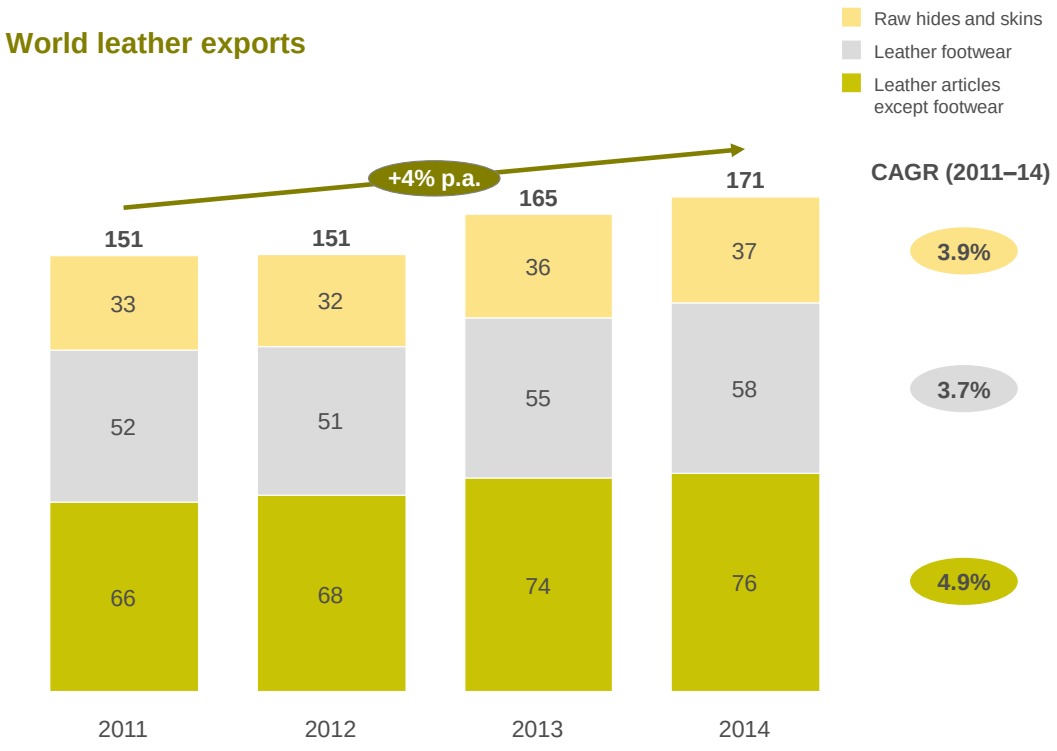
3.2 Leather and footwear clusters

Global trade flows

The global leather industry is USD 80 bn in size, with China its largest producer and US its largest consumer. The industry revenue is forecasted to reach USD 91 bn, with a CAGR of 3 to 4 per cent over the next five years. Leather products have four segments—footwear, leather apparel and leather goods, finished leather, and saddlery and harness. The first two—footwear and apparel and goods—form the major share of the leather industry. About 65 per cent of global leather goes into producing leather footwear. Globally, trade in leather and leather goods was around USD 170 bn in 2014, growing at 4 per cent per annum over the last few years (Exhibit 1.50). Around 80 per cent of this comes from the export of leather goods and footwear. China has the largest share of exports in leather footwear and other leather articles, followed by Italy. In exports of raw hides and skins, Italy takes first place, followed by the US and Brazil.

Leather is a highly traded commodity. On average, the global leather trade accounts for around 75 per cent of total leather production.

EXHIBIT 1.50



SOURCE: ITC trade map

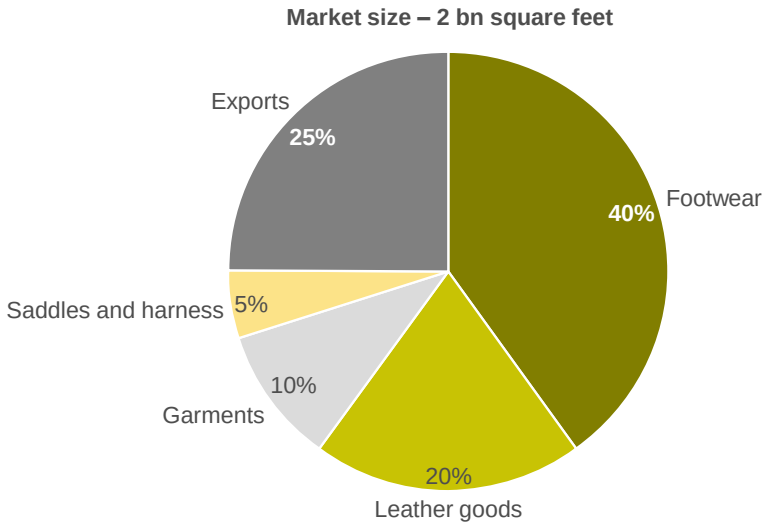
The Indian leather industry

The livestock population in India is 512 mn, consisting of cattle, buffalo, sheep, goats, pigs, etc. These offer a steady supply of around 2 bn square feet of leather for the industry every year, of which a quarter is exported (Exhibit 1.51).

Besides access to raw material, India has a natural advantage in this labour-intensive industry in terms of workforce. The leather and leather products' industries together employ over 2.5 mn Indians, primarily from the economically weaker sections; 30 per cent of employees are women.

EXHIBIT 1.51

Leather consumption in India



SOURCE: CLE

Leather clusters in India

The industry is an important foreign exchange earner. India exported around USD 6 bn worth of leather and associated products in 2014. Exports have grown rapidly, achieving annual growth of around 9 per cent over the last four years.

The three major leather clusters with significant export volumes are (Exhibit 1.52):

Tamil Nadu, a significant concentration of exporting units (around 33 per cent)—Perambur, Chennai, Ambur and Ranipet constitute the leather cluster, primarily using the Chennai port to export leather-related products

- Uttar Pradesh has around 28 per cent of exporting units spread across Kanpur, Noida, Faridabad and Agra. Most leather articles are exported through container ports in the west, e.g., Mundra and JNPT
- West Bengal: Kolkata houses a leather cluster in the Bantala region and exports through ports on the east coast

The top five destinations for Indian leather products were the US with 13.3 per cent share, Germany with 12.8 per cent, the UK with 12.5 per cent, Italy with 8.4 per cent and Hong Kong with 7.4 per cent. The top 10 countries account for more than 75 per cent share of leather and related products from India (Exhibit 1.53).

EXHIBIT 1.52

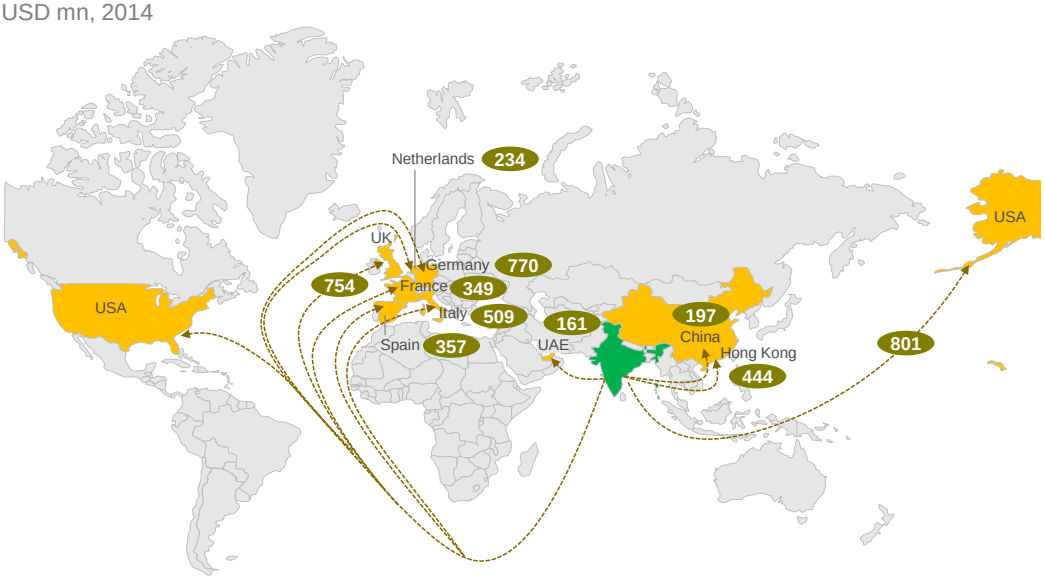
Leather production centres in India

EXHIBIT 1.53

Leather cargo flows from India

Leather export cargo

USD mn, 2014



Top 10 countries have 75%+ share of leather exports from India

SOURCE: ITC Trade Map

The opportunity for India

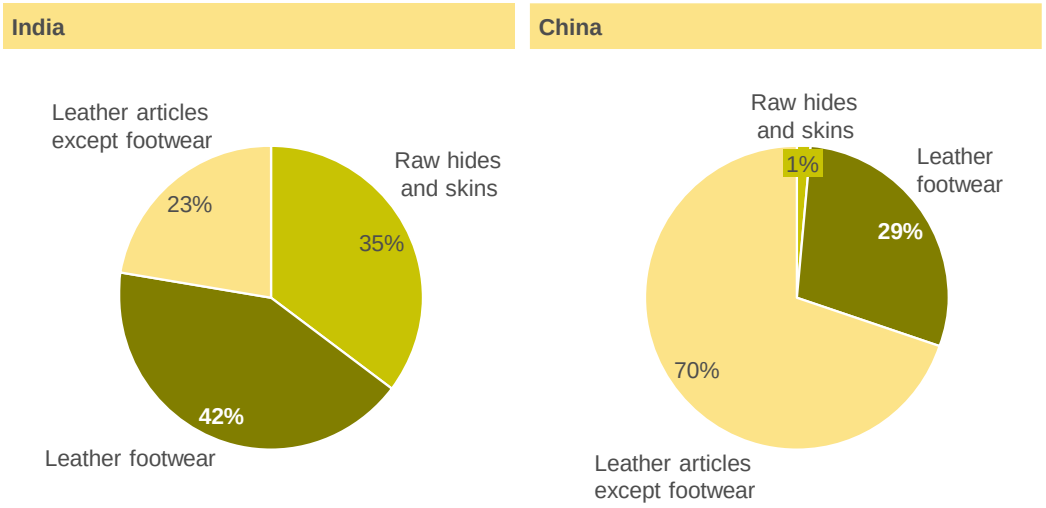
At 42 per cent, footwear forms the largest share of leather and leather product exports from India. India has grown tremendously from being a raw leather exporter to becoming a supplier of high value-added products in the last few decades.

Indian leather exports are around 3.5 per cent of India's export basket. Leather and leather goods together accounted for 1.8 per cent of India's total exports in 2013–14, compared to 2.9 per cent in 2004–05. Although India is the second largest manufacturer of leather footwear after China, its exports were only 5.6 per cent of the total 2,065 mn pairs produced in 2014.

The industry may find it difficult to meet the export target of USD 14 bn by 2016–17 for which about 6.2 bn square feet of leather is required (more than thrice the present production). Even at a more realistic target of doubling its exports to USD 10 bn in 2016–17 from USD 5 bn in 2013–14, the Indian leather industry may need an additional 3 bn square feet of raw hide, which needs more than export substitution.

EXHIBIT 1.54

Comparison of India and China: Leather export split, 2014



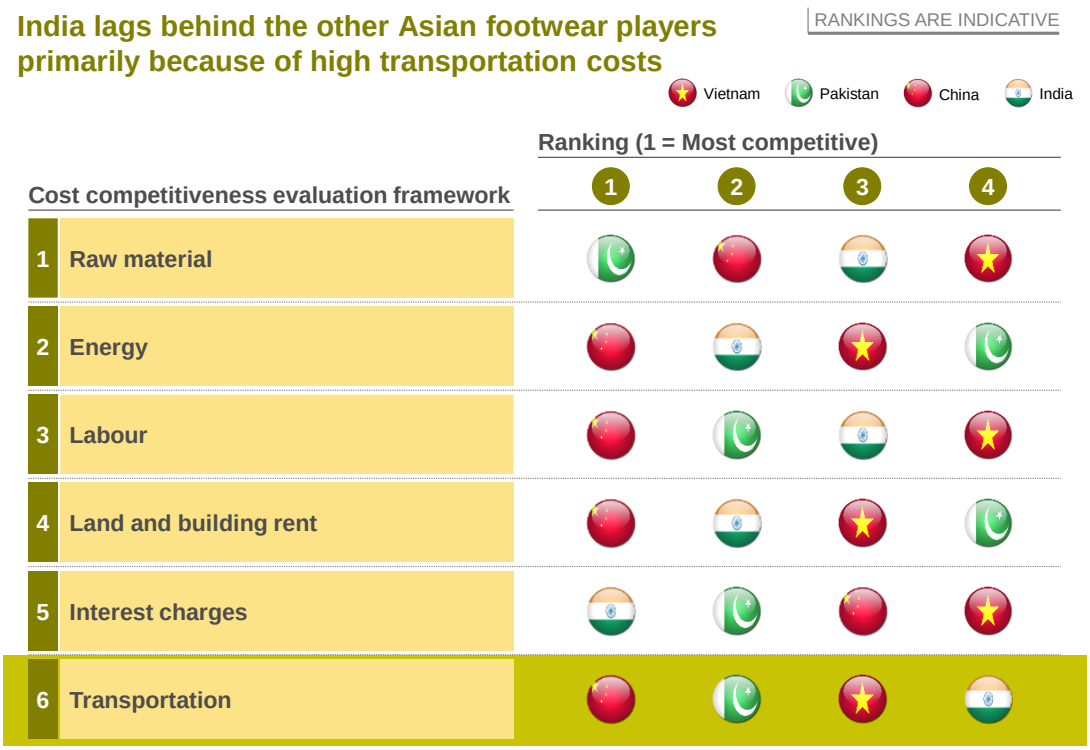
China has a much higher share in value-added leather articles—footwear, apparel and goods while India exports large amounts of raw hides and skins (Exhibit 1.54). India needs to reverse this.

The challenges faced and the need for port-led industrialisation

The shortage of raw material is not the only challenge for the industry in India. When compared to China and Vietnam, Indian leather products in the international market are more expensive, due to:

- Half the labour productivity of China or Vietnam in leather manufacturing
- Relatively high dependence on imports for inputs needed for footwear, garments and goods
- The unorganised structure of Indian leather manufacturing. Nearly 85 per cent of the industry consists of very small manufacturers, who are often uncompetitive
- Poorer infrastructure than China across all utilities – electricity, water, roads and ports
- Mostly land-locked big leather clusters, raising transportation costs for manufacturing units (Exhibit 1.55).

EXHIBIT 1.55



The role of ports and logistics infrastructure

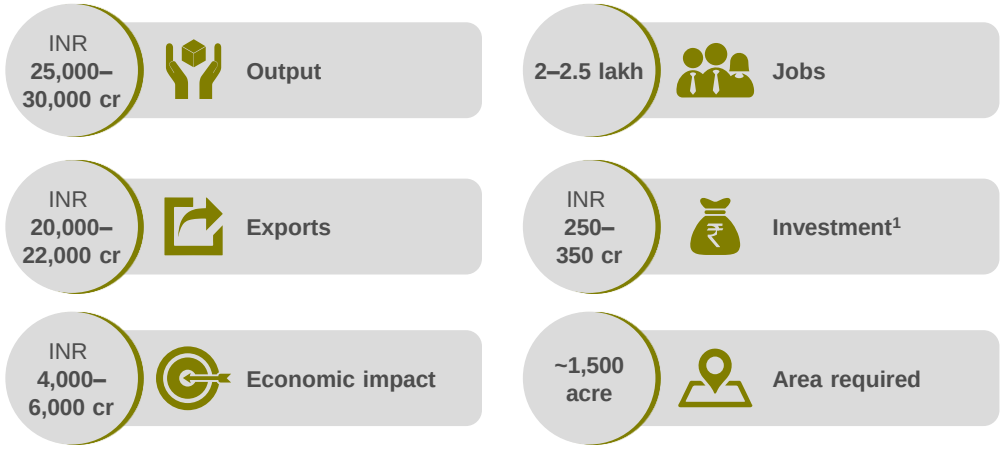
Building leather clusters near ports could reduce transportation costs involved in product exports and input imports.

Port-proximate manufacturing has played an important role in the competitiveness of leather footwear and leather goods manufacturers in China. Wenzhou is a port-based footwear cluster and is known as the shoe capital of the world. In India, on the other hand, only the Chennai leather cluster leverages the port. Several other clusters could be developed with a similar focus. These clusters will need to augment their raw material base, enhance capacity, modernise and upgrade leather units, address environmental concerns, develop human resources, support traditional leather artisans, address infrastructure constraints and establish institutional facilities.

Bihar is an excellent choice for the development of the leather industry owing to the availability of raw materials, traditional skills and labour and proximity to NW1. The leather complex at Bantala near Kolkata can also be connected to Haldia port. Similarly, in the South, Perambur may be connected to Chennai or Ennore ports to reduce travel and export costs. Leather clusters could also emerge in other parts of Tamil Nadu, such as Ambur and Ranipet. The potential impact from the proposed leather and footwear cluster is shown in Exhibit 1.56.

EXHIBIT 1.56

Potential impact from each leather and footwear cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

3.3 Food processing clusters

Global trade flows

The global food processing industry was estimated to be USD 3,200 bn in 2010[8]. It can be categorised into eight major segments—meat, marine, fruits and vegetables, vegetable oil, dairy, grain mills, ready-to-eat and other foods, and animal feed. The industry contributes around 7 per cent to global exports. The sector-wise contribution to global export volumes in 2001 and 2013 and corresponding growth rates for the same period is shown in Exhibit 1.57.

Fruits and vegetables, grain mills, marine and meat formed the biggest part of global exports in processed food segments. It is also important to note that grain mills, ready-to-eat foods and vegetable oil were the fastest growing segments. The US is the single biggest market for the sale of processed food, while the US, Europe and Japan together account for over 60 per cent of the total retail processed food sales in the world[9]. India's share in global exports has been estimated to be around 1.2 per cent[10]. Sugar and sugar confectionery, animal and vegetable fats and oils, dairy products and frozen and preserved meat, and fish and marine products command the biggest share. Exhibit 1.58 shows the split of global demand for processed food and the split of global exports between countries.

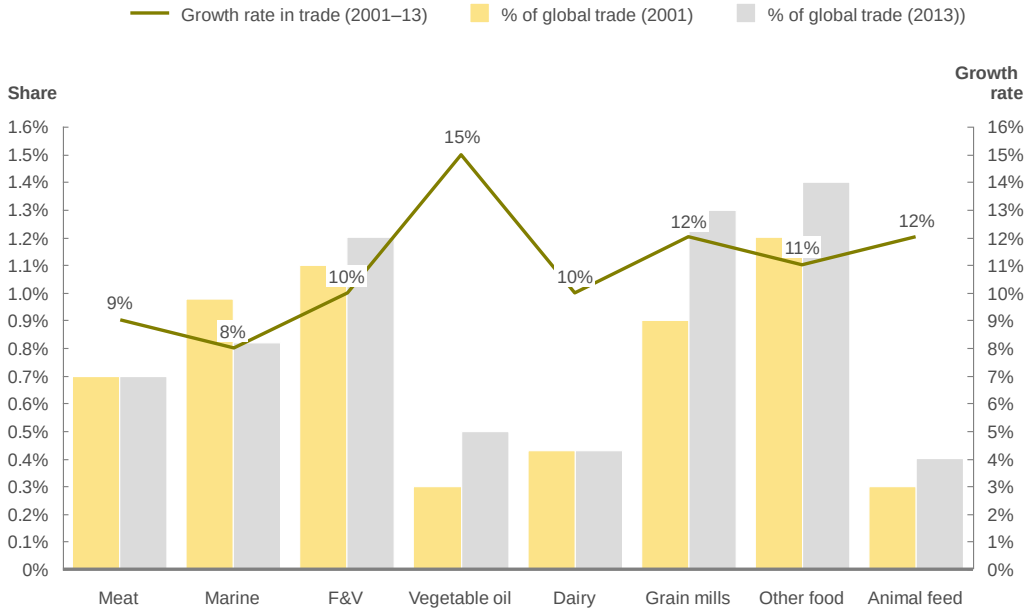
8 Gyan Research and Analytics Pvt Ltd., 2012

9 Cygnus APF Quarterly Report, May 2007

10 Government of India, National Manufacturing Competitiveness Council (2009). Enhancing firm level competitiveness—Indian food and agro-processing industry: Strategies and road map development

EXHIBIT 1.57

Segment-wise contribution to global exports 2001–13

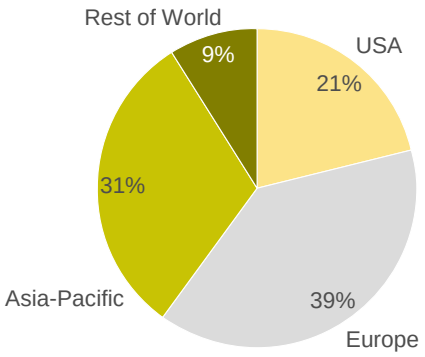


SOURCE: ITC Trade Map, VCIC Conceptual Development Plan

EXHIBIT 1.58

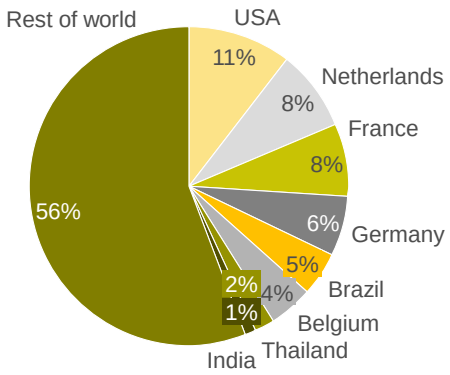
Share of global processed food market

Global processed food market demand, Percent



Split of global exports of processed food

Global exports of processed food, Percent



SOURCE: FICCI Knowledge paper on "Processed food and Agribusiness", Cygnus APF Quarterly Report, May 2009, GOI National Manufacturing Competitiveness Council, 2009

Food processing in India

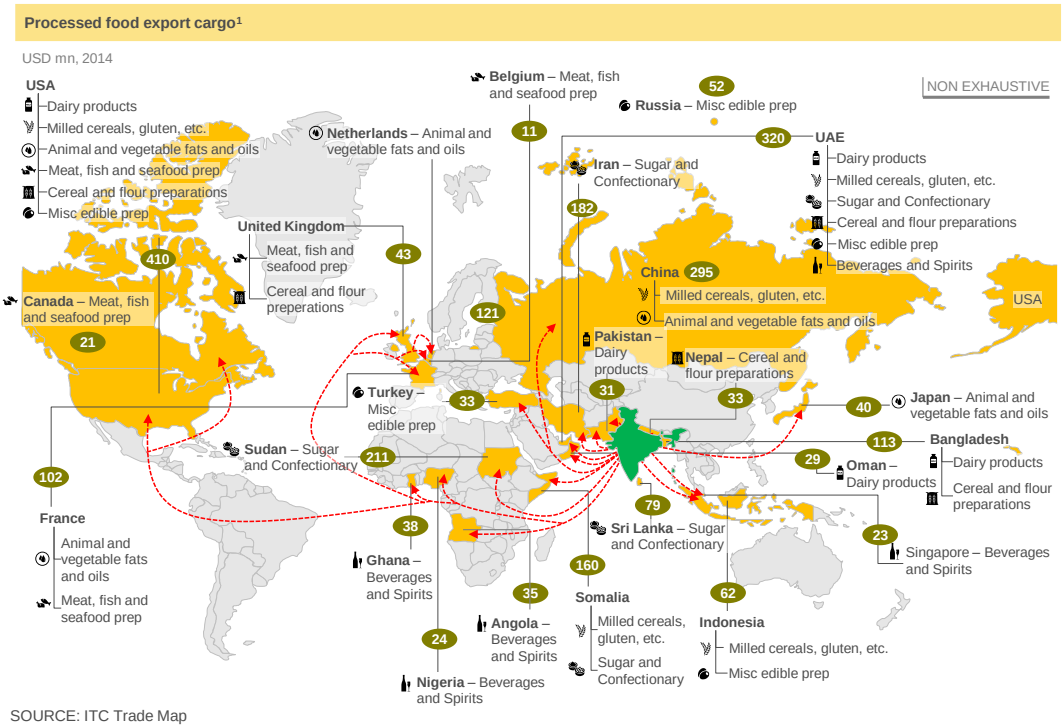
The Indian food processing industry was estimated to be USD 121 bn in FY 2012[11] and ranks fifth in the world in exports, production and consumption. It contributes around 9 per cent of the GDP in manufacturing and around 11 per cent of the GDP in agriculture[12].

Indian exports of processed food and related items rose at a CAGR of 23.3 per cent during FY 11–15 reaching USD 21.5 bn in FY 2015[13]. The share of processed food exports in total food exports was 32 per cent in FY 2014.

The US, Bangladesh and the UAE are the major countries that import processed food and agriculture-related products from India. The US, Canada and Belgium are also major importers of processed marine foods from India. Exhibit 1.59 shows the export value of some key processed food categories exported from India in 2014.

EXHIBIT 1.59

Processed food cargo flows from India



SOURCE: ITC Trade Map

[11] D&B Research
[12] MOSPI Annual Report 2014-15
[13] IBEF

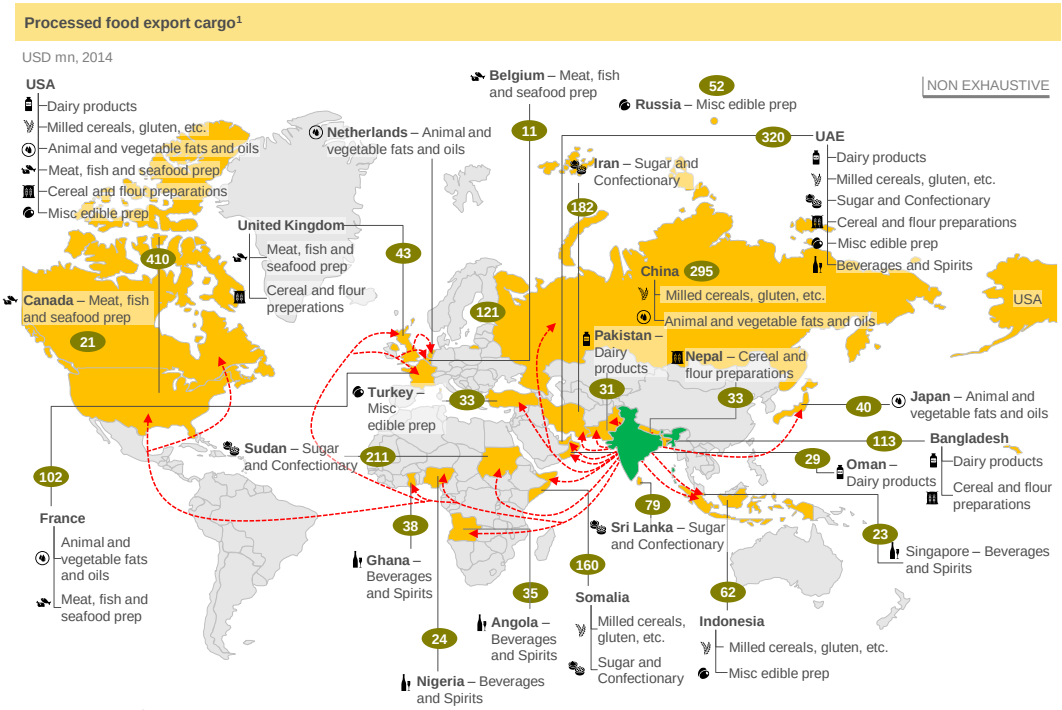
Food processing clusters in India

Small-scale and unorganised sectors account for around 75 per cent of the total food processing industry in India (Exhibit 1.60). SMEs in the food processing industry are spread across the country. Andhra Pradesh, Gujarat, Maharashtra and Uttar Pradesh have the maximum share in the organised sector. Exhibit 1.61 shows the share of different states in the unorganised food processing units.

Andhra Pradesh is the centre for fruits, vegetables and grain processing; Gujarat is the centre for edible oils and dairy, Maharashtra is the centre for fruits, vegetables, grains and beverages while Uttar Pradesh has food processing units across most product categories.

EXHIBIT 1.60

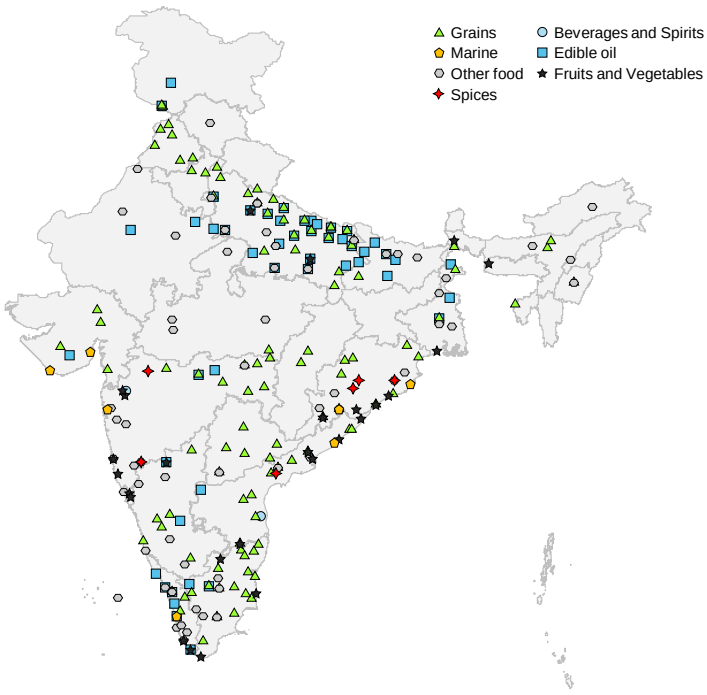
Processed food cargo flows from India



SOURCE: ITC Trade Map

EXHIBIT 1.61

Footprints of processed food segment in unorganised sector



SOURCE: Cluster observatory

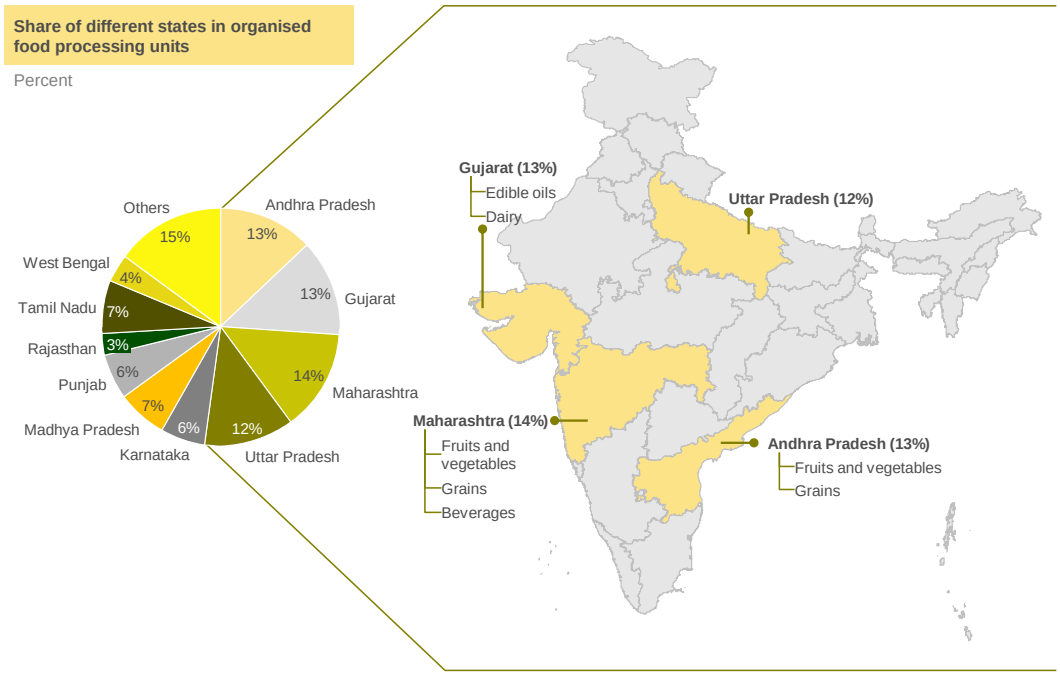
The opportunity for India

India is the second largest producer of food after China, but processes much less than other countries across segments (Exhibit 1.62, 1. 63). Even though India has been a major exporter of food, processed foods form a very small share in India's export share across all kinds of products:

- Cereals and processed derivatives: India is one of the largest exporters of cereals, including wheat, rice, barley and oats, contributing around 40 per cent of the total exports from Asia in 2014. In comparison, the export of value-added derivatives of cereals forms a very small share in the export basket of India (Exhibit 1. 64). In 2014, the export value of milled products, malts and starches was 3 per cent of the value of export of cereals as compared to the average 24 per cent from Asia and 16 per cent globally. This suggests a huge untapped potential for value addition in the food processing of cereals for exports from India
- Meat, fish and marine products: India is one of the largest exporters, contributing around 20 per cent to the total exports from Asia in 2014. However, the export value of processed derivatives of meat, fish and marine products is merely 1.4 per cent of the export value of raw, frozen and preserved meat, fish and marine products. This figure was around 41 per cent and around 20 per cent for Asia and the world respectively (Exhibit 1.65)

EXHIBIT 1.62

Key food processing clusters in India: Organised sector

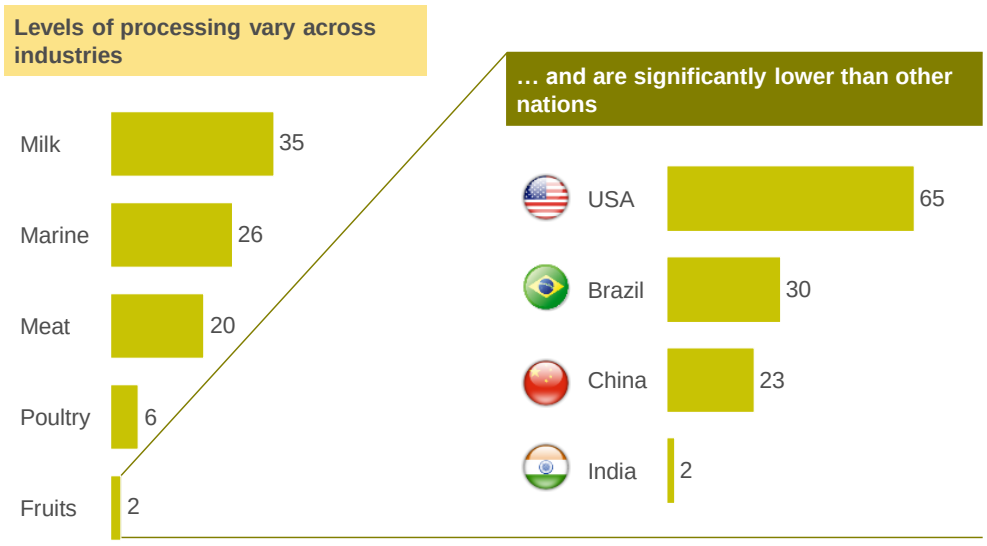


SOURCE: GOI Ministry of Statistics and Programme Implementation (2010) Annual Survey of Industries

EXHIBIT 1.63

Levels of food processing in India are much lower than those in other countries

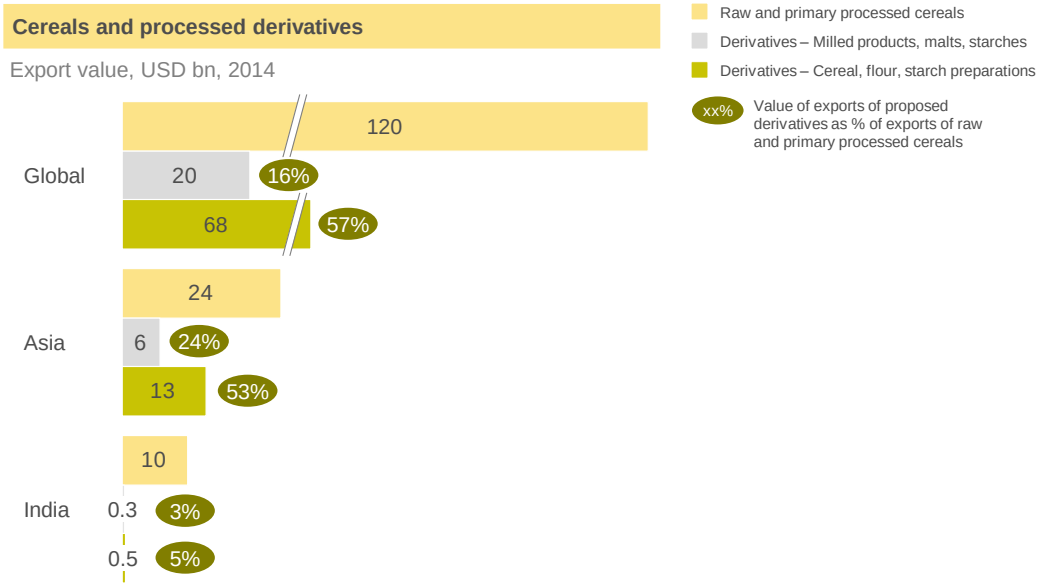
Processing level (Per cent)



SOURCE: Ministry of Food Processing Annual Report, 2009–10

EXHIBIT 1.64

India's export basket comprises mainly raw and primary[1] processed cereals

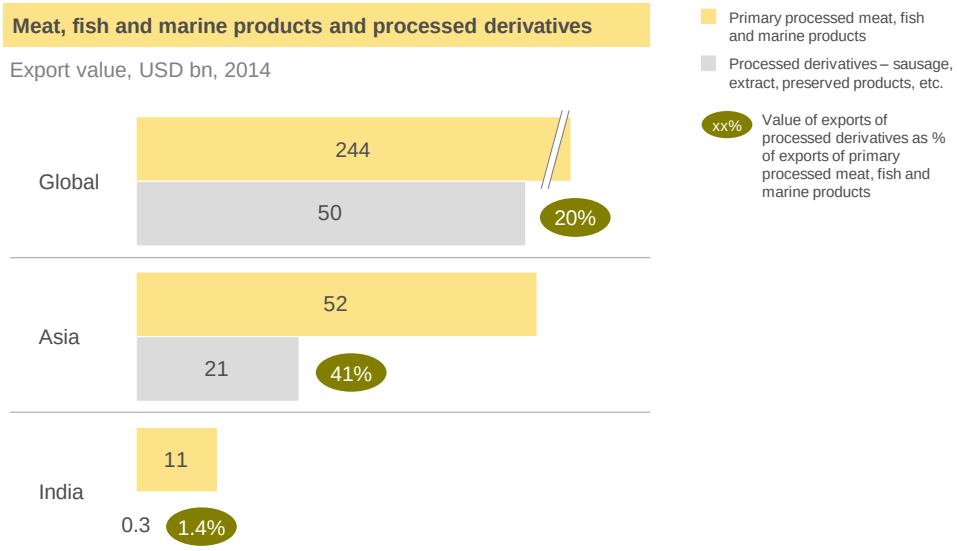


1 Primary processing refers to quick and simple transformation of food like packaging, milling of rice, etc.

SOURCE: ITC Trade Map

EXHIBIT 1.65

India's export basket comprises mainly primary[1] processed meat, fish and marine products



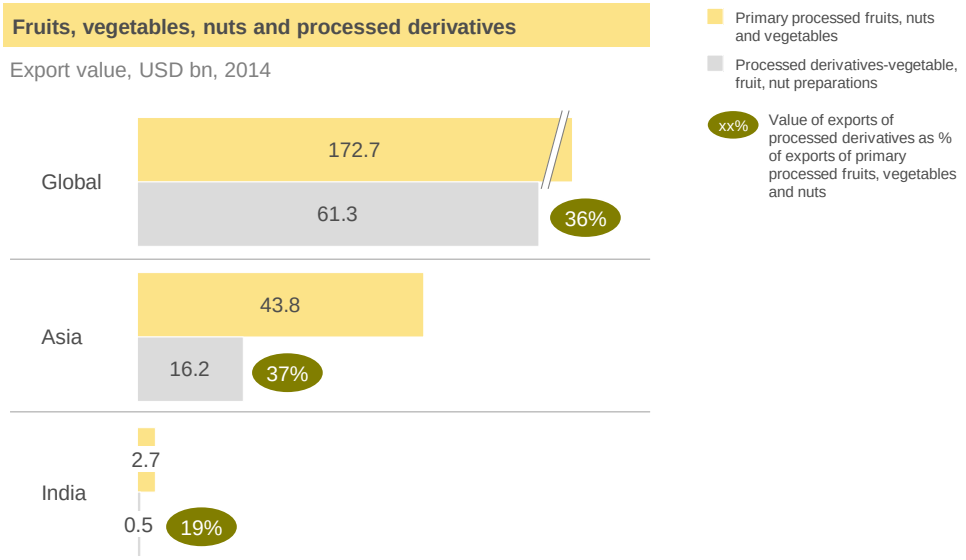
1 Primary processing refers to quick and simple transformation of food like packaging, milling of rice, etc.

SOURCE: ITC Trade Map

- **Fruits, vegetables and nuts:** The value of export of processed derivatives of fruits, vegetables and nuts from India was 19 per cent of the value of export of primary processed fruits, vegetables and nuts in 2014. Owing to higher value-added food processing, this figure was around 37 per cent and around 36 per cent for Asia and the world respectively (Exhibit 1.66).

EXHIBIT 1.66

India's export basket comprises mainly primary[1] processed fruits, vegetables and nuts



1 Primary processing refers to quick and simple transformation of food like packaging, milling of rice, etc.

SOURCE: ITC Trade Map

This suggests huge potential for manufacturing processed derivatives from cereals, meat, fish and marine products and fruits, vegetables and nuts in India. The industry's aspiration is to triple food processing levels in India from around 7 per cent in 2010 to 20 per cent in 2020 by augmenting manufacturing capacity in secondary and tertiary processing, increasing cold storage and warehouse capacity and developing skilled resources to manage different steps of the food processing value chain[14]. The expected impact could be:

- A 20 to 40 per cent increase in farm incomes
- A 50 per cent reduction in wastage levels
- Around 20 to 30 mn direct and 60 to 80 mn indirect jobs

[14] FICCI's India Food Processing: Mission 2020

Considering the small domestic market for processed foods in India, exports have to fuel the aspiration for growth in the processed food industry. This requires that the industry prepares itself for high export competitiveness.

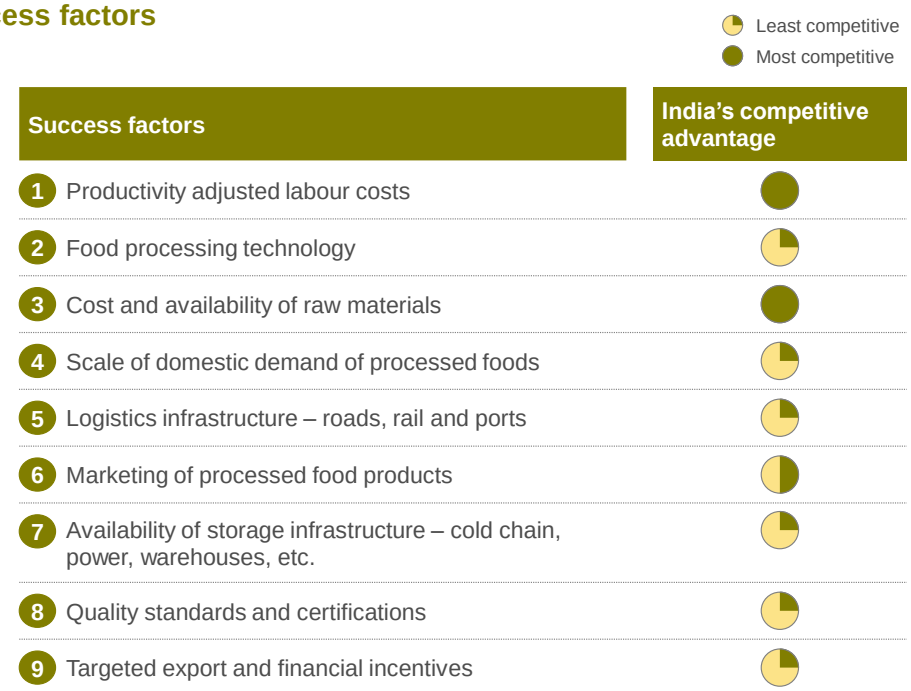
The challenges faced and the role of port-led industrialisation

India is resource rich but the absence of domestic scale, outdated technology, inefficient logistics and supply chain and unavailability of infrastructural facilities constrains food processing. China, Brazil, Thailand, Germany, Indonesia and Vietnam are tough competitors in the processed meat, fish and marine foods market. Greece, Italy, the Netherlands, France and Belgium are the main competitors in the cereal derived food products' segment.

An analysis of India's export competitiveness reveals that India ranks favourably on productivity-adjusted labour costs and the availability and cost of raw materials (Exhibit 1.67). However, it lags behind on most of the other aspects of the industry ecosystem and government and regulatory support required for the sector. India also lacks updated food processing technology and the necessary support infrastructure for the industry. There are severe constraints due to the non-availability of or limited access to quality control and testing infrastructure, storage facilities and inefficient supply chain and logistics infrastructure leading to huge wastage and high costs of processed food products.

EXHIBIT 1.67

India's food-processing competitiveness was assessed on a set of nine success factors



The role of ports and logistics infrastructure

The perishable nature of most food products make efficient logistics particularly important to reduce the transportation time for raw materials and finished products. Transit cost is also an important factor in the overall product cost, and India is already at a disadvantage here. Port infrastructure and hinterland connectivity are therefore extremely important for export-oriented cargo.

Global success story

Some international food parks have thrived primarily because of their optimal location, e.g., Penang International Halal Hub in Malaysia which caters to sea food processing, herbs extraction, bakery products, canned foods and beverages, and others. This hub is strategically located between the large markets of India and China and has linkages with good ports. The location is complemented by efficient transport infrastructure and the availability of skilled resources through the Penang Skill Development Centre. It is also monitored by the Halal Industry Development Corporation, which laid down the guidelines for HALMAS status – an accreditation given to Halal Park operators as a mark of excellence indicating that the products are of the highest quality. Companies eligible under the guidelines also receive various fiscal incentives, such as tax and income tax exemptions.

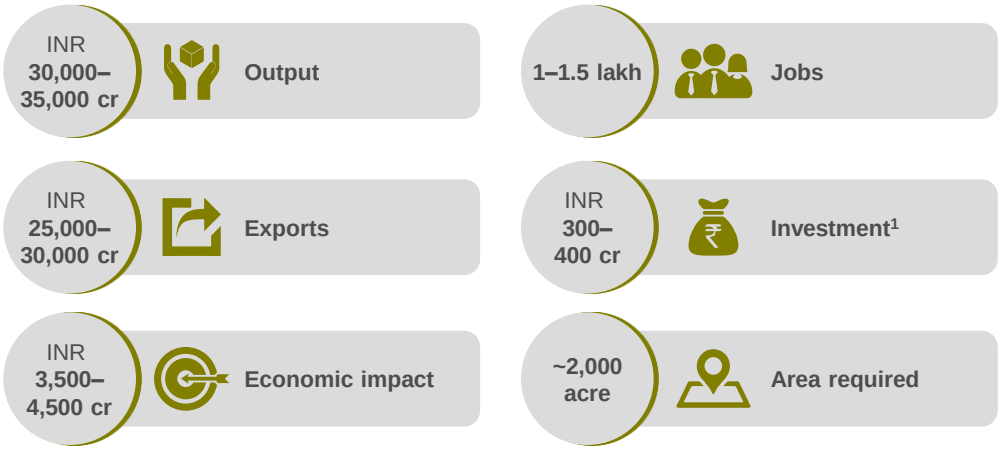
Considering the export orientation of the food processing sector, it is important that Mega Food Parks be port-based or have adequate linkages with ports. Possible locations include:

- Kakinada in Andhra Pradesh: Since Andhra Pradesh has the necessary factors for production, including proximity to raw materials, port infrastructure and existing industrial agglomeration, it is most suitable for a port-based Mega Food Park with significant export orientation of value-added food products of rice, fruits and vegetables. The proposed Mega Food Park could also draw synergies from VCIC, where food processing is a focus sector with Kakinada, Gannavaram and Yerpedu–Srikalahasti as the proposed nodes for development
- Southern Maharashtra: The state is a leading producer of mango, cashews and fish. Food processing is currently done using traditional methods and is oriented primarily towards domestic consumption. A Mega Food Park specialising in the manufacturing and export of value-added products from mango, cashews and fish can come up in resource-rich districts of Ratnagiri and Sindhudurg, closely linked to Jaigad and Vijaydurg ports

The potential impact from food processing industrial cluster is shown in Exhibit 1.68.

EXHIBIT 1.68

Potential impact from each food processing cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

3.4 Furniture clusters

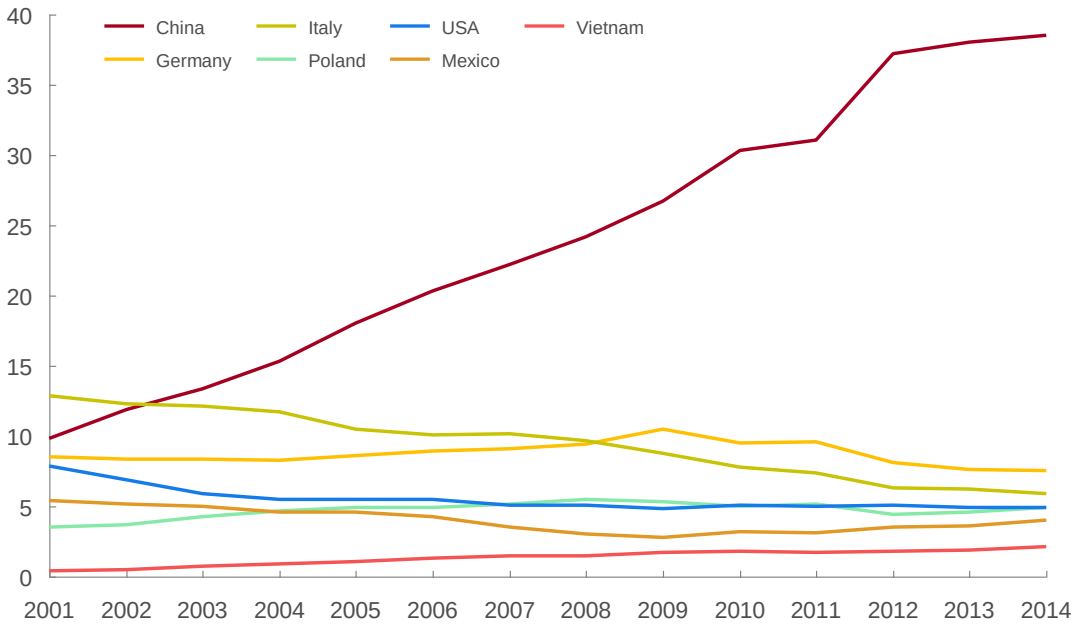
Global trade flows

The global furniture market comprises six major categories and amounted to around USD 420 bn in 2014. It is pegged to grow at around 3.5 per cent y-o-y to reach USD 450 bn by 2019. Furniture is a highly traded commodity globally, with exports worth USD 242 bn, or 58 per cent of consumption. Global exports are primarily driven by four of the six key categories—office and domestic furniture (USD 85 bn), seats (USD 73 bn), lamps and lighting (USD 54 bn) and mattresses (USD 16 bn).

China dominates across all categories of the furniture market, with a 40 per cent share in global exports (Exhibits 1.69 and 1. 70). The largest importers are the US (24 per cent) and Germany (10 per cent).Vietnam has grown its share in global exports five times in the last 15 years owing to the availability of cheap raw material and labour. India has less than one per cent share of global exports.

EXHIBIT 1.69

Global furniture market exports

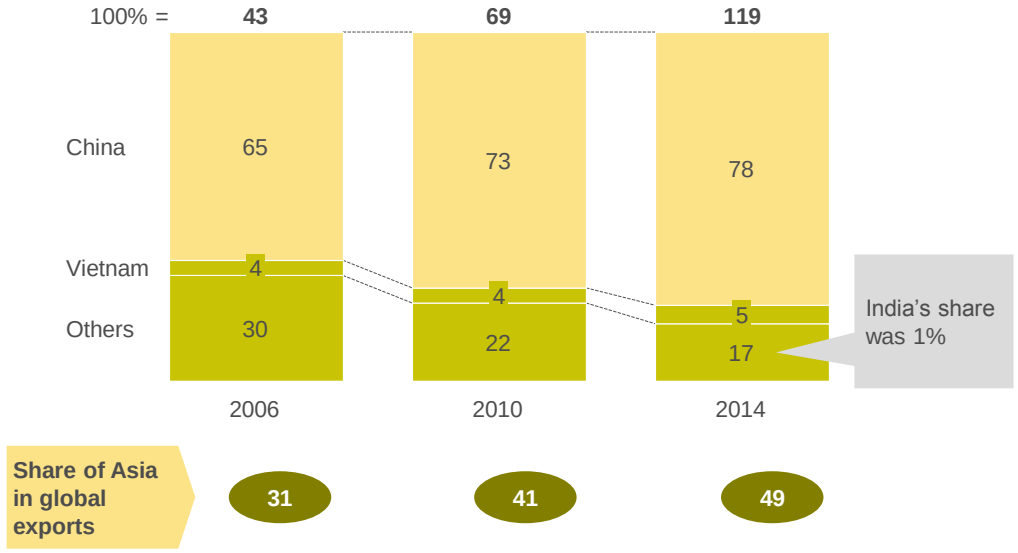


SOURCE: ITC Trademap

EXHIBIT 1.70

China has a near monopoly in export of furniture from Asia

Split of export of furniture, lighting, signs and pre-fabricated buildings from Asia
Per cent, USD bn



SOURCE: International trade database by ITC

The US is the largest importer with 24 per cent share in global imports, followed by Germany (10 per cent), the UK (5 per cent), France (5 per cent), Canada (4 per cent) and Japan (4 per cent). Key trade flows in the world are primarily from China to the developed economies. Another major trend in the global trade is the flow of furniture from markets with cheaper labour to the markets in proximity, e.g., Mexico to the US (Exhibit 1.71).

EXHIBIT 1.71

Key global trade flows

From ...	... to	Trade (in USD bn)
China	US	24.1
Mexico	US	9
US	Canada	5.5
China	Japan	5.17
Canada	US	4.5
Poland	Germany	4.4
China	Germany	4.1
China	UK	4
China	Malaysia	3.1
China	Singapore	3
China	Australia	2.9
China	Hong Kong	2.6
China	Canada	2.5
China	Russia	2.4
China	UAE	2.3
US	Mexico	2.3
Germany	France	2.2
China	Netherlands	2.2
Vietnam	US	2.2
Italy	France	2.1

SOURCE: ITC Trademap

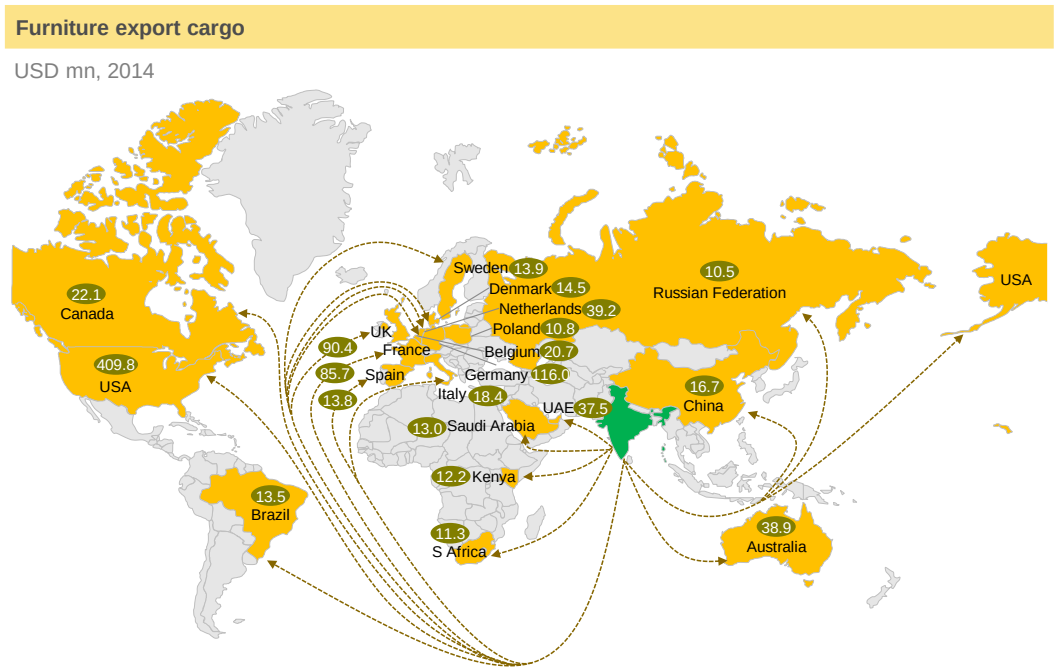
The Indian furniture industry

The demand for furniture in India increased at 12 per cent annually from 2007 to 2014, forming a USD 25 bn market. At 65 per cent of the overall market, home furniture is the largest segment in India, whereas the other large sectors of the global market like lamps and lighting and seating contribute only 2.5 per cent and 8 per cent respectively.

India is primarily a self-sufficient market, with both exports and imports being less than 5 per cent of the overall market. The maximum share of India's furniture exports (47 percent) goes to the US and the UK. Exhibit 1.72 shows key cargo flows from India.

EXHIBIT 1.72

Furniture cargo flows from India



SOURCE: ITC trade database

Furniture clusters in India

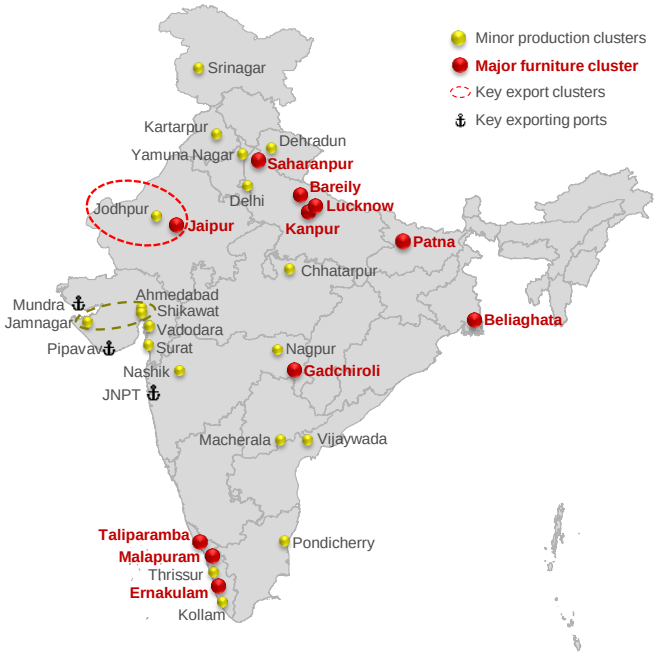
Furniture in India is manufactured in key pockets that include:

- Rajasthan: Jaipur (marble)
- Uttar Pradesh: Kanpur and Lucknow (steel furniture); Saharanpur (wooden furniture); Bareilly (cane and bamboo)
- Kerala: Malappuram, Taliparamba and Ernakulam (wooden furniture);
- Maharashtra: Gadchiroli (bamboo)
- West Bengal: Beliaghata (lamps)
- Bihar: Patna (GLS lamps)

Mundra is the largest exporting port from the country, contributing to around 70 per cent of furniture exports. Its cargo comes primarily from the immediate hinterlands in Kutch and the secondary hinterlands of North India, mainly the Rajasthan belt (Jodhpur and Jaipur). Pipavav is the second biggest port in terms of volume, catering to the South Gujarat and Rajasthan clusters. Only two other clusters in the country are oriented towards exports, while the majority serve domestic demand (Exhibit 1.73). India could build on its large domestic market, traditional craft skills and the trend of shifting production centres to make a substantial dent in the export market.

EXHIBIT 1.73

Key clusters in India



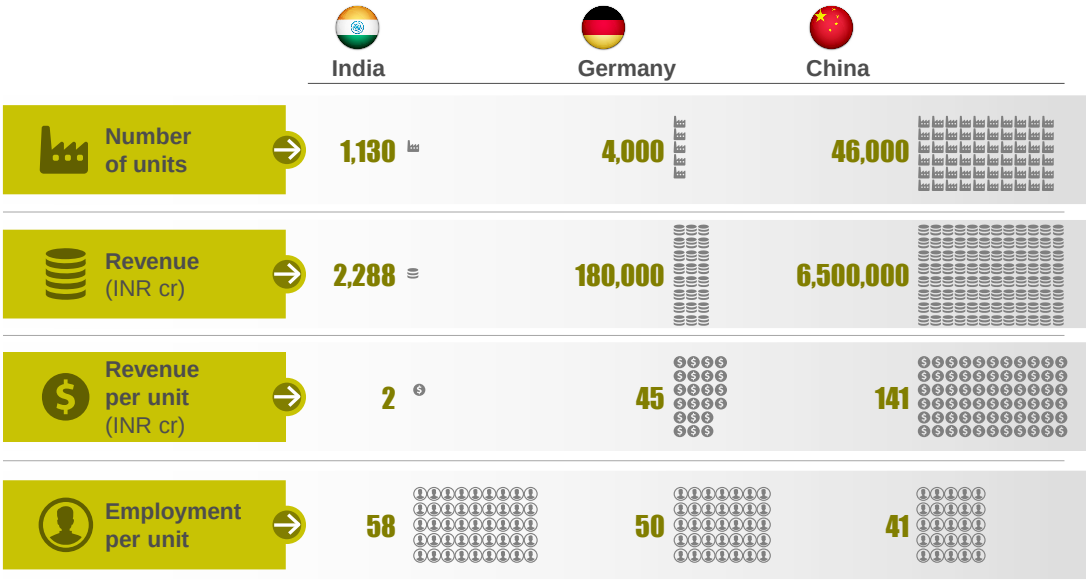
The challenges faced and the role of port-led industrialisation

India may need to resolve some of its constraints:

- Sub-scale operations: India has 1,384 registered manufacturing units for furniture production in India. These are much smaller and highly labour-intensive in comparison with Germany and China which are considered as hubs of manufacturing activity (Exhibit 1.74)
- Import dependence for raw material: India depends heavily on other countries for sourcing wood, importing around 5 mn cubic metres of wood primarily through Mundra and Kandla ports
- Logistics costs: The logistics costs for finished products contribute around 10 to 12 per cent of overall value, while importing raw materials contributes another 5 per cent (Exhibit 1.75). Port-based clusters could thus be more cost-effective and help to cut down the overall cost of exports from India.

EXHIBIT 1.74

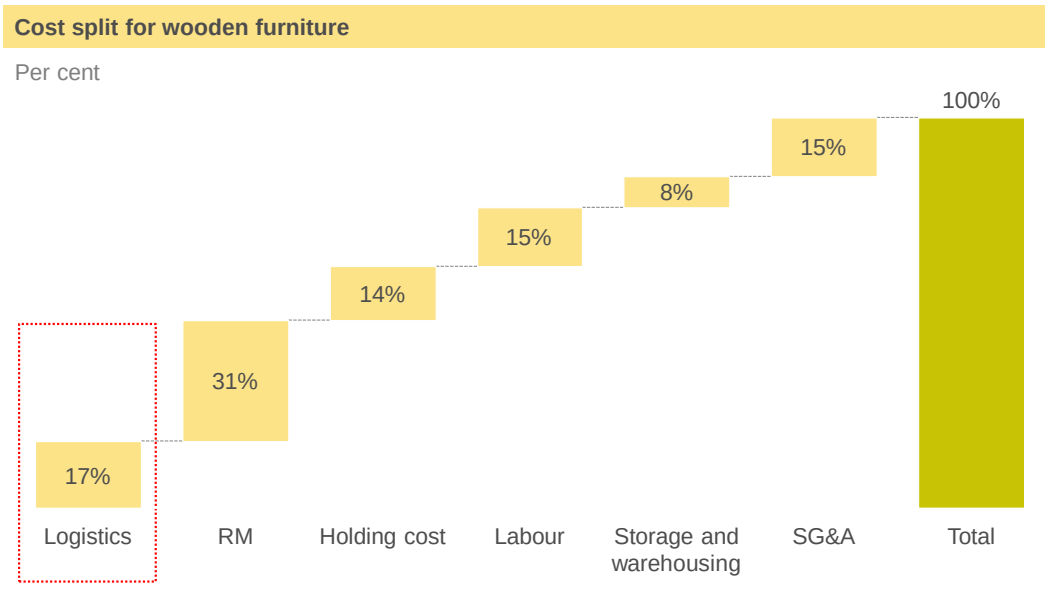
How Indian furniture units compare with other countries



SOURCE: ASI, FAO International furniture market, China light manufacturing yearbook

EXHIBIT 1.75

Furniture cost breakdown



SOURCE: Market research

The role of ports and logistics infrastructure

China is the biggest producer of furniture and the biggest importer of timber in the world. Around 70 per cent of the country's overall capacity is installed coastally (Exhibit 1.76), and Malaysia has a similar set-up (Exhibit 1. 77).

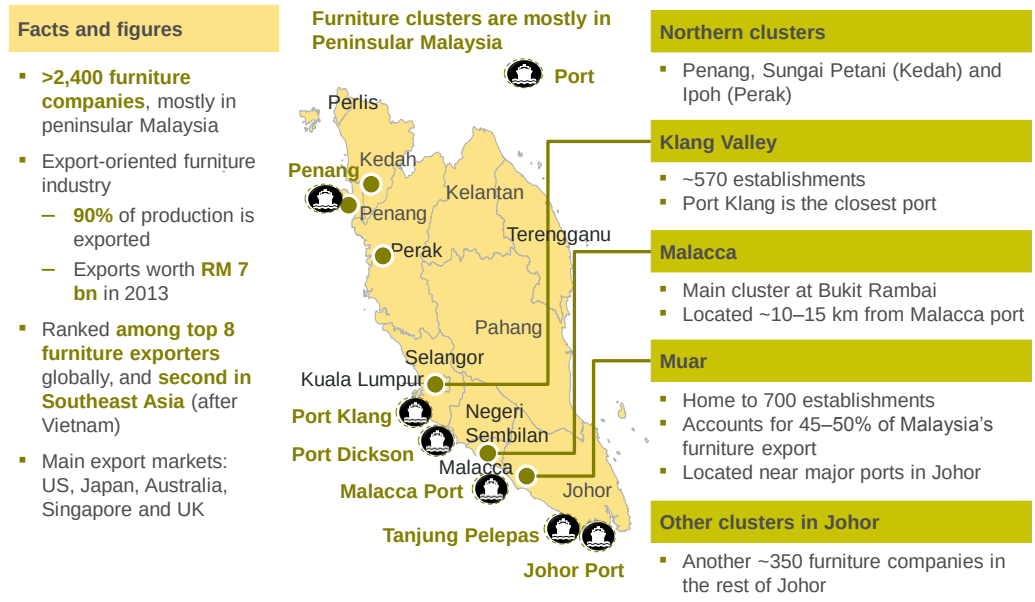
EXHIBIT 1.76

70% of the installed capacity in China is coastal

SOURCE: China light manufacturing yearbook

EXHIBIT 1.77

Malaysia is a major furniture exporter with furniture clusters located in close proximity to major ports



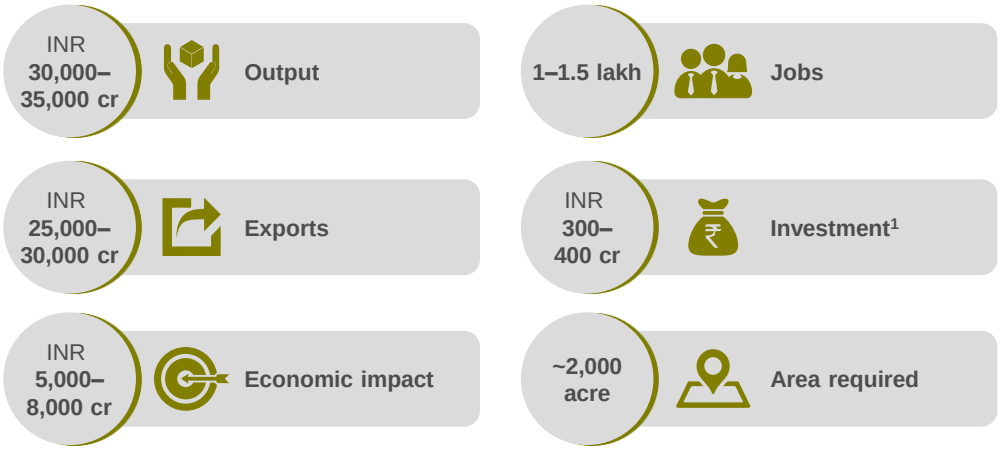
SOURCE: Ministry of International Trade and Investment; Malaysian Furniture Promotion Council; furniture cluster association

As discussed in the previous section, it seems logical to develop coastal clusters for export-based manufacturing. Given there is already a manufacturing set-up in Kerala, it would be ideal to develop it further. There is also significant potential to expand the current clusters in Gujarat and Assam. For Gujarat, the raw material of marble is available close to the existing sites. A concerted effort to make these clusters export competitive can go a long way.

Additionally, the existing bamboo processing industry could also be upgraded to an export-centric cluster with proper connectivity to ports. The proposed ICD in North Bengal along with the existing NW2 can play an important role in making this cluster export-competitive. The potential impact from the proposed furniture cluster is shown in Exhibit 1.78.

EXHIBIT 1.78

Potential impact from each furniture cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

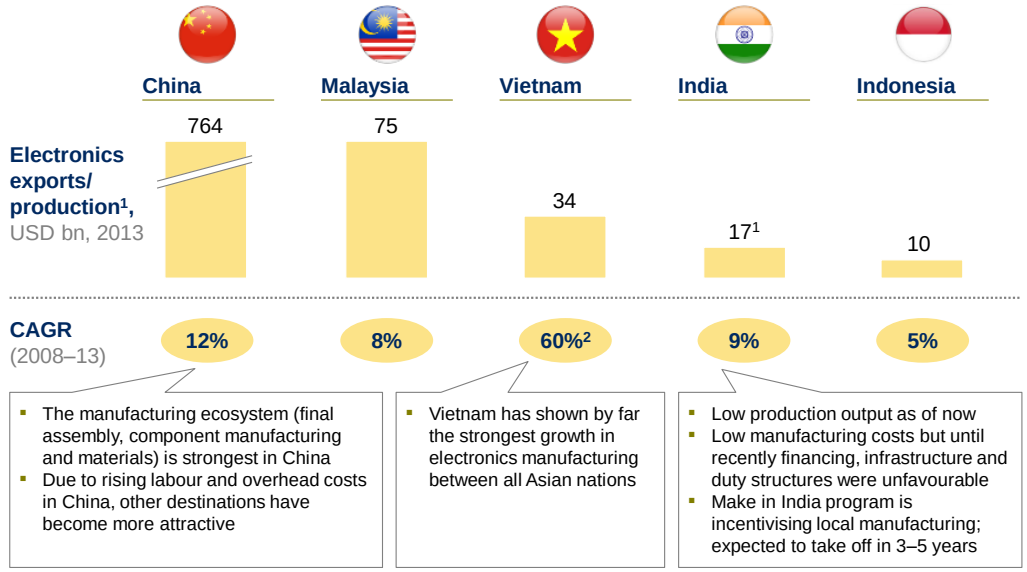
3.5 Electronics clusters

Global trade flows

In Asia, China is the leading manufacturer of electronic goods followed by Malaysia and Vietnam. The manufacturing ecosystem is strongest in China but rising labour and overhead costs are making other destinations appear more attractive (Exhibit 1.79). Vietnam has shown the strongest growth in electronics manufacturing among all the Asian nations. The “Make in India” programme, which incentivises local manufacturing, is likely to boost electronics manufacturing in the coming years.

EXHIBIT 1.79

China is by far the largest electronics manufacturing hub in Asia, but other destinations are starting to emerge



1 Local electronics production for India, electronics exports for all other countries; 2 2009–14

SOURCE: Miti, Vietnam GSO, BDG Asia, IESA, China National Bureau of Statistics

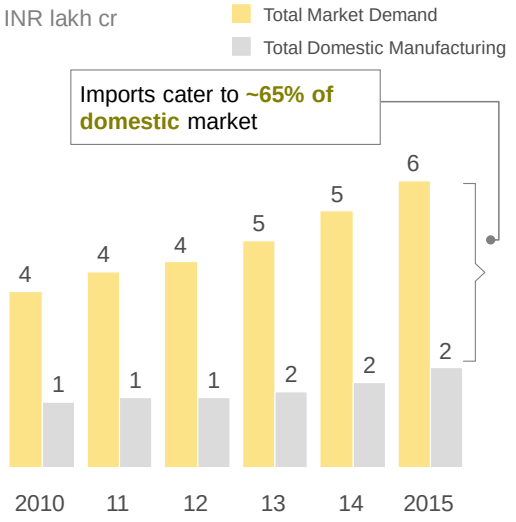
The Indian electronics industry

The demand for electronics has grown at a consistent pace in the country, reaching INR 6 lakh cr in 2015. Communication and broadcasting equipment and consumer electronics form the majority of the demand. But production has not been able to keep pace with demand, remaining static at around INR 2 lakh cr. This has led to around 65 per cent of domestic demand being served through imports in 2015 (Exhibit 1.80, 1.81).

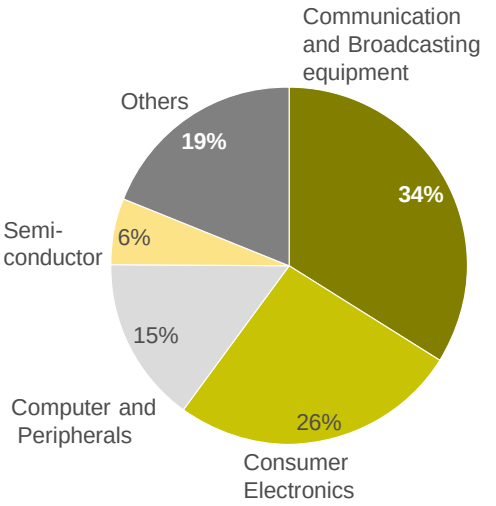
EXHIBIT 1.80

Indian electronics and IT hardware demand has grown at a steady pace of 10% CAGR in the last 5 years

Indian electronics and IT hardware market size



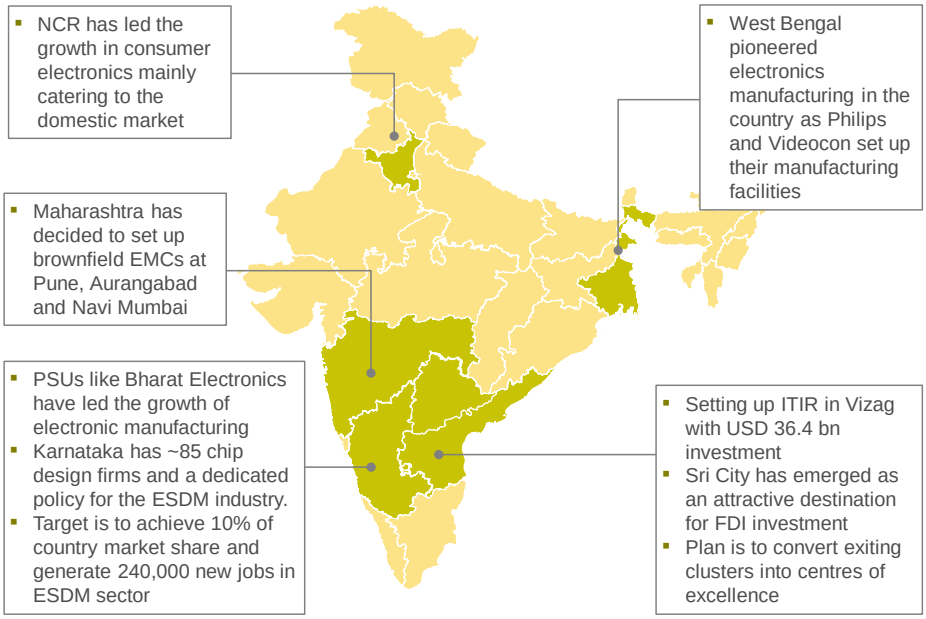
Break up of Indian Electronics and IT Hardware Sector in 2015



SOURCE: NSDC report on Electronic and IT Hardware

EXHIBIT 1.81

NCR, West Bengal and Karnataka have led domestic manufacturing in the electronics cluster



SOURCE: iesaonline.org; www.dqindia.com

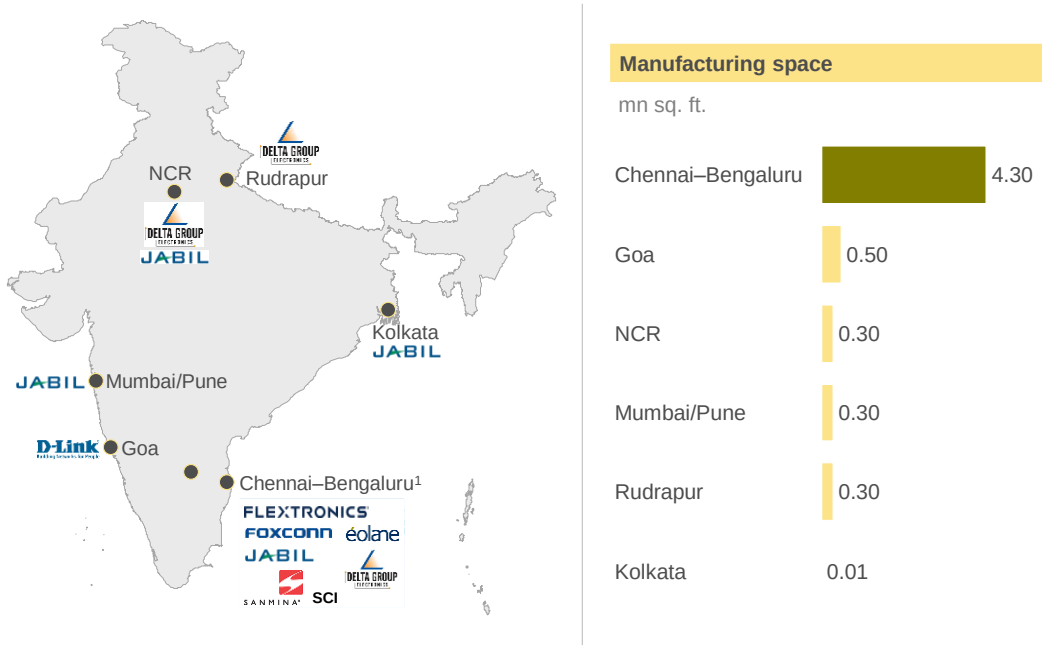
The opportunity for India

In 2014, India imported electronics items worth nearly USD 40 bn, and at current growth rates the figure could rise to USD 85 to 100 bn by 2025. While the Asian export market is huge, India's share in it is a minuscule 0.5 per cent. Total exports of electronics from Asia were worth USD 1.9 trillion in 2014. The figure has been growing at the rate of 5 per cent per annum over the last seven years. India could tap into this market by building up three distinct sources of competitive advantage for electronics manufacturing:

- **Strong and growing domestic demand**
- **Already established as an electronics design hub:** Nearly 2,000 chips are designed per year in India with more than 20,000 engineers working in this field
- **An emerging centre for downstream assembly operations:** India has started undertaking downstream activities of assembly operations. For example, Sri City in Andhra Pradesh is emerging as a centre for mobile phone assembly operations (Exhibit 1.82)

EXHIBIT 1.82

The Chennai–Bengaluru cluster is emerging as the largest assembly cluster



1 Including Pondicherry

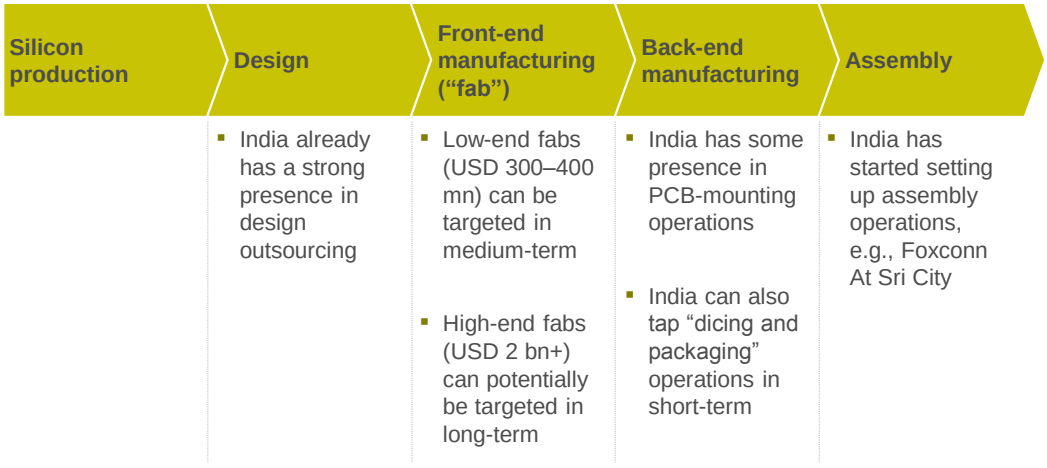
SOURCE: NVR

India focuses on the low value-added part of electronics manufacturing (assembly operations) and does not have a significant footprint in upstream activities. India could target "dicing and packaging operations" in the medium term. Over the medium to long term, India could target to establish a "fab"—a

manufacturing facility for wafer and chip production. Setting up a high-end fab today requires capital investments of more than USD 5 bn. India could target low-end fabs in the medium term, i.e., investments of USD 300 to 400 mn focused on analog chips, subsequently attracting a high-end fab in the long term. A typical electronic supply chain is shown in Exhibit 1.83.

EXHIBIT 1.83

Electronics supply chain

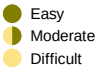


The challenges faced and the role of port-led industrialisation

The National Policy on Electronics (2012) lays out the vision of developing the electronics system design and manufacturing (ESDM) sector to achieve a turnover of around USD 400 bn, attract investment of around USD 100 bn and generate around 28 mn jobs.
A comparison between India and competitor countries on a number of non-cost factors reveals that India fares poorly on the legal and regulatory environment and is average on logistical efficiency (Exhibit 1.84).

EXHIBIT 1.84

Comparison of countries on certain key non-cost factors



Description	China	Malaysia	Vietnam	India	Indonesia
A **Managerial talent**: Availability, competition for and turnover					
B **Technical talent**: Availability, competition for and turnover					
C **Logistics efficacy**: Supplier availability, utilities, transportation (e.g., roads, ports and airports)					
D **Legal and regulatory environment** (e.g., customs clearance), contracts, and tax systems					
▪ Ease of doing business rank[1]	84	18	90	130	109
▪ Enforcing contracts rank[2]	35	29	47	186	172
E **Ramp-up challenges**: one-time costs (e.g., utilities, construction, hiring of talent)					

1 World bank 2016 data
2 Out of 189 nations – Only these rankings have been updated with 2014 World Bank data
SOURCE: Expert interviews; World Bank

The role of ports and logistics infrastructure

Electronics manufacturing tends to have a global supply chain spanning countries and continents. Port-proximate locations could be a critical success factor for setting up fabrication units, helping to link them with global supply chains:

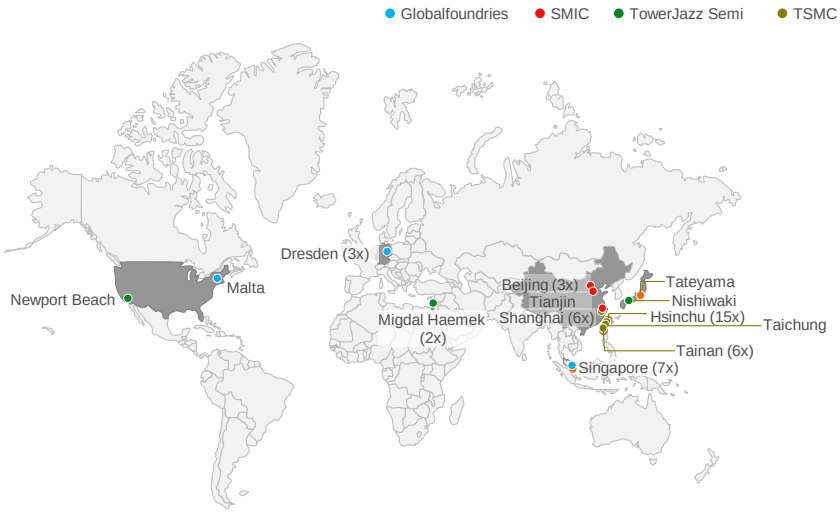
- **Import of raw materials:** India could continue to import the raw materials needed for dicing and packaging operations (in the short term) and for wafer production (in the medium to long term). Many of these are classified as "photo-sensitives" and begin to lose yield after a period of 35 to 40 days.
- **Linkage with export markets:** The domestic demand for electronics chips in India could be insufficient to keep the fab fully loaded. The cost of not loading a fab for one day could be USD 1 to 2 mn. The most feasible business model for India could be for a global player to set up the fab in India to source their global requirement in addition to serving local demands

Of the 48 fabs across the globe owned by the top-five semi-conductor foundries, 42 are within 40 km of a sea port (Exhibit 1.85).

EXHIBIT 1.85

Nearly all fabs worldwide are port-based or port-proximate

Regional front-end fab distribution (status: in production) of Top-5 semiconductor foundries[1]



- Out of 48 fabs (includes expansions) in production
- 41 (85%) are based in the Asia-Pacific region, 5 in EMEA and 2 in North America

1 Top 5 vendors (TSMC, UMC, GF, SMIC, TowerJazz) hold a 2012E revenue share of close to 90%
2 Includes fab expansions
3 200mm equiv.

SOURCE: iSuppli (4Q 2012); World FAB Watch (2Q 2012)

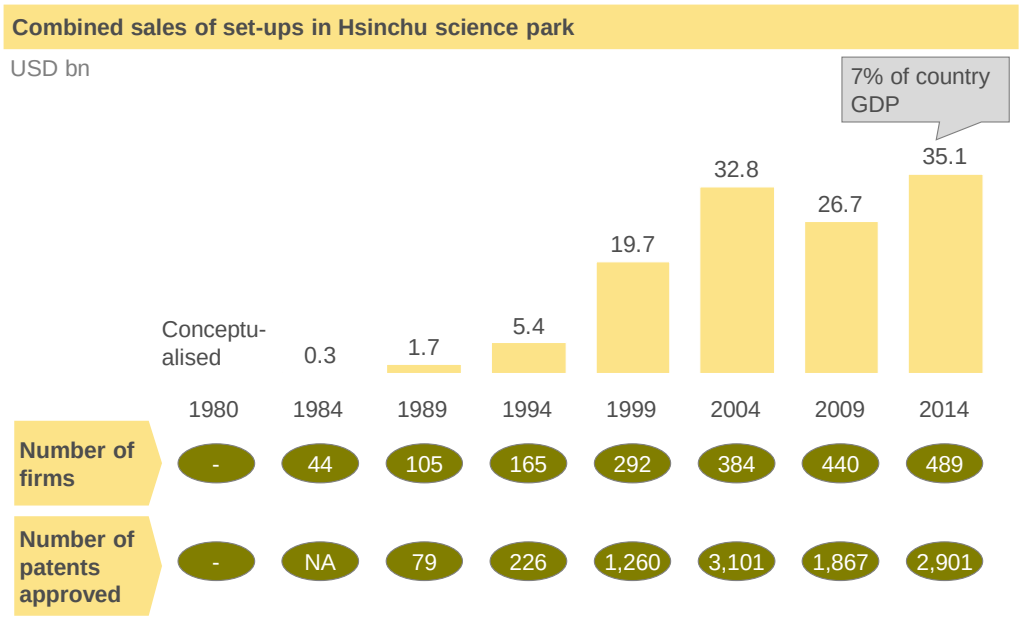
Global success story

Successful port-based or port-proximate clusters create disproportionate value for the nation in terms of value added, exports and jobs. For example, the Hsinchu Science Park, which began has grown to be a USD 35 bn revenue zone, equivalent to 7 per cent of Taiwan's GDP.

The Chittagong Export Processing Zone generates USD 2 bn of exports (primarily apparel), which is equivalent to 2.5 per cent of Bangladesh's GDP.

The value added at the Port of Antwerp is 6 per cent of Belgium's GDP.

The Hsinchu Science Park, started 35 years ago, has emerged as a USD 35 bn revenue zone



SOURCE: Hsinchu science park bureau, ministry of science and technology, Taiwan

Kick-starting upstream manufacturing may require an "ecosystem" approach, perhaps through setting up a "Science and Technology Park" to create this ecosystem, instead of piecemeal electronics clusters as these may need to be backed by strong technical research capabilities.

The choice of location for setting up the electronics manufacturing clusters could depend on two criteria:

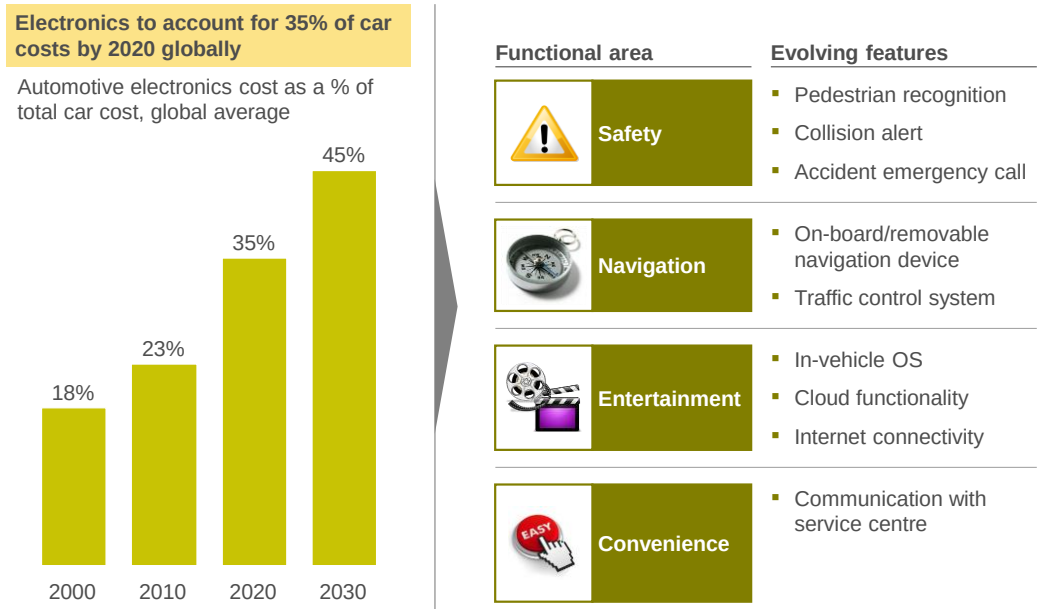
- **Availability of urban and social infrastructure:** "Science and Technology Parks" may need to attract expats and Indians working abroad in high-tech industries. An existing developed social and urban

infrastructure (e.g., proximity to research universities, international airports, metropolitans) may be a key success factor

- **Synergies with other sectors:** By 2020, almost 35 per cent of total car costs may be related to electronics components. A science and technology park could derive synergies from other proximate automotive clusters (Exhibit 1.86)

EXHIBIT 1.86

There can be high synergies between the automotive and electronics clusters

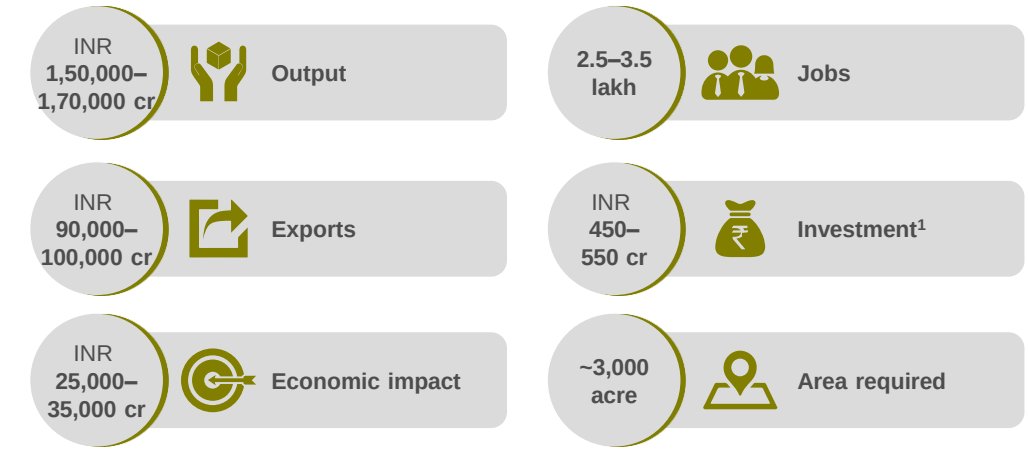


SOURCE: PTW-Hawk survey; strategy analytics

Based on these considerations, possible locations for setting up the first "Science and Technology Parks" in India could be Northern Maharashtra (Mumbai or proximate) to tap synergies with the Pune-/Satara-based automotive cluster or Northern Tamil Nadu/Southern Andhra Pradesh for synergies with the Chennai-/Ennore-based automotive cluster. Both these locations also have the sort of established urban and social infrastructure necessary for the development of science and technology parks. The potential impact from the proposed Science and Technology Park is shown in Exhibit 1.87.

EXHIBIT 1.87

Potential impact from each electronic cluster



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

4. COASTAL ECONOMIC ZONES

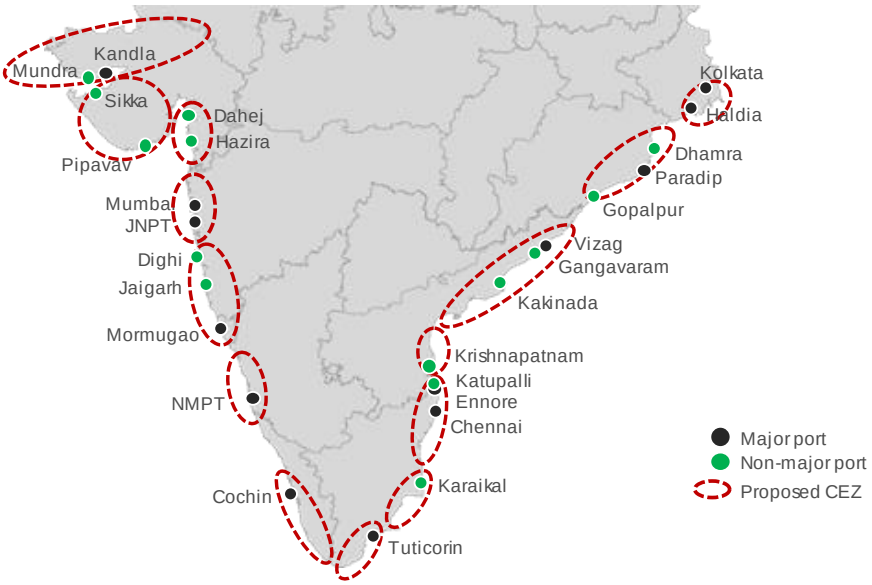
The Coastal Economic Zone (CEZ) is a concept introduced under Sagarmala as the focal point for development along India's coastline. It envisions the active participation of ports in contributing to the economic development of India, like other large global ports are doing for their respective nations. The CEZs could be spatial economic regions comprising a group of coastal districts or districts with a strong port linkage. These are bounded land parcels that could actually house industrial units and requisite infrastructure. Each CEZ could be in the immediate hinterland of ports (existing and new proposed ports), within a radius of 100 km with a sizeable domestic market and export potential. Multiple industrial clusters will be part of each CEZ, with discrete land banks and a minimum size based on the analysis of scale economics for a given industry.

Fourteen coastal economic zones have been identified along the Indian coastline, with each coastal state having one or more CEZ. These CEZs have been geographically mapped out covering one or more districts, and potential industries relevant for each CEZs have been proposed. Each CEZ is also mapped to its nearby ports (Exhibit 1.88).

Perspective plans for each CEZ have also been prepared and are attached as annexure to tis volume of the report. These perspective plans outline the current economic situation, existing industrial corridors & complexes in the defined boundary and rationale for proposed bulk or discrete cluster.

EXHIBIT 1.88

Proposed coastal economic zones



The table describes the possible geographical coverage, port linkages and high potential industries for each CEZ.

	CEZ	Probable districts	Port	Potential industries	Other sample projects
1	Kutch – Gujarat	Kutch	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	Wadhwan 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 SH 164 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	Petrochemicals	Railway line from Bellikeri 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
9	Poompuhar – Tamil Nadu	Cuddalore, Perambalur, Ariyalur, Tiruchirappallu, Thanjavur, Thiruvarur, Nagapattinam	Cuddalore	Leather processing, Power	Sirkazhi/Cuddalore port, road connectivity to Cuddalore port

	CEZ	Probable districts	Port	Potential industries	Other sample projects
10	VCIC South – Tamil Nadu	Thiruvallur, Chennai, Kancheepuram	Chennai, Ennore and Katupalli	Steel, Petrochemicals, Electronics, 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, road to Krishnapatnam Port from Naidupeta
12	VCIC North – Andhra Pradesh	Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram, Srikakulam	Vizag, Kakinada	Food processing, Petrochemicals, Cement, Apparel	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 24 Parganas	Kolkata, Haldia	Leather processing	Sagar port, ICD, LPG import terminal, expressway from Durgapur to Haldia

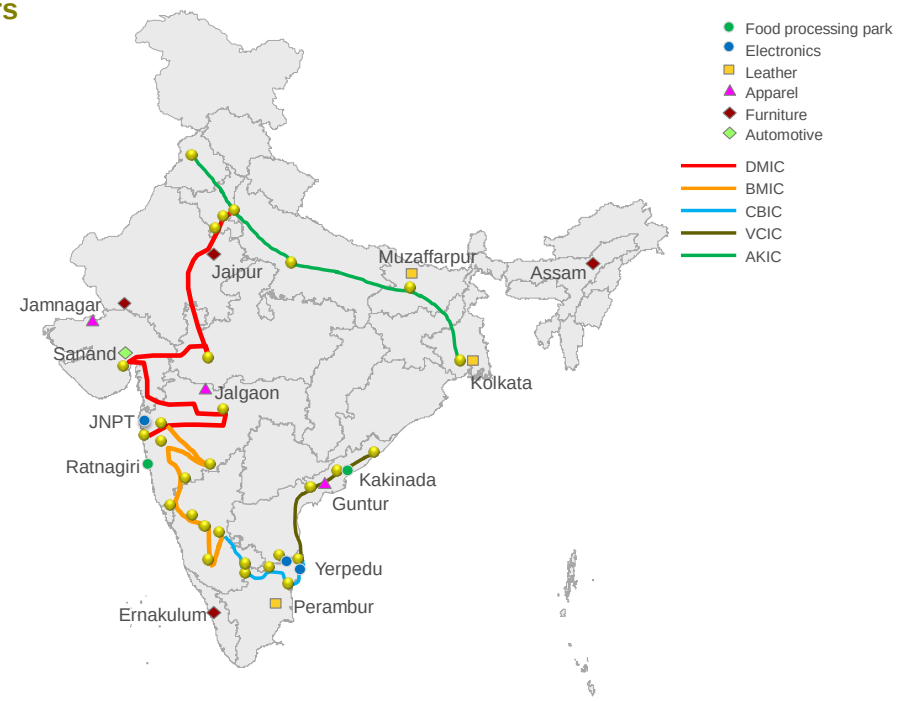
These 14 coastal economic zones are also envisaged to tap synergies with the planned industrial corridors. The Government of India has planned for five industrial corridor projects—the Delhi–Mumbai Industrial Corridor (DMIC), Bengaluru–Mumbai Economic Corridor (BMEC), Chennai–Bangalore Industrial Corridor (CBIC), Visakhapatnam–Chennai Industrial Corridor (VCIC) and Amritsar–Kolkata Industrial Corridor (AKIC) to provide a thrust to manufacturing and industrialisation. Industries could be developed at selected nodal points along the corridors, leveraging their inherent strength on raw materials, labour, connectivity and infrastructure. These corridors could facilitate the government's push in the manufacturing sector to "Make in India". Several projects could be undertaken to provide essential infrastructure—widening roads, setting up railway linkages and connectivity with ports at nodal points. It is essential to tap into the potential of the manufacturing industry and utilise it by developing discrete manufacturing clusters alongside the industrial corridors.

The proposed industrial clusters under Sagarmala have been mapped to the corridors—the apparel cluster in Guntur could fall on the VCIC near the Kakinada node and the other cluster in Jalgaon could be on the DMIC and BMEC. The leather clusters proposed in Muzaffarpur and Kolkata could fall on the AKIC and leather clusters in Perambur could fall on the twin corridors of CBIC and VCIC. The proposed Mega Food Park could draw synergies from the VCIC where food processing is a focus sector for development at the Kakinada node. The electronics clusters proposed in northern Maharashtra could fall on the DMIC at

the JNPT node. The cluster may also benefit from being on the western DFC. The other electronics cluster has been proposed near the Yerpedu–Srikalahasti node, to be developed as a focus industry under the VCIC (Exhibit 1.89).

Exhibit 1.89

Most of the proposed discrete manufacturing clusters lie on industrial corridors



SOURCE: Make in India website

The states are expected to come forward to work with the Centre to develop these CEZs and the corresponding industrial clusters. All the 14 CEZs come under the influence area of major or non-major ports. The influence area is considered flexible and districts covered under the CEZ could change in the future depending upon the industry growth.

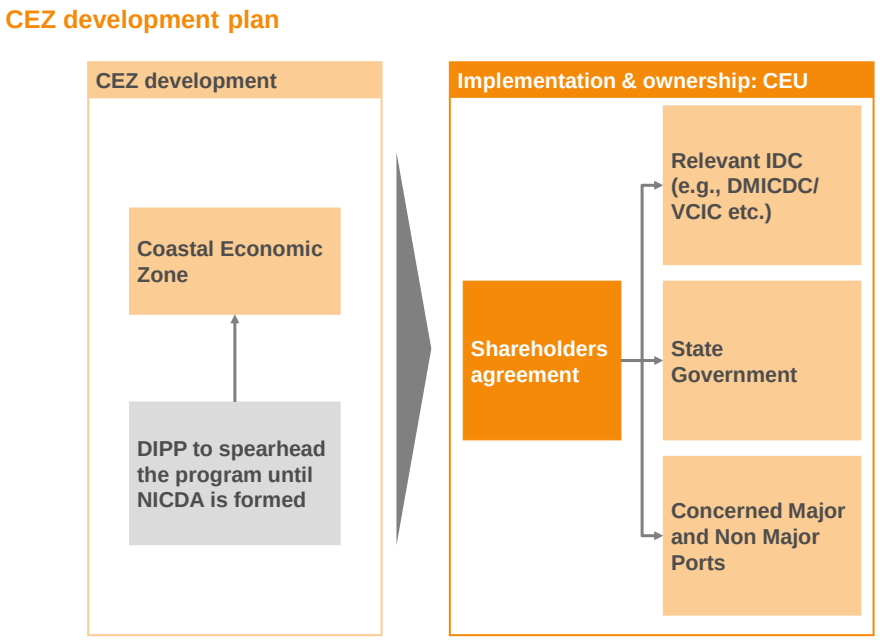
Three or four of the 14 proposed CEZs could be taken up as early pilots, and the learning from these replicated across other CEZs. The early pilot CEZs could be shortlisted on the basis of the availability of large contiguous land parcels, access to urbanisation and supporting infrastructure, prime manufacturing locations and availability of deep draft container terminals.

4.1 Institutional structure for delivering the CEZ master plan in co-ordination with state and central ministries

A separate development entity needs to be created for the preparation and implementation of the master plan for each CEZ. This includes the identification

and project preparation of industrial clusters and coastal economic units that are within or proximate to ports. In this sense, the programme could be driven by DIPP with the help of the SDC. The latter can bring in port focus along with strategic land parcels near ports. The DIPP can contribute in its institutional capacity in developing industrial corridors (Exhibit 1.90).

EXHIBIT 1.90



The institutional structure of the CEZs will follow certain design principles:

- They will operate within the ambit of existing institutional structures and build on work done by other ministries: The CEZs will work within the industrial corridors programme of the DIPP and NICDA.
- They will leverage existing laws and regulations: The SEZ Act will be amended to include qualifying CEUs. The Shareholders Agreements of DMICDC with key states such as Gujarat and Maharashtra will also help to address key areas of zone administration and governance.
- They will leverage existing land parcels near ports to minimise lead time in acquiring land. They will also reduce the contiguous land requirement (200 acres) to a minimum and empower the SPVs formed for CEU development to acquire land.
- They will prioritise prime port-based manufacturing locations for establishing a demonstration effect in the first set of CEUs, through three or four pilots in available land parcels near JNPT, Ennore, Kandla and Paradip ports.

- They will adopt a public-led financing model while keeping the flexibility to accommodate private-led industrial zones. In this context, they can explore the possibility of tweaking the DMIC model.

Kick-starting CEZs in India

Perspective plans are being prepared by the Sagarmala consultants for the 14 CEZs and also being shared with respective state governments for their inputs. These perspective plans are based on detailed analysis of traffic flows through key ports within each CEZ, projection of future traffic flows for 20 years, competitive advantages and natural resources in the CEZ and benchmarking of best practices from international examples of port-led development. These plans include:

- Physical demarcation of the CEZ area
- Overview of the current economic and industrial scenario of the CEZ
- Summary of existing industrial estates/parks and SEZs within the CEZ
- Opportunities for port-led industrialisation, i.e., bulk and discrete manufacturing clusters, emerging from a detailed assessment of origin–destination movement of key traffic flows through the relevant port
- Identification of land parcels suitable for industrial development
- Identification of key infrastructure projects needed to enable port-led industrialisation in the CEZ by suitably linking industrial clusters to ports

In order to take the development of these 14 CEZs forward, the MoS will make detailed master plans, in phases. These master plans will build on the perspective plans to project investment, population and employment growth, identify specific land parcels to be developed as CEUs, detail out specific infrastructure and connectivity projects required with preliminary engineering studies for cost estimates.

In addition, for the prioritised CEUs, the master plan will also lay out zoning and land use plan, circulation frameworks, radial infrastructure diagrams, massing, landscape plan, development norms and regulations, infrastructure needs assessment, project cost estimates and financial feasibility assessment

4.2 Institutional structure

From an institutional point of view, DIPP could take forward the CEZ programme through NICDA, or through DMICDC pending NICDA approval. Institutional expertise in the following areas is required for the development of CEZs:

- Infrastructure design
- Procurement of land
- Tendering and contracting
- Construction and project management
- Project finance and investment marketing

- Skill development
- Fostering ease of doing business
- Evaluating fiscal concessions

These capabilities are institutionally well-embedded within the DMICDC. DIPP is also developing some of the proposed CEZs like the VCIC through the industrial corridors program. Until NICDA is formed, it is suggested that a dedicated cell be set up within DMICDC focusing on the development of CEZs and the five prioritised CEUs. Eventually, upon approval of NICDA, the cell may be spun off into a separate CEZ Development Corporation along the lines of DMICDC.

As some of the CEUs could be export oriented, it is recommended that the CEUs which meet the qualifying criteria of SEZs should be approved as SEZs and benefits under the SEZ programme should be available to them.

4.3 Inter-ministerial committee for the CEZ programme

It is suggested that an IMC be constituted for taking forward and implementing the CEZ programme. The IMC will include representation from NITI Aayog, DIPP, Department of Expenditure, Department of Revenue, Department of Economic Affairs, Ministries of Shipping, Railways and Road Transport and Highways with other concerned central ministries and state governments as special invitees. The terms of the IMC should include:

- Finalising the responsibility and institutional structure for developing and implementing CEZs and CEUs
- Examining the legal status for CEZ and CEUs
- Appraising fiscal incentives that will be available to developers and industrial units in CEUs, e.g., tax holidays, indirect taxes, benefits under SEZ Act
- Examining the reforms needed on aspects of ease of doing business to compete with global manufacturing locations, e.g., labour laws, currency convertibility, Customs, approval and inspection procedures, single window clearances
- Assessing the amendments required, if any, to confer benefits under the SEZ Act for qualifying CEZs
- Identifying strategic land parcels in prime manufacturing locations and near deep draft ports for setting up CEUs
- Examining powers to acquire land for the purpose of setting up CEUs
- Agreeing, in principle, with the Shareholders' Agreements with states of pilot CEUs

□ □ □

5. ANNEXURE: RATIONALE FOR BULK & DISCRETE CLUSTERS

Proposed bulk industry clusters

CEZ	Industry cluster – bulk proposed	Rationale
Dakshin Kanara	▪ Gas-based petchem clusters	▪ Reduce import dependence; established at upcoming greenfield refinery locations
Kachchh	▪ Cement ▪ Gas-based petchem clusters	▪ **Petchem:** Reduce import dependence; established at upcoming greenfield refinery locations ▪ **Cement**: Limestone reserve
Mannar	▪ Refinery and petchem clusters	▪ Reduce import dependence
North Konkan	▪ Power	▪ 40% saving on logistics cost; established coastal shipping model in relevant states
Poompuhar	▪ Power	
South Konkan	▪ Refinery and petchem clusters ▪ Steel	▪ Reduce import dependence; established at upcoming greenfield refinery locations
Suryapur	▪ Marine cluster	▪ Already established shipyards; steel industry and auto cluster
VCIC North	▪ Cement ▪ Gas-based petchem clusters ▪ Power	▪ **Petchem:** Reduce import dependence; established at upcoming greenfield refinery locations
VCIC South	▪ Gas-based petchem clusters ▪ Marine cluster ▪ Steel	▪ **Petchem:** Reduce import dependence; established at upcoming greenfield refinery locations ▪ **Marine & Steel :**Already established shipyards; proposed steel cluster & existing auto cluster

10

Proposed discrete industry clusters

CEZ	Industry cluster – bulk proposed	Rationale
Gaud	▪ Leather and footwear	▪ State govt. support on leather park ; existing small scale industry focus on consolidation
Kachchh	▪ Furniture	▪ Existing industry; high timber throughput at Kandla
Malabar	▪ Furniture	▪ Existing industry; consolidation ▪ Dependency on imported wood
	▪ Furniture	▪ Existing industry
	▪ Leather and footwear	▪ Existing industry
North Konkan	▪ Apparel	▪ **Apparel:** Cotton producing state; minimize logistics between states
	▪ Electronics	▪ **Electronics:** Dependence on imports of raw materials; co-relation with auto
Poompuhar	▪ Leather and footwear	▪ Consolidation of existing industry
Saurashtra	▪ Apparel	▪ **Apparel:** Cotton producing state; minimize logistics between states
	▪ Automotive	▪ **Auto:** Consolidation at Sanand
South Konkan	▪ Food processing	▪ Food producing states
VCIC Centre	▪ Electronics	▪ **Electronics:** Dependence on imports of raw materials; co-relation with auto
VCIC North	▪ Apparel	▪ **Apparel:** Cotton producing state; minimize logistics between states
	▪ Food processing	

11

Coastal Economic Zones perspective plan

Contents

ANDHRA PRADESH CEZ PERSPECTIVE PLAN	3
GUJARAT CEZ Perspective Plan	32
KARNATAKA CEZ PERSPECTIVE PLAN	55
KERALA CEZ PERSPECTIVE PLAN	67
ODISHA CEZ PERSPECTIVE PLAN	83
TAMIL NADU STATE PERSPECTIVE PLAN	100
WEST BENGAL CEZ PERSPECTIVE PLAN	123
MAHARASHTRA & GOA CEZ PERSPECTIVE PLAN	134

ANDHRA PRADESH CEZ PERSPECTIVE PLAN

The new state of Andhra Pradesh has the second longest coastline of around 974 km in India. The state has 1 major port: Vishakapatnam, with ~14 other minor ports.

It is one of the largest producers of marine products. Amaravati is the proposed riverfront capital of the state. Other major cities include Visakhapatnam, Vijayawada, Tirupati, Rajahmundry, Guntur, Kakinada and Nellore. Andhra Pradesh has abundant natural resources, fertile land and river basins, water resources, an extensive canal system and conducive agro-climatic conditions. Andhra Pradesh also has a port (Vizag) handling India's second highest volume of cargo[1].

CURRENT ECONOMIC SCENARIO

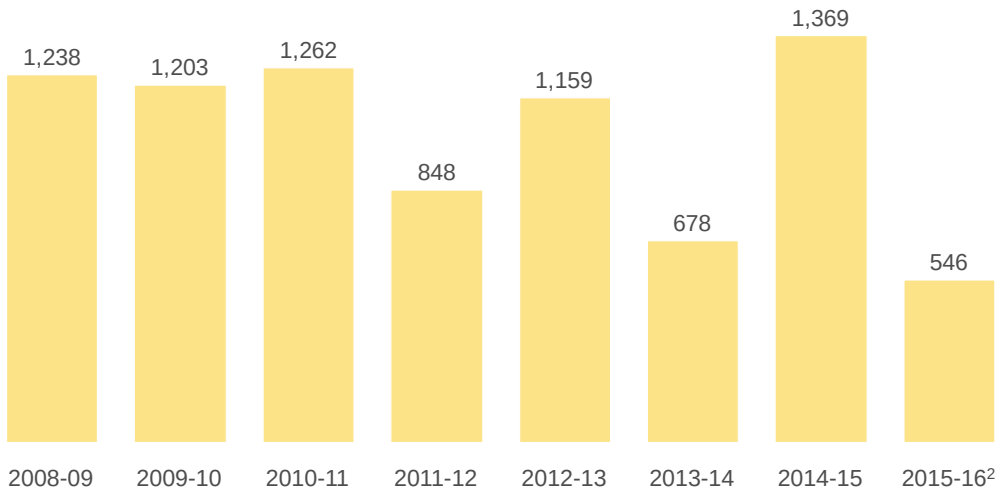
Andhra Pradesh's GDP in 2015–16, at current prices, was around INR 539,027 cr, contributing around 8 per cent to Indian economy. According to the Department of Industrial Policy & Promotion (DIPP), cumulative FDI inflows to Andhra Pradesh between April 2000 and September 2015 reached more than USD 11 bn. FDI inflows during April 2015 to June 2015 were recorded at USD 422 mn. Andhra Pradesh contributes around 4 per cent share to the cumulative FDI inflows of India.

[1] All the information given in the introduction until "Exports" has been sourced from *Andhra Pradesh*, a report by the India Brand Equity Foundation, unless otherwise specified.

EXHIBIT 1

FDI inflows in Andhra Pradesh[1]

US$ million



1 Including Telangana
2 During April 2015-September 2015

SOURCE: Department of Industrial Policy and Promotion (DIPP)

Major industries

Andhra Pradesh has a strong presence in agro and food processing, textiles, chemicals and petrochemicals, pharmaceuticals, metallurgy, electronics and electrical engineering sectors.

- The Automobile and Auto Components Policy 2015–20 aims to generate new employment opportunities for at least 2 lakh people and attract new investments of at least INR 20,000 cr in this sector by 2020. The automobile sector in Andhra Pradesh has a potential for USD 2 bn investment and around USD 4 bn output, according to a recent analysis by the Automotive Components Manufacturers' Association of India (ACMA).
- Bulk drugs and pharmaceuticals: Andhra Pradesh is home to nearly 266 bulk drug manufacturing companies. Of these, 90 per cent are small and medium enterprises. Andhra Pradesh's bulk drug production grew from more than INR 19,000 cr in 2012–13 to more than INR 20,000 cr in 2013–14. Various pharmaceutical companies have set up their manufacturing hubs in Visakhapatnam and Srikakulam. The state provides ample growth opportunities owing to the location of ports, as well as large parcels of land for expansion.
- Apparel and textiles: Andhra Pradesh produces medium grade and superior long staple varieties of cotton. The state's cotton and silk production have

been increasing steadily. Brandix India Apparel City, based in Visakhapatnam, is recognised as the best example of modernisation and technology and facilitates a stage for end-to-end apparel business.

- Poultry farming: Around 3.5 cr live birds are produced every month (one-third of the country's production), besides 6 cr eggs a day. This sector provides employment to nearly 20 lakh people and contributes around INR 20,000 cr to the state's annual GDP

Major exports

Exports from Visakhapatnam port, one of 13 major ports in India, were around 25 mn tonne in 2013–14. It is also a leading Indian port for marine exports. In 2014–15, the port handled 83 million tonnes of cargo. The overall value of exports from the state increased from around USD 14 bn in 2007–08 to USD 16 bn in 2014–15.

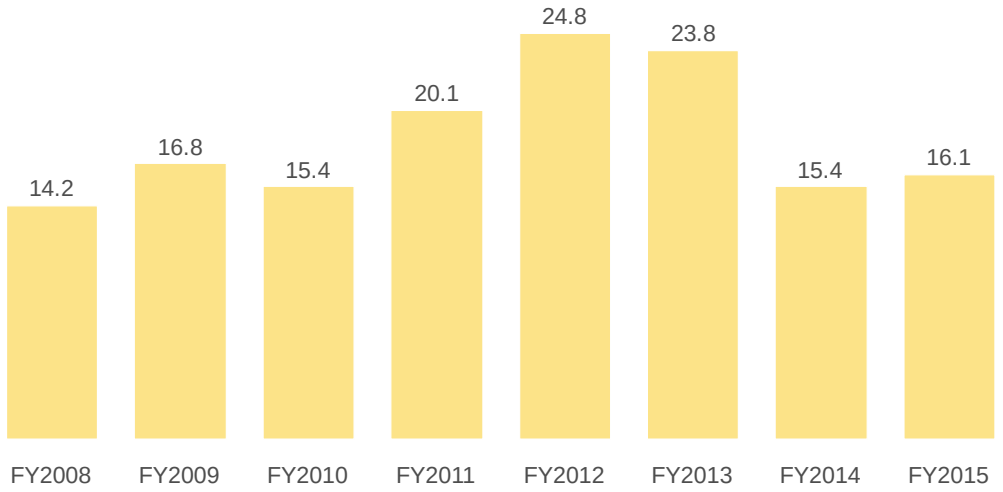
Andhra Pradesh primarily exports drugs, pharmaceuticals and allied chemicals and plastics, agriculture and agro-based products, engineering products, mineral products, handicrafts and carpets, textiles, leather, animal and marine products.

- Marine products: Andhra Pradesh is one of the largest producers of brackish water shrimps and freshwater prawns and contributes more than 20 per cent to the country's total marine exports. During 2014–15, the state accounted for a share of about 22 per cent of the overall exports of seafood products from India, in value terms. In 2014–15, seafood exports were worth around USD 1,251 mn, and have been projected to increase to roughly USD 1,465 mn by 2015–16.
- IT/ITES: According to data released by the Andhra Pradesh IT department, the state's overall IT revenues from IT/ITES exports, SEZs, Software Technology Parks of India (STPI) and domestic business increased by nearly 26 per cent to INR 64,354 cr in FY 2012–13 as compared to INR 53,246 cr the previous financial year. The state government is targeting to increase its exports share in the country's overall software exports to around 5 per cent. Exports of IT products increased from roughly USD 212 mn in 2013–14 to nearly USD 230 mn in 2014–15.
- Bulk drugs and pharmaceuticals: The Andhra Pradesh pharma industry currently contributes about 35 per cent to Indian pharma exports. Bulk drugs accounted for around 40 per cent of Indian pharmaceutical exports, which grew roughly 10 per cent last year to around USD 14 bn. Andhra Pradesh accounted for 30 per cent of India's total pharmaceutical exports in 2014–15, second to Maharashtra.
- Andhra Pradesh also exports significant volumes of pulses, groundnuts, rice, maize and wheat. During April 2015 to August 2015, the state exported around 2 mn MT of maize and 743,000 MT of wheat.

EXHIBIT 2

Total exports turnover from Andhra Pradesh

US$ billion



SOURCE: Port of Visakhapatnam, economic survey 2014-15

Industrial Development Policy 2015–20

Industrial development helps to promote higher capital formation, creates opportunities to increase wage incomes and utilises surplus workforce to bring about equitable development. It can also be a means to mitigate poverty and unemployment. The Andhra Pradesh Industrial Development Policy 2015–20 aims to establish state-of-the-art infrastructure, promote manufacturing, enhance inclusivity, foster innovation and create employment opportunities across sectors. The state government seeks to market the new state as a preferred destination for investors by providing a favourable business climate, excellent infrastructure, good law and order and industrial relations. The new industrial policy focuses on creating a conducive ecosystem which makes industries in Andhra Pradesh innovative and globally competitive. The state government of Andhra Pradesh has been consistently emphasising sustainable industrial development through capacity building at the grassroots level[2].

[2] Industrial Development Policy 2015–20, Government of Andhra Pradesh

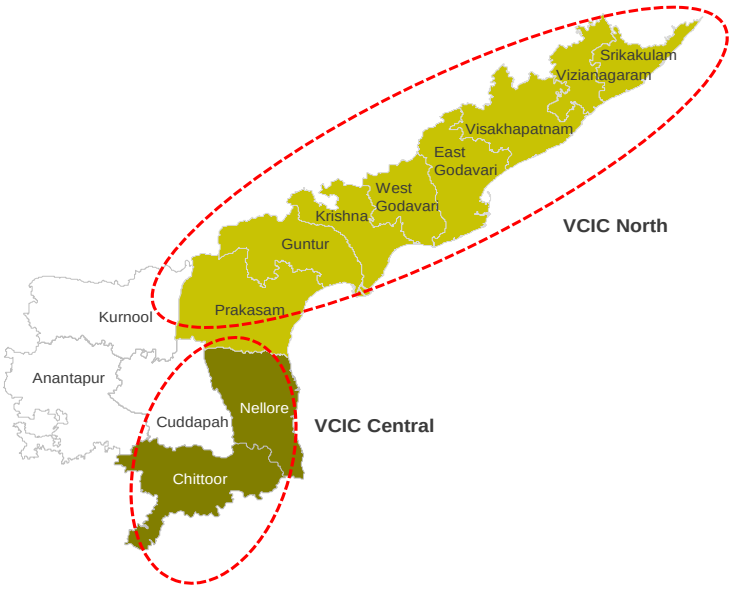
Andhra Pradesh Coastal Economic Zones

Leveraging its optimal location, natural resources and long coastline, Andhra Pradesh could aim for an industrial transformation supported by a comprehensive Coastal Economic Zone plan.

The state's long coastline allows Andhra Pradesh the opportunity to create international gateways. It has abundant natural resources of limestone, bauxite, marine products, etc. and is strategically located with respect to other ASEAN economies. However, the current contribution of Andhra Pradesh's manufacturing sector in the GSDP is around 10 per cent as compared to the national average of 15 per cent, signalling untapped potential. Along with this, industrialisation levels are skewed across districts.

EXHIBIT 3

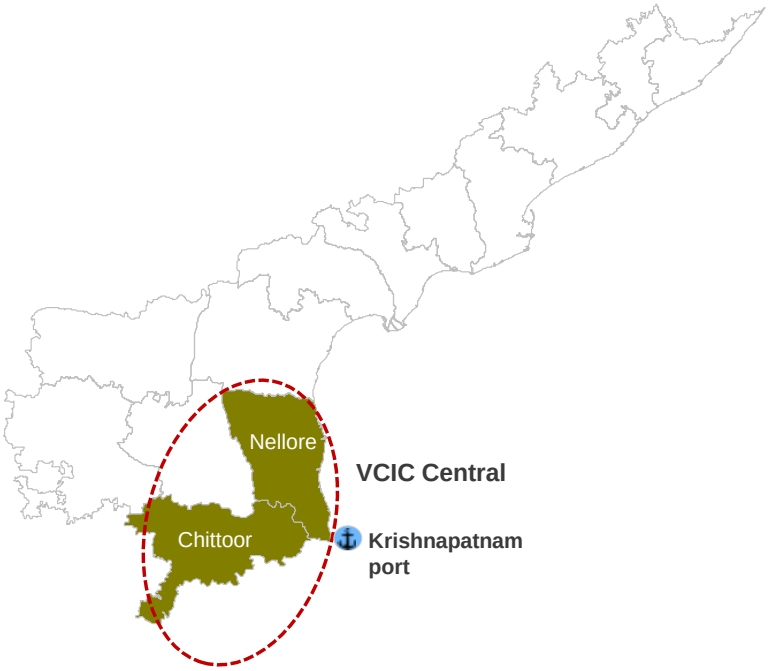
Andhra Pradesh Coastal Economic Zones



VCIC Central Coastal Economic Zone

EXHIBIT 4

VCIC central coastal economic zones



The VCIC Central CEZ could cover two districts of Andhra Pradesh: Chitoor and Nellore, which constitute around 10 per cent of the state's population and around 6 per cent of its GDP. The CEZ is envisaged to synergise with manufacturing hubs along the VCIC being developed with technical assistance from the Asian Development Bank. The Srikalahasti–Yerpedu node in the VCIC Central CEZ falls under the corridor. Similarly, the Krishnapatnam node in Nellore district is being developed under the CBIC, which is known for its automotive cluster stretching from Nellore district to south of Chennai.

SEZ and Industrial complexes

The VCIC Central CEZ comprises of 5 manufacturing based Special economic zones (shown below) which could attract investments and create jobs in the zone.

Name of the SEZ	Location	Type of SEZ- Products
Apache SEZ Development India Private Limited	Mandal Tada, Nellore District, Andhra Pradesh	Footwear
Mas Fabric Park (India) Pvt. Ltd.	Chintavaram village, Chillakru Mandal, Nellore District, Andhra Pradesh	Textile and Apparel
Bhartiya International SEZ. Limited	Nellore, Andhra Pradesh	Leather sector
IFFCO Kisan SEZ Limited	Villages Regadichelika, Racharlapadu, Chowduputtedu, Uchaguntapatem, North Ammuluru, Mandal Kodavaluru, District Nellore, Andhra Pradesh	Multi Product
Andhra Pradesh Industrial Infrastructural Corporation Ltd.(APIIC)	Villages, Dawarkapuram and Palepolam, Mandals- Naidupeta and Pellakuru, District- Nellore, Andhra Pradesh	Multi Product

Additionally, there are around 20 industrial complexes developed by APIIC (Andhra Pradesh Industrial Infrastructure Corporation) which could contribute to throughput of the ports and investments attraction.

1. AN - Nellore PH-I & II
2. Venkatachalam
3. Tada
4. Gudur
5. Kavali
6. Pannamgadu
7. IP Naidupet
8. IP Mambattu Phase I
9. IP Mambattu Phase II
10. Vengamambapuram
11. Nakkalakalva Kandriga

12. IP Epuru
13. IP Pantapalem
14. IP Ballavolu
15. IP Jatlakonduru
16. IP Kothapatnam
17. IP Ramdas Kandriga
18. IP Bvenkatareddy Palem
19. IP Anakalapaturu
20. IP Graddagunt

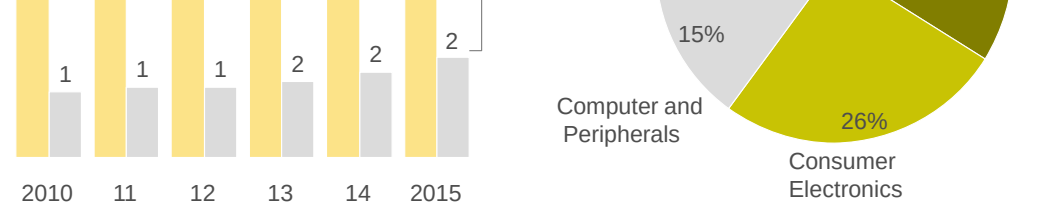
Port led industrialization

- **Electronics park in Southern Andhra Pradesh**

The demand for electronics has grown at a consistent pace in the country, reaching 6 lakh cr in 2015. Most of this demand comes from communication and broadcasting equipment and consumer electronics. The production of electronics, however, has remained static at around 2 lakh cr, increasing the gap between exports and imports with around 65 per cent of the domestic demand being served from imports in 2015. The National Policy on Electronics (2012) has laid down a vision to develop the domestic electronics sector (ESDM) for a turnover of about 400 USD bn, attract investment of about USD 100 bn and generate around 28 mn jobs.

EXHIBIT 5

Indian electronics and IT hardware demand has grown at a steady pace of 10% CAGR in the last 5 years



SOURCE: NSDC report on Electronic and IT Hardware

Electronics manufacturing these days tends to have a global supply chain spanning countries (even continents). A port-proximate location will be a critical success factor for setting up fabrication units linked with global supply chains:

- **Import of raw materials:** India will continue to import the raw materials needed for dicing/packaging operations (in the short term) and for wafer production (in medium to long term). Many of these are classified as "photo-sensitives" and start losing yield after a period of 35 to 40 days.
- **Linkage with export markets:** The domestic demand for electronics chips in India will be insufficient to keep a fab fully loaded. The cost of not loading a fab for one day could be USD 1 to 2 mn. The most feasible business model for India would be for a global player to set up a fab in India to source their global requirement and serve local demand.

Successful port-based or port-proximate clusters create disproportionate value for the nation in terms of the value added, exports, and jobs. For example, Hsinchu Science Park has grown to be a USD 35 bn revenue zone (equivalent to 7 per cent of Taiwan's GDP) after starting from nothing in 1980. The Chittagong Export Processing Zone generates USD 2 bn of exports, primarily apparel (equivalent to 2.5 per cent of Bangladesh's GDP). The value added at the Port of Antwerp is 6 per cent of Belgium's GDP.

Kick-starting upstream manufacturing will require an "ecosystem" approach. India could set up a "science and technology park" creating this eco-system

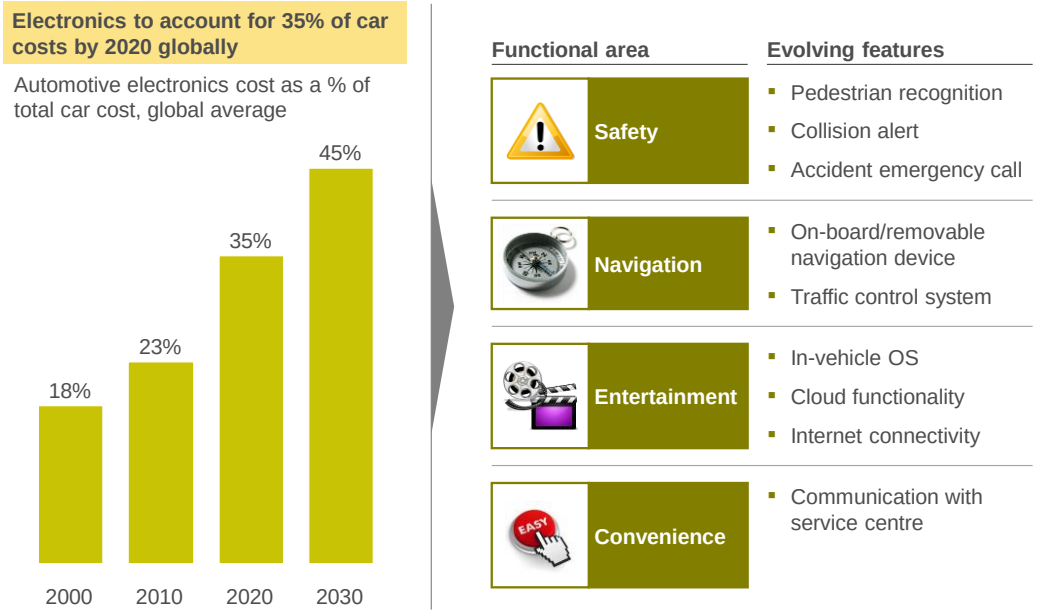
instead of piece-meal electronics clusters. These clusters will need to be backed by strong technical research capabilities.

The choice of location for setting up electronics manufacturing clusters will depend on two criteria:

- **Availability of urban and social infrastructure:** Science and technology parks will need to attract expats and Indians working abroad in the high-tech industry. An existing developed social and urban infrastructure (e.g., proximity to research universities, international airport, metropolitans) will be a key success factor.
- **Synergies with other sectors, e.g., Automotive:** We estimate that by 2020, almost 35 per cent of total car cost will be related to its electronics components.

EXHIBIT 6

High synergies between automotive and electronics clusters



SOURCE: PTW-Hawk survey; strategy analytics

Port modernisation and connectivity projects identified:

- Upgradation of the hinterland road From Naidupeta (Nellore district of Andhra Pradesh) to Krishnagiri (in Tamil Nadu)
- Upgradation of the proposed NH67 from Bellary (Karnataka) to Krishnapatnam (Nellore district of Andhra Pradesh)
- Four-lane greenfield road to Krishnapatnam Port from Naidupeta (Andhra Pradesh)

- Upgradation of the existing R&B road from Chilakaru cross (NH16) to power plants
- Development of 5 km greenfield road connecting north and south industrial cluster of Khandaleru Creek near Krishnapatnam Port
- Upgradation of 24 km road to four lanes, connecting Nellore city to Krishnapatnam Port to NH 5 in SPSR Nellore district of Andhra Pradesh
- Rail connectivity between Krishnapatnam and Venkatachalam
- Rail connectivity between Krishnapatnam and Obulavaripalle
- Freezing and fish segregating facilities for tuna and other catch near Krishnapatnam Port
- Rail connectivity to south port of Krishnapatnam Port from Guduru (26 km)
- Development of one passenger jetty at Krishnapatnam Port for tourism
- Development of Pulicat Lake Island in SPS Nellore District as tourist spot

In terms of setting up Coastal Economic units under CEZ's, the development could be taken up in a phased process initiating with the districts, since have larger potential for attracting investments due to already existing industrial muscle and eco-system.

Phase 1 districts: Krishnapatnam

Phase 2 districts: Chittoor, Nellore

Land availability

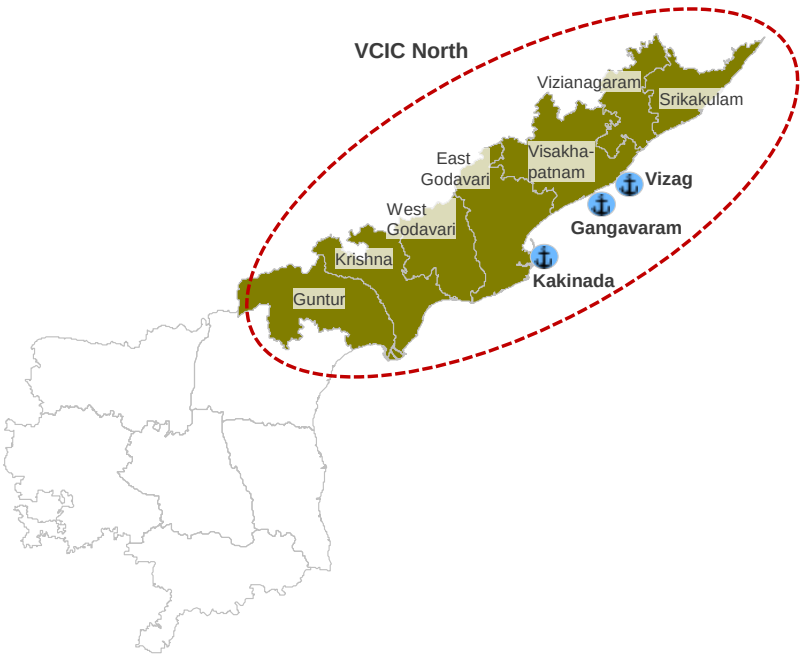
District	Land Bank Location [Estate]	Acres
Vishakhapatnam	SEZ Naidupeta	1,907
Vishakhapatnam	IP Thamminapatnam	1,016
Vishakhapatnam	IP Naidupet	629
Vishakhapatnam	IP Kothapatnam	537
Vishakhapatnam	IP_Krishnapatnam	431
Vishakhapatnam	IP_Pynampuram	324
Vishakhapatnam	IP,Thatiparthy (UDL)	316
Vishakhapatnam	IP_Mambattu Phase-II	209
Vishakhapatnam	IP Ballavolu	208

Vishakhapatnam	IP Kothapalli Koru Gunta	176
Nellore	IP Attivaram	156

VCIC North Coastal Economic Zone

EXHIBIT 7

VCIC North coastal economic zone



The VCIC North Coastal Economic Zone could cover seven districts of Andhra Pradesh: Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari, Krishna and Guntur. These districts constitute around 35 per cent of state population and around 30 per cent of state GDP.

The CEZ also covers three operational ports: Visakhapatnam, Gangavaram and Kakinada (deep water and anchorage).

Industrial activity in the CEZ is unevenly distributed, with agrarian districts like Srikakulum and Vizianagaram together contributing only 6 per cent to the state's industrial GDP. Visakhapatnam alone, on the other hand, contributes 20 per cent to the state industrial GDP.

Industrial activity in the Northern Andhra Pradesh CER is relatively evenly distributed, with Guntur, Krishna and West Godavari contributing 7 per cent, 8 per cent and 5 per cent respectively of the state industrial GDP. Food processing, textiles and cement are the major industries in this CER. Like the Northern

Andhra Pradesh CER, this CER is also envisaged to synergise with industrial development initiatives currently underway for the Visakhapatnam–Chennai Industrial Corridor (VCIC). The CER could be supplemented by discrete manufacturing node of VCIC. In turn, initiatives under VCIC would also gain from the development of the CER. The VCIC, being developed with technical assistance from Asian Development Bank (ADB), has four discrete manufacturing nodes, of which the Gannavaram node would fall within the Central Andhra Pradesh CER

Food processing, textiles, petrochemicals, and metallurgy are the major industries in this CEZ. This zone could be supplemented by distinct manufacturing hubs along the Visakhapatnam–Chennai Industrial Corridor (VCIC). In turn, initiatives under VCIC could also gain from the development of the CEZ. The VCIC, being developed with technical assistance from Asian Development Bank (ADB), has four discrete manufacturing nodes of which two, Visakhapatnam and Kakinada, fall within this CEZ.

The CEZ has seven operational manufacturing based special economic zones concentrated in the Vishakhapatnam district.

Name of the SEZ	Location	Type of SEZ- Products
Divi's Laboratories Limited	Chippada Village, Visakhapatnam, Andhra Pradesh	Pharmaceuticals
Ramky Pharma City (India) Pvt. Ltd.	E-Bonangi Villages, Parawada Mandal, Visakhapatnam District, Andhra Pradesh	Pharmaceuitacals
Hetero Infrastructure Pvt. Ltd.	Nakkapalli Mandal, Visakhapatnam District, Andhra Pradesh	Pharmaceuticals
Andhra Pradesh Industrial Infrastructural Corporation Ltd.(APIIC)	Atchutapuram and Rambilli Mandals, Visakhapatnam District, Andhra Pradesh	Multi Product
Brandix India Apparel City Private Limited	Duppituru, Doturupalem Maruture and Gurujaplen Villages in Visakhapatnam District, Andhra Pradesh	Textile

Name of the SEZ	Location	Type of SEZ- Products
Andhra Pradesh Industrial Infrastructure Corporation Limited (APIIC)	Village Annangi and Bodduvanipalem, Mandals Maddipadu and Korispadu, District prakasham, Andhra Pradesh	Building Products
Dr. Reddy's Laboratories Limited	Village Devunipalavalasa, Mandal Ranasthalam, District Srikakulam, Andhra Pradesh.	Pharmaceutical

Additionally, there are around 23 industrial complexes developed by the state industrial development corporation which could act catalyst for attracting investments and providing employment to coastal communities of the CEZ.

1. AGANAMPUDI
2. GURRAMPALEM
3. PARAWADA
4. PEDAGANTYADA
5. HEALTH CITY
6. ANAKAPALLY
7. ARAKU
8. PADERU
9. GAMBHEERAM
10. PYDAMMATHOTA
11. IP CHIPPADA
12. IP DUVVADA
13. IP KAPULUPPADA
14. IP MAKAVARAPALEM
15. IT RESAPUVANIPALEM
16. THUNGLAM UDL
17. AN-JAGGAIAHPETA PH-I&II
18. GANNAVARAM
19. GUDIVADA
20. KONDAPALLY
21. MACHILIPATNAM
22. AN – KANURU

23. IP JAYANTHIPURAM

Also, the Visakhapatnam-Kakinada PCPIR is one of the six Petroleum Chemical Petrochemical Investment Regions (PCPIRs) planned to be promoted in India. The Cabinet Committee on Economic Affairs (CCEA), Government of India, in its meeting held on February 23, 2009 approved Visakhapatnam-Kakinada PCPIR, Andhra Pradesh Industrial Infrastructure Corporation (APIIC) is the nodal agency for managing implementation of VK-PCPIR. The project envisages 640 sq.km., encompassing 97 revenue villages across parts of 10 mandals of Visakhapatnam and East Godavari Districts. The project shall create adequate investments and job opportunities in the region.

The North Coastal CEZ shall also benefit from the announced East Coast Dedicated Freight Corridor which originates in Kharagpur and ends in Vijaywada a part of the CEZ. The freight corridor project if becomes reality, could solve logistics in-efficiency and time & cost lags in the region

Vizag port and relevant cargo

In terms of volumes, Visakhapatnam is the fifth largest major port in the country handling approximately 58 MTPA of cargo. Visakhapatnam is located on the northern coast of Andhra Pradesh and serves the Central and Eastern hinterlands of the country like Telangana, Chhattisgarh, Madhya Pradesh and Southern Odisha.

Currently the port handles ~12 MTPA of thermal coal and ~14.6 MTPA of POL. Other major commodities include coking coal, containers, fertilizers and iron-ore. Going into the future we expect the total traffic at the port to go to ~80 MTPA by 2020 and 100-110 MTPA by 2025

Major commodities

POL

POL crude and product constitute the biggest portion of traffic handled at the port. Visakhapatnam handles roughly 15 MTPA of POL which comprises approximately 8 MTPA of crude import, 4.6 MTPA of product movement and 1.1 MTPA of LPG imports.

Expansion of HPCL in the future could lead to a traffic of roughly 15 MTPA of crude import by 2025. POL coastal traffic is expected to reach 7.5 MTPA by 2025 which includes 4-5 MTPA of coastal shipping potential from Paradip to Vizag port to cater to the demand of Andhra Pradesh and Telangana.

LPG imports are expected to increase to 1.5 MTPA by 2025 driven by government's focus on distribution of LPG connections to rural households. The split of the current POL traffic and the estimated traffic in 2025 is as shown below.

Thermal Coal

Currently the port unloads 9.3 MTPA of thermal coal out of which approximately 4 MTPA is for power generation in Adani Power Maharashtra Ltd. in Gondia district. Remaining is primarily for the consumption of non-power plants (>50% of the overall imports). Unloading of thermal coal would potentially be driven by Tiroda plant, demand of captive power plants and import substitution.

The port also handles 2.8 MTPA of outbound coal which is coastal shipped to Tamil Nadu. This figure is projected to grow to ~3.7 MTPA by 2020, ~5 MTPA by 2025 and 5-6 MTPA by 2035.

Coking Coal

The port currently handles 6 MTPA of coking coal which is used for steel production in the steel plants of Rashtriya Ispat Nigam Limited (RINL), SAIL Bhilai, Tata Steel Limited, Jindal Power and Steels Limited. Other consumers of coking coal include Uttam Galva Metallics, Jayswal Neco and Bhushan Power and Steel Limited. We project that going forward the volumes of coking coal handled by the port could potentially increase to 8.6 MTPA by 2020, 11-12 MTPA by 2025 and 18-20 MTPA by 2035. This increase will be driven primarily by expansion in SAIL Bhilai and Nagarnar plants. The increase of coking coal traffic due to expansion of steel plants in the hinterland could also be shared by the competing non-major port of Gangavaram.

Containers

The port, through the Visakha Container Terminal currently handles ~0.25 MTEUs. Andhra Pradesh and Telangana are the key hinterlands for the port. Other hinterlands include Odisha (primarily Bhubaneshwar and Jharsuguda), Madhya Pradesh, Bihar and Chhattisgarh. Visakhapatnam region itself contributes ~20% to the total container traffic at port.

Fertilisers

The port imported 2.6 MTPA of fertilizers and raw materials for fertilizers in FY 15. This comprises of approximately 1.5-1.8 MTPA of finished fertilizer and 1-1.2 MTPA of raw material of fertilizers. The finished fertilizer serves the demand in the hinterlands of Andhra Pradesh, Telangana, Madhya Pradesh and Chattisgarh. Part of the raw material for fertilizers is utilized in the DAP, NPK, Urea and AS fertilizer plants in Andhra Pradesh itself and a part of it is sent to plants in Uttar Pradesh.

The overall volume of fertilizer and fertilizer raw material is expected to increase to ~4 MTPA by 2020, ~5 MTPA by 2025 and 7-8 MTPA by 2035.

Alumina powder and Other ores

Visakhapatnam port also handles alumina power and other ores of approximately 2.6 MTPA currently. This is utilized by customers including NALCO, Sesa Sterlite Ltd., and other metallurgy units. This figures is expected to increase to 2.6 MTPA by 2020 and ~3-4 MTPA by 2025.

Other localized commodities

Other highly fragmented cargo also makes a sizeable chunk of the total cargo volume handled at Visakhapatnam port. This volume is currently 4.6 MTPA and is expected to increase to ~8 MTPA by 2020 and 10-12 MTPA by 2025.

Rationale for industrial clusters

Gas based petchem cluster

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed.

Availability of naphtha: India produces around 18 MTPA of naphtha which is around 8-10 per cent of refinery crude throughput capacity. Some of the domestic consumption of naphtha happens in petrochemical plants with the balance being used as a feedstock for power generation, fertiliser plants and refineries. As Indian refineries expand capacity from the current ~220 MTPA to ~280 MTPA in 2025, the amount of naphtha produced domestically may grow to ~25 MTPA and ~20 MTPA of it could be used for petrochemical production in the optimistic case. With additional petrochemical plants coming up, the export of naphtha seems unlikely, as most of it may be used in domestic production of petrochemicals.

Availability of gas: Domestic gas production was around 25 MTPA in 2013–14 and no significant increase in supply from domestic sources is expected in the near future. There is currently ~20 MTPA of operational terminal infrastructure for re-gasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Projects of around 45 MTPA capacity have been announced to come up in the next 10 years.

Based on the above assessment, the incremental capacity of petrochemical plants could be set up in locations where greenfield refineries are coming up (Maharashtra, Tamil Nadu) and at locations where LNG import terminals are coming up (Mundra, Mangalore, **Kakinada** and Ennore).

Apparel

Setting-up port-based or proximate manufacturing clusters could help logistics issues in the textiles manufacturing industry and significantly increase the competitiveness of apparel manufacturing. Welspun is a good example of setting up an at-scale facility (800 acres, 14,000 workers, own power supply) and a close-to-port location (50 km away from India's largest container port, Mundra).

To replicate the Welspun success model, three or four "apparel parks" could be set up in the country, linking cotton-producing regions with ports. A mapping of cotton-producing regions in India shows three possible locations for setting up these clusters

Saurashtra region in Gujarat: Amreli, Bhavnagar, Jamnagar, Rajkot, Surendranagar and Ahmedabad are among the highest cotton-producing districts in this region.

Central Andhra Pradesh: Guntur is a key cotton-producing district. This cluster could also tap into cotton being produced in Khammam, Warangal, Karimnagar and Adilabad districts in Telangana.

Vidarbha region in Maharashtra: Jalgaon, Aurangabad, Jalna, Buldana and Akola are they key cotton-producing districts in this region.

Food Processing

Considering the export orientation of the food processing sector, it is important that Mega Food Parks be port-based or have adequate linkages to ports. Possible locations include:

- **Kakinada in Andhra Pradesh:** Since Andhra Pradesh has the necessary factors of production, including proximity to raw materials, port infrastructure and existing industrial agglomeration, it is most suitable for a port-based Mega Food Park with significant export orientation of value-added food products of rice, fruits and vegetables. The proposed Mega Food Park could also draw synergies from VCIC where food processing is a focus sector with Kakinada, Gannavaram and Yerpedu–Srikalahasti as the proposed nodes for development.
- **Southern Maharashtra:** The state is a leading producer of mango, cashews and fish. However, food processing is currently done using traditional methods and oriented primarily towards domestic consumption. A Mega Food Park specialising in the manufacturing and export of value-added products from mango, cashews and fish can come up in resource-rich districts of Ratnagiri and Sindhudurg, closely linked to Jaigad and Vijaydurg ports

Cement

The traditional mode of setting up cement capacity in India has been inland plants located close to limestone reserves. Five coastal of states West Bengal, Kerala, Odisha, Tamil Nadu and Maharashtra have limited and declining limestone reserves. On the other hand, Andhra Pradesh, Karnataka and Gujarat have excess limestone reserves that can support future capacity development.

Cement demand in the limestone deficient coastal states is expected to grow to 190 mn tonnes in 2025 from the current 86 mn tonnes. Of ~100 MTPA of additional capacity required, 40 MTPA could be through coastal clinkerisation clusters in southern Gujarat and central Andhra Pradesh, with grinding units at ports close to demand centres, e.g., Mumbai, Cochin, Chennai/Ennore, Kolkata, etc. This configuration could save INR 700-800 per tonne (10 to 15 per cent of total delivered cost of cement) compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by lower cost of fly ash and cement transport to demand centres.

By 2025, this 40 MTPA coastal cement capacity could be expected to save around INR 2,500 cr per annum in logistics cost. Based on the mapping of limestone

reserves in India, two possible locations for setting up these clusters could be considered:

In Gujarat, Kutch, Junagarh and Bhavnagar are districts with the highest limestone reserves.

In Andhra Pradesh, Guntur, Nalgonda, Kurnool and Cudappah are districts with the highest limestone reserves. These clusters could host the clinkerisation units while receiving ports could host the grinding units.

Power complexes

India's demand for coal in 2014–15 was around 850 MTPA, primarily from coal-fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 percent. Power demand in the country could reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then due to the "24x7 power to all" the peak demand could be higher. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal-based thermal power plants may still continue to meet more than 70 per cent of the country's power requirement.

Tamil Nadu and Maharashtra are both industrial states with high power demand. Maharashtra has the highest consumption in the country with ~138 bn units, while Tamil Nadu's consumption is ~93 bn units. As both the states continue to dominate the urban and industrial landscape of the country, the power demand is expected to witness a steady growth for the next 10 years. Significant capacity expansion in these states may be required—power demand in Maharashtra is likely to reach around 400 bn units by 2025, while Tamil Nadu's demand may be close to around 300 bn units.

Pithead plants are more economical as it is cheaper to wire the power than transporting thermal coal from the minehead to plants near the demand centres. However, capacity may also be set up within the respective states with coal being transported. South Eastern and Mahanadi coalfields are expected to account for bulk of the growth in coal production. Coastal power complexes could leverage the coastal shipping of thermal coal from MCL to significantly reduce the logistics cost which could be as high as 30 per cent of the cost of power production.

Tamil Nadu is already a successful model, with plants at Tuticorin, Ennore, and Chennai leveraging coastal shipping. Southern Andhra Pradesh also leverages coastal shipping through its power complex in Krishnapatnam. Logistics cost of transporting thermal coal through rail-sea-rail route is around 40 per cent cheaper than the rail only route.

Power plants located at coastal locations benefit the most from the difference as the cost of last mile transportation is minimal. Sirkazhi in Tamil Nadu, **Vodarevu in Central AP** and Vadhavan in Maharashtra could be the potential locations for building power complexes to support the power demand of these states. Coastal power complexes also have the natural advantage of access to water.

Port led industrialization

Some of the other high-potential industries identified for this CEZ are Food Processing, Cement manufacturing, <insert all points or remove all mentions here>

1. Food processing in? <please make this uniform with other points and insert recommended locations in the title>

India is the second largest producer of food in the world, after China. However, it has a minuscule share in the global trade of processed foods. The Indian food processing industry was estimated to be USD 121 billion in FY 2014. It contributes around 9 per cent of the GDP in manufacturing and around 11 per cent of the GDP in agriculture.

The level of processing in India is much lower compared to other countries. India scores poorly on logistics and storage infrastructure—one of the key enablers for driving the export competitiveness of the food processing sector. Export cargo moving from the manufacturing clusters to the ports is subjected to high inland logistics costs as well as significant variability in transit time. Bottlenecks in road and rail transport prevent the smooth movement of cargo. Road cargo travels 250 to 300 km per day in India as compared to 600 to 800 km each day as per international standards. The railways also do not have a proper cold chain facility, which is extremely important for food cargo. The perishable nature of the food products make it crucial to have efficient logistics for quicker transportation of raw materials and finished products.

Logistics affects cost in two ways: direct freight cost and the cost of handling inventory for the duration of the transit. Freight cost contributes a significant portion to the ex-port price of the processed food cargo. Like other export-oriented cargo, the inventory handling cost of a processed food consignment for the duration of the transit period and the buffer period is an additional cost to the trade.

With the second longest coastline and three major river basins, Andhra Pradesh is a leading producer of fruits and vegetables, coconut, rice, spices, fish, prawn and shrimp. Despite the demarcation of Telangana, agriculture is a natural comparative advantage for Andhra Pradesh, with over a 23 per cent share in GSDP at constant prices. Kakinada could be considered for setting up a port-based food processing mega park focused on export-oriented value-added food products of rice, fruits and vegetables.

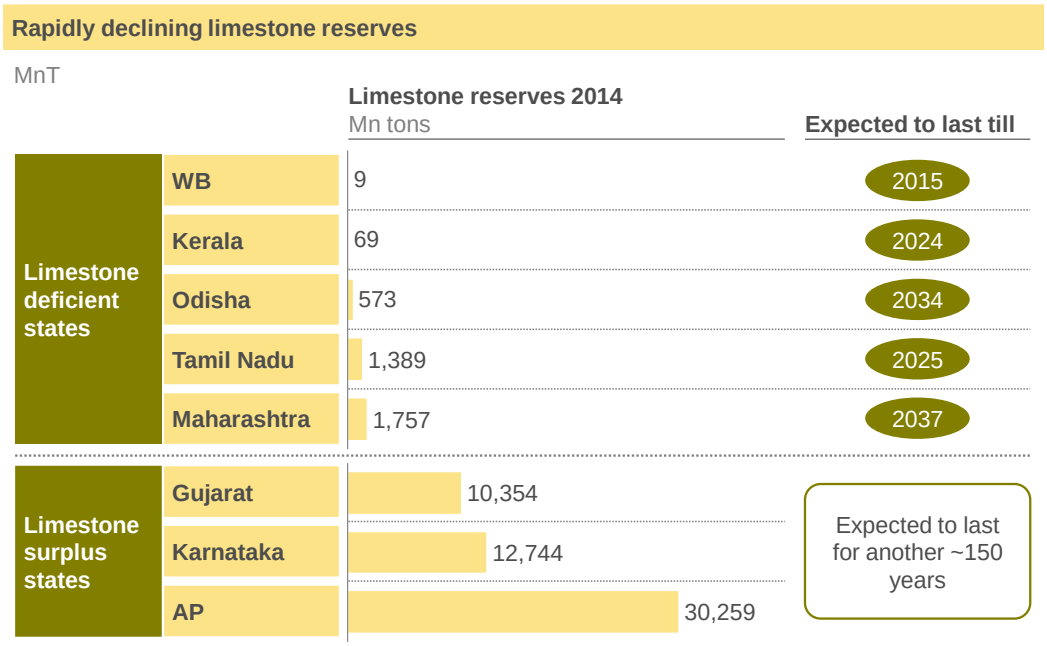
2. Cement cluster in Central Andhra Pradesh

India's geographical diversity endows some states with an excess of natural resources. Limestone—an important raw material in the production of cement—is also unevenly distributed and uneconomical to transport over long distances. Five key maritime states have depleting limestone reserves and will soon have to depend on other states for their cement supply. On the other hand, Andhra Pradesh ranks highest among three maritime states having large reserves of limestone that are expected to last at least for another 150 years. A bulk

commodity, cement could be easily coastally shipped to meet the deficit of other states.

EXHIBIT 8

Limestone surplus and deficient states



SOURCE: International cement review; Planning commission report

Studies reveal that the most economical mode of serving this demand would potentially be through setting up coastal clinkerisation clusters in Central Andhra Pradesh and grinding units at ports close to demand centres (Mumbai, Cochin, etc.). This configuration could save on average INR 600 per tonne (10 to 15 per cent of total delivered cost of cement) as shown in the exhibit 9, compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by lower cost of fly-ash movement (due to better availability at ports), and lower cost of transporting cement to demand centres.

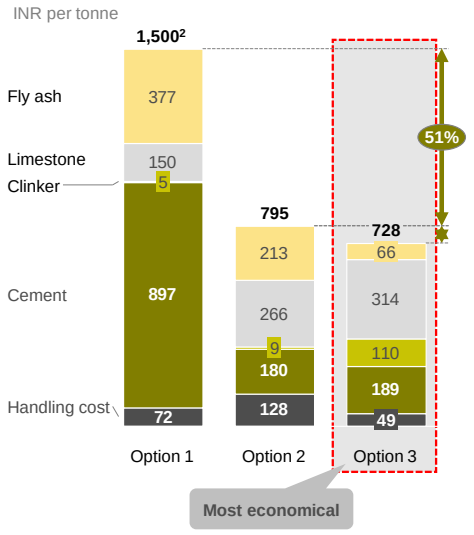
EXHIBIT 9

Coastal clinker capacity with grinding units near coastal demand centers, will be most economical option

Three options evaluated for location of new Cement capacity

Option 1 (Serve through hinterland AP capacity)	▪ Fly-ash: 240 km via road @ INR 3/ton-km, Nellore to Guntur ▪ Limestone: Transported 40 km from pit via road @ INR 3/ton-km to Guntur ▪ Clinker: Transported inside the plant via conveyor belt – @ INR 5/ton ▪ Cement: 400 km via rail @ INR 1.5/ton-km…from Guntur to Chennai by rail
Option 2 (Serve through coastal AP integrated unit)	▪ Fly-ash: 76 Km from Krishna dist. To Macahlipatnam, via road @ INR 3/ton-km ▪ Limestone: Transported 40 km from pit via road @ INR 3/ton-km ▪ Clinker: Transported inside the plant via conveyor belt – @ INR 5/ton ▪ Cement: 450 km via sea @ INR 0.15/ton-km, from Machalipatnam to Chennai
Option 3 (Serve through coastal AP clinker and Chennai Grinding unit)	▪ Fly-ash: 20 km via road @ INR 3/ton-km, from Ennore to Chennai grinding unit ▪ Limestone: Transported 40 km from pit via road @ INR 3/ton-km to clinker plant in Machalipatnam ▪ Clinker: 450 km via sea @ INR 0.15/ton-km, from Macahlipatnam to grinding unit near the Chennai ▪ Cement: 20km via. road @ INR 3/ton-km to demand centers around Chennai

Cement logistics cost for serving limestone demand in Chennai

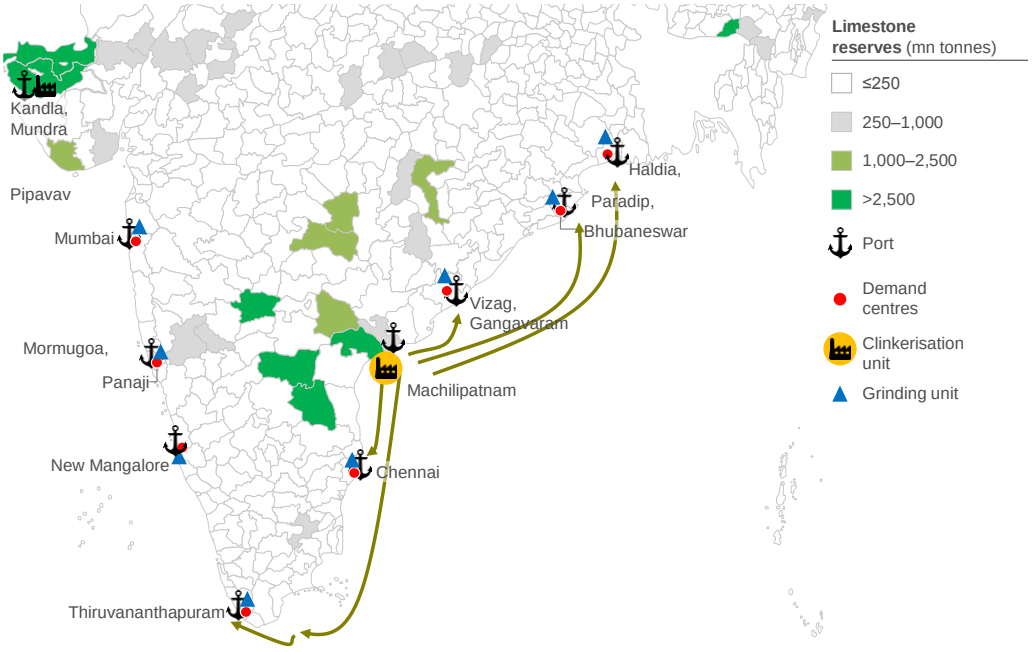


1 Base logistics cost estimated (assuming 25% of total cement cost of INR 6,000/ton) to be INR 1,500/ton for hinterland plant, and relatively scaled up for other capacity examples too

The next exhibit shows a probable location for a cement cluster in the Central Andhra Pradesh region. Guntur, Nalgonda, Kurnool and Cudappah are the districts with the highest limestone reserves. The clinkers produced in the region could be coastally shipped to the demand centres in Odisha, Tamil Nadu and Kerala. Andhra Pradesh itself will be a major consumer of the new capacity due to intensified construction activities expected in the upcoming capital at Amaravati and promotion of industrial activity in VCIC.

EXHIBIT 10

Central Andhra Pradesh is a potential location for coastal cement clinkerisation clusters, with grinding units near demand centres



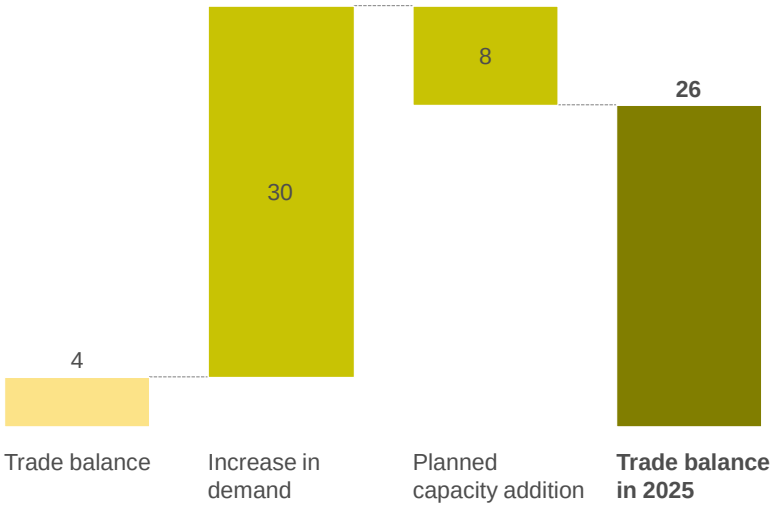
3. Petrochemicals cluster in Kakinada

The consumption of petrochemicals in the country has grown at a consistent rate of around 6 per cent in the last few years. Demand in 2006–07 was around 22 MTPA which rose to around 33 MTPA in 2013–14. As petrochemical demand is strongly correlated to GDP growth, if India's GDP grows by 6 to 7 per cent over the next 10 years, the demand for petrochemicals could be in the range of 60 to 70 MTPA by 2025.

In 2013–14, total installed capacity for petrochemicals production was around 33 MTPA. Operating at around 85 per cent capacity utilisation, the country produced around 28 MTPA of petrochemicals in 2013–14, an increase from 21 MTPA in 2006–07. The rising gap between domestic demand and production of petrochemicals has increased India's dependence on imports. It is expected that around 8 MTPA of petrochemical production capacity may be commissioned in the next 10 years. India is likely to require significant capacity addition of around 25 MTPA to prevent further import dependence. The competitiveness of these plants will need to be carefully examined under various feedstock price scenarios.

EXHIBIT 11

Trade balance in 2025 with planned capacity addition



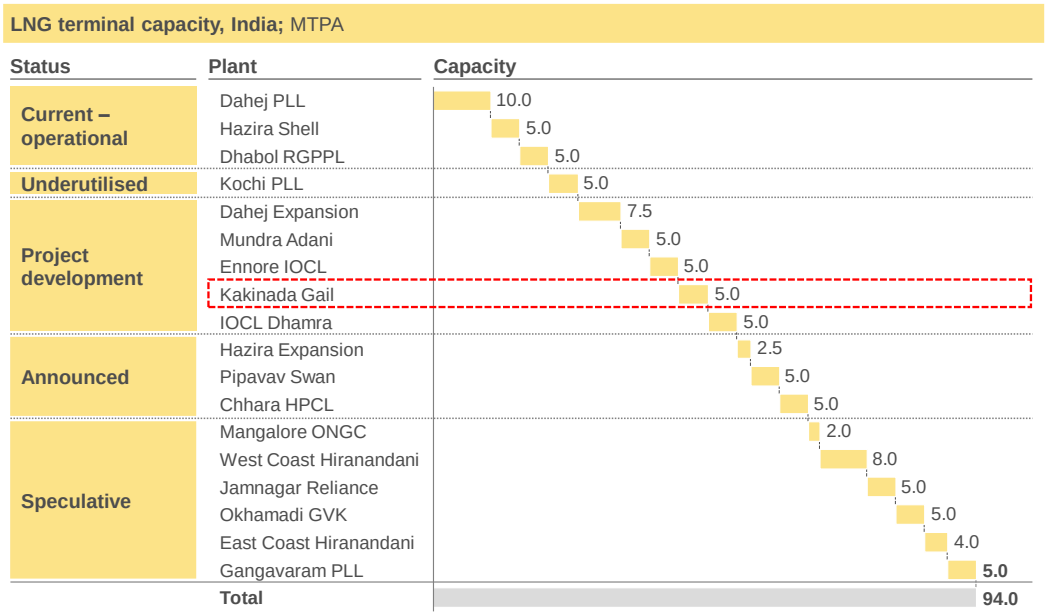
SOURCE: MLCPCSTAT 14

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed. India produces around 18 MTPA of naphtha which is around 8 to 10 per cent of refinery crude throughput capacity. As Indian refineries expand capacity from the current around 220 MTPA to around 280 MTPA in 2025, the amount of naphtha produced domestically may grow to around 25 MTPA, of which 20 MTPA could be used for petrochemical production in the optimistic case. The domestic gas production was around 25 MTPA in 2013–14, with no significant increase in supply expected in the near future. There is currently around 20 MTPA of operational terminal infrastructure for regasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Projects of around 45 MTPA capacity have been announced to come up in the next 10 years.

One of these regasification terminals is expected to come up in Kakinada where GAIL is setting up an LNG terminal. Considering the increased availability of gas in the region, petrochemical plants that use gas as a feedstock could come up there.

EXHIBIT 12

LNG import terminal is expected to come in Kakinada



1 Expected to be ready by end of 2016/17; 2 Received environment clearance in 2015, pending till completion of Hiranandani facility; 3 Received environment clearance in 2013; 4 In talks with investors; 5 Expected to be ready by 2018

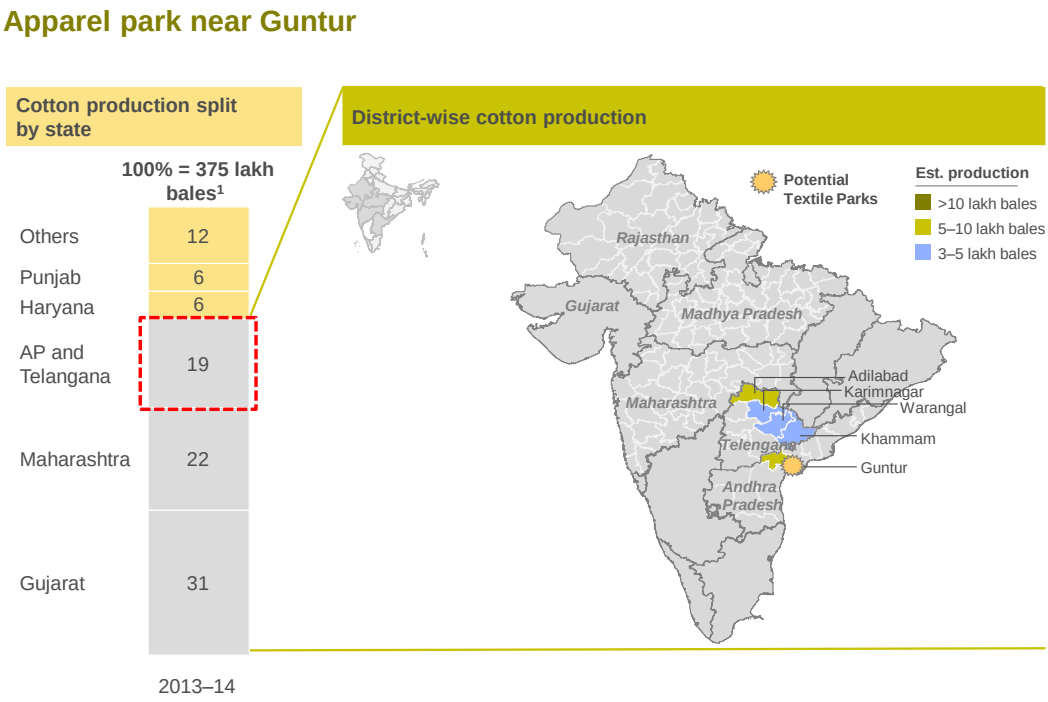
SOURCE: PPAC; press search

4. Textile/apparel cluster near Guntur

As the world's third largest cotton producer, India has a raw material–based competitive advantage in apparel manufacturing. Andhra Pradesh/Telangana is a primary reason for this advantage, being the highest cotton-producing state in India.

An export-based apparel cluster in the region, using the cotton produced in the districts, could reduce the overall movement of cotton and corresponding logistics costs. This could help improve the competitiveness of apparel exports from the country. Guntur is a key cotton-producing district. This cluster could also tap into cotton demand being produced in Khammam, Warangal, Karimnagar and Adilabad districts in Telangana. A strategically placed apparel park could be set up in the region.

EXHIBIT 13



1 of 170kg
2 Based on "Cotton statistics at a glance" published by Directorate of Cotton Development & National Centre for Integrated Pest Management

5. Power complex at proposed Vodarevu Port

India's demand for coal in 2014–15 was around 850 MTPA, primarily from coal-fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent. If power reforms are successful and there is mass electrification, then with "24/7 power to all", peak demand could be as high as 280 GW. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal-based thermal power plants could continue to meet more than 70 per cent of the country's requirement.

A coastal power complex can leverage the coastal shipping of thermal coal from MCL to coastal power clusters, to significantly reduce logistics costs which could be as high as 30 per cent of cost of power production. The logistics costs for transporting thermal coal via coastal shipping are around 40 per cent lower than transporting thermal coal via rail. Tamil Nadu is already a successful model, with plants at Tuticorin, Ennore, and Chennai leveraging coastal shipping. Southern Andhra Pradesh also leverages coastal shipping through its power complex in Krishnapatnam. To make coastal shipping viable, it is imperative to set up plants in and around the ports to ensure minimal last-mile connectivity to control logistics costs. The upcoming Vodarevu port in Andhra Pradesh could be a potential location for building a power complex to support the power demand of the state.

Port modernization and connectivity projects

Other key projects – Brownfield expansion of steel plants in Vizag could also be undertaken

- Setting up a logistics and maritime university at Kakinada
- Development of fish landing centre in Appikonda
- Proposal for a fisheries growth centre for the development of fisheries at Uppada in East Godavari District
- Construction of passenger jetty at Baruva in Srikakulam district
- Construction of tourism passenger jetty at:
  - Kalingapatnam, Srikakulam district
  - Bheemunipatnam, Visakhapatnam district
  - Sacramento Shoal, East Godavari district
  - Manginapudi, Krishna district
  - Kothapatnam, Prakasam district
  - Maipadu, SPS Nellore district
  - Bhavani Island, Krishna district
- Shifting fishing harbour northwards, opposite lighthouse from existing location at Kakinada Anchorage Port
- Developing fishing harbour in Juvvaladinne for coastal community in SPSR Nellore district
- Establishing of world-class fishing harbour at:
  - Bandaruvani Peta, Srikakulam district
  - Konada, Vijayanagaram district
  - Bhyravapalem, East Godavari district
  - Nagayalanka, Krishna district
  - Kothapatnam, Prakasam District in the State of Andhra Pradesh
  - Allur, SPS Nellore District in the State of Andhra Pradesh
- Direct connectivity between Jaggayyapalem and Mindi
- Upgrading existing dedicated port connectivity from Krishnapatnam Port to NH5 in SPSR Nellore district
- Additional oil jetty at Vizag
- Additional stackyard for GCB at Vizag
- IB signalling for RV line
- Decongesting RV line (Vizag & Gangavaram port), second line

- Connecting Vizag Port to NH16 (Phase II)
- Road connectivity from outer harbour to port connectivity junction (B)
- Developing flyover bridge from Seahorses Junction area to dock area at Vizag Port
- Revamping the connectivity to get wagons at Vizag
- Forming of new Railway line from Kovvuru to Bhadrachalam Road

In terms of setting up Coastal Economic units under CEZ's, the development could be taken up in a phased process initiating with the districts which have larger potential for attracting investments due to already existing industrial muscle and eco-system.

Phase 1 districts: East Godavari,Visakhapatnam

Phase 2 districts: Guntur, Krishna, Vizianagram, West Godavari

Phase 3 districts: Prakasam

Land availability

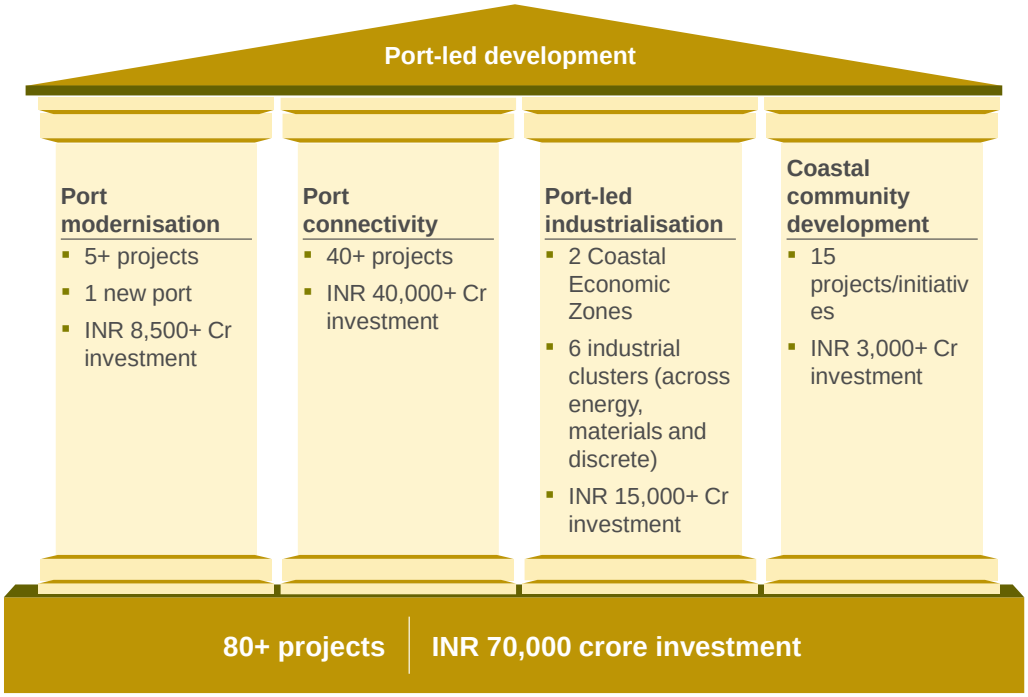
Land Bank Location [Estate]	Acres
IP_Kona_Lao_KSEZ	2,095
APIIC_Atchutapuram_APSEZ	1,412
APSEZ,EXPANSION(DTA)	1,331
IP_Santabommali	1,273
IP_Makavaripalem	309
IP_Thammavaram	275
IP_Odalarevvu	247
IP_Chippada	177
IP-Peddapuram (undeveloped)	135
IP_Yeleswaram_LAO_VIWSCO	120
IP_Parawada_Expansion	112
IP_Neemam	111

IMPACT

The Sagarmala National Perspective Plan has classified over 80 projects under the four pillars of port-led development. These will require an investment of INR 70,000 cr. The industrial clusters could generate 8 to 10 lakh jobs in the next 10 years.

EXHIBIT 14

Sagarmala: Port-led development



Gujarat CEZ Perspective Plan

The state has 42 ports—a major port at Kandla and 41 minor ports, along the coastline. The Kandla port handled around 92 mn tonne in 2014–15. Petroleum, oil and lubricants (POL), coal, fertilisers and iron ore are major commodities in the port traffic at Kandla.

A major share of the overall population of Gujarat lives in rural areas, but a drop in these figures reflects growing urbanisation in the state. The state government has announced plans to invest around USD 1,703 mn as per Budget 2015–16 to develop and improve urban areas.

CURRENT ECONOMIC SCENARIO

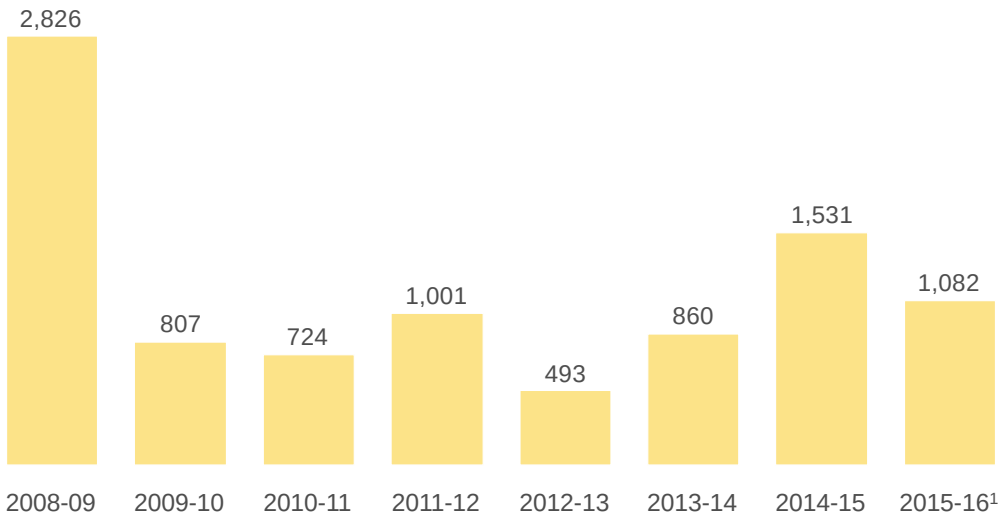
One of India's most industrialised states, Gujarat has attracted huge investments over the last 10 years. It is a model for industrial growth in India and a prime destination for industrialists with its investor-friendly ambience—investment regions, special economic zones, product clusters, industrial parks and industrial estates. This development has spanned all of Gujarat, with all districts witnessing varying degrees of growth.

Gujarat's GDP in 2015–16, at current prices, was around INR 577,921 cr, contributing around 9 per cent to India's economy. According to the DIPP, FDI inflows to Gujarat totalled roughly USD 12 bn between April 2000 and June 2015. Also, Gujarat accounted for a 5 per cent share in overall FDI inflows to India.

EXHIBIT 15

FDI equity inflows, 2008-09 to 2015-16[1]

US$ million



1 During April 2015-September 2015

SOURCE: Department of Industrial Policy and Promotion (DIPP), April 2000 to June 2015

MAJOR INDUSTRIES

Gujarat is a leader in industrial sectors such as chemicals, petrochemicals, dairy, drugs and pharmaceuticals, cement and ceramics, gems and jewellery, textiles, and engineering, some of which are discussed subsequently. The industrial sector of the state comprises around 603,000 micro, small and medium industries, which provide employment to about 3,851,000 people. Together, 13 major industry groups account for around 82 per cent of total factories, 95 per cent of total fixed capital investment, 90 per cent of the value of output and 93 per cent of value addition to Gujarat's industrial economy.

- Agro-based and food-processing industry: Gujarat has abundant natural resources in terms of varied soil, climatic conditions and a diversified cropping pattern suitable for agricultural activities. It has the highest production figures in the world for castor (67 per cent), fennel (67 per cent), cumin (36 per cent), groundnut (8 per cent), and guar seed (6 per cent). The state has also emerged as the leader in several other sectors such as dairy, fisheries, animal husbandry, traditional horticulture and floriculture. Gujarat is keen to promote the agro-processing industry, which currently consists of small and medium enterprises producing a wide variety of products. It has about 16,400 small enterprises in food processing, beverage and tobacco processing. The agro-processing sector accounts for a significant proportion of Gujarat's working population.

- Chemicals and petrochemicals: Gujarat's chemicals and petrochemicals industry is one of the fastest growing sectors in the state's economy and accounts for half of the annual investment in the state. The diverse chemical industry of Gujarat offers the complete portfolio of chemical products, including petrochemicals and downstream, pharmaceuticals, dyes and intermediates. The state contributes 15 per cent of the country's chemical exports. The three cracker complexes at Hazira, Vadodara and Dahej have a total installed capacity of 1,180 KTA.
- IT/ITES: According to a new policy and incentive scheme, the state government plans to promote the sector by providing subsidies to investors and creating 10 lakh new jobs. It also aims to increase IT/ITES sector exports from the state to around USD 2 bn per annum.
- Plastic and allied industries: Gujarat is known as the polymer state of India, producing around 70 per cent of the total plastic raw materials of the country. It also produces 55 per cent of polyethylene, 60 per cent of PVC and 63 per cent of PS. Gujarat is a major hub for the manufacture of processing machinery in the country.

In Budget 2015–16, the state government announced plans to invest around USD 458 mn for the growth of the industrial sector and roughly USD 5 mn to develop industrial parks, logistic parks and a park for defence manufacturing units. It has also taken initiatives to set up industrial estates on non-agricultural land after assessing industrial viability. A modified scheme has also been introduced to provide financial assistance to promote and encourage industrial parks by private institutions.

MAJOR EXPORTS

In 2014–15, overall exports from Gujarat were valued at around USD 60 bn. Gujarat accounted for roughly a 19 per cent share in the overall exports of India in the same period. Exports include products from various sectors, such as textiles, petroleum, chemicals, pharmaceuticals, engineering and gems and jewellery. Products exported from intermediate and minor ports include naphtha, petrol, cement, bauxite, salt and food grains. Gujarat's export commodities include

- Chemicals and petrochemicals industry: Gujarat's chemicals sector is one of the fastest growing sectors. The state contributes to more than 20 per cent of India's chemicals output. Exports from this sector are globally competitive and leading destinations include the US, Europe and other developed nations.
- Gems and jewellery: Gujarat contributes to about 72 per cent of the total exports of India. It has a well-established diamond industry and diamond processing and trading units are spread across Surat, Ahmadabad, Palanpur, Bhavnagar, Valsad and Navsari.

- IT/ITES: Gujarat is emerging as a major hub for IT activity through various approved and proposed SEZs. The growth of software exports in Gujarat, at a CAGR of 47 per cent between 1999 and 2005, indicates the potential of the IT sector.
- Cotton: In 2014–15, Gujarat was the largest producer (around 31 per cent) and exporter (60 per cent) of cotton in the country.
- Pharma: Gujarat also contributed nearly 30 to 35 per cent to India's pharma sector turnover and around 28 per cent to India's pharma exports during 2014–15.

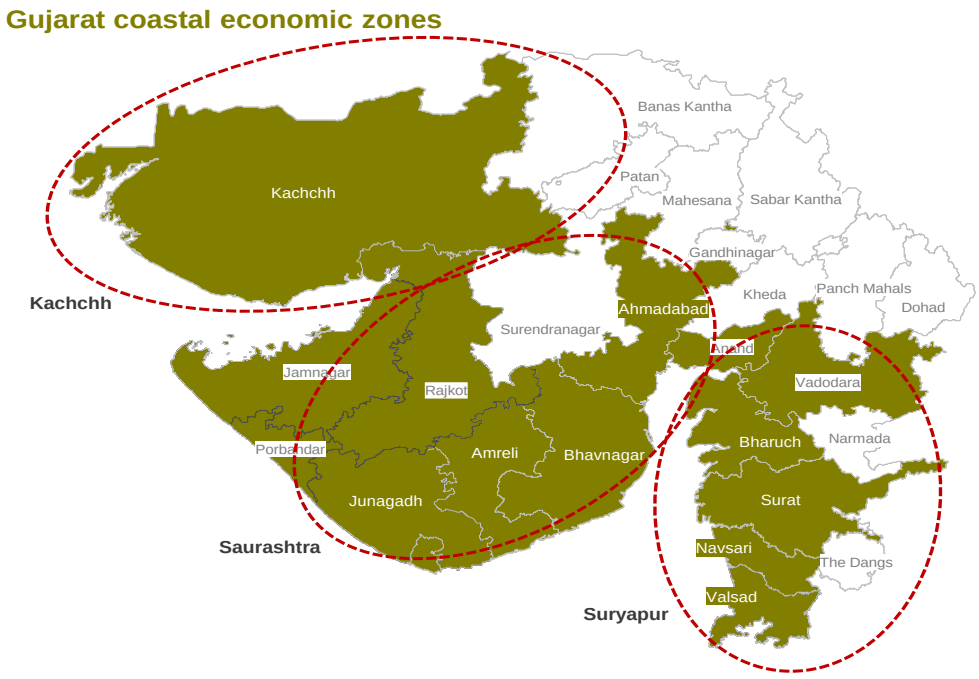
DEVELOPMENT OF SPECIAL ECONOMIC ZONES

As of July 2015, Gujarat had 79 special economic zones (SEZs) of which 18 are operational, 26 are notified, 31 are formally approved and four have in-principle approval. Gujarat ranks first in terms of total area covered under SEZs in India at 6,818.58 hectares (ha). It is also a leading SEZ state with the highest geographical area of 29,423.9 ha under SEZ development.

COASTAL ECONOMIC ZONES

Gujarat can be divided into three coastal economic zones (CEZs): Kachchh, Saurashtra and Suryapur.

EXHIBIT 16



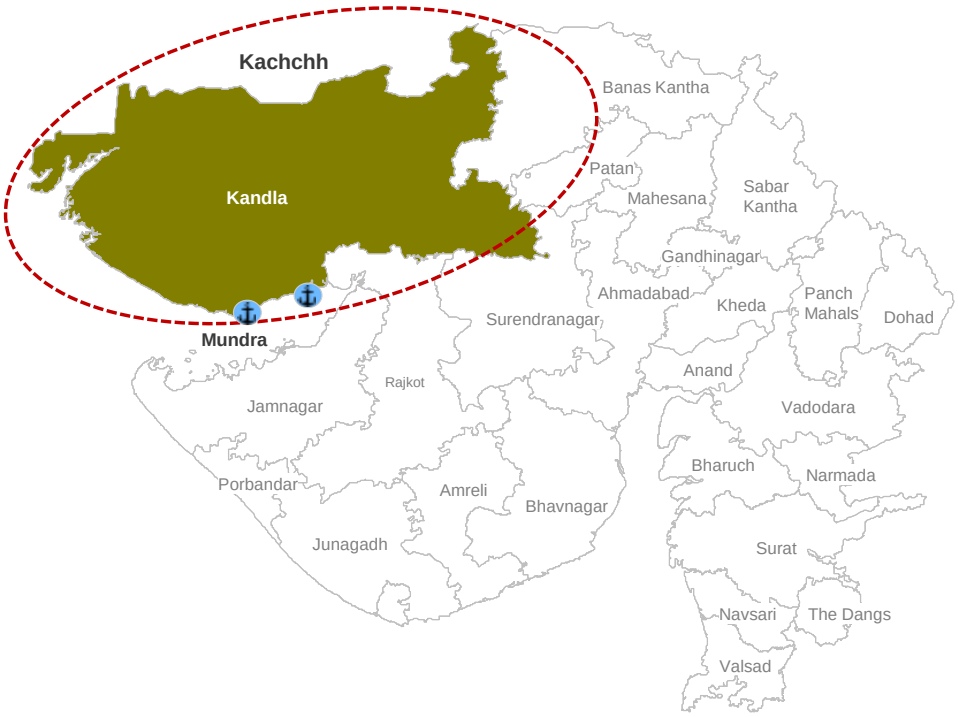
Kachchh Coastal Economic Zone

The Kachchh/Northern Gujarat CEZ covers the district of Kutch and will be spread across a length of nearly 300 km along the coastline of the state. The CEZ covers two key operational ports: Mundra and Kandla (both Kandla and Vadinar). It will serve the hinterlands of India's northern states—Delhi-NCR, Punjab, Haryana, Rajasthan and Gujarat.

The Kachchh district contributes around 4 per cent to state GDP while accounting for 3 per cent of the state's population. The Kachchh area is well known for its production of chemicals and fertilisers with players like IOCL, Reliance and IFFCO having facilities in the coastal region of the state.

EXHIBIT 17

Kachchh coastal economic zone



The Kachchh CEZ is envisaged to promote the existing set of industries in the region and use the strategic location of the state in terms of proximity to one of the key maritime routes in the country. Three high-potential sectors have been identified for Kachchh based on the projected rates of growth, driven by domestic and export demands, comparative advantage from production in Gujarat, and employment generation potential.

Special economic zones & Industrial complexes

The CEZ has two operational manufacturing based SEZ's.

Name of the SEZ	Location	Type of SEZ- Product
Mundra Port and Special Economic Zone (Adani Power Private Limited) (Mundra Port and Special Economic Zone)	Village Mundra, Taluka Mundra,	Multi Product
Euro Multivision Ltd.	District Kutch, Gujarat	Non-conventional energy including solar energy equipments/cell

Kandla port and relevant cargo

Kandla is the largest major port in the country handling more than 90 MTPA of cargo (including the Kandla creek and Vadinar). Kandla is strategically located in the interior part of the northern coast of Gujarat placed perfectly to serve the North and Western hinterlands of the country like Rajasthan, Delhi-NCR, Punjab and Haryana.

Currently the port handles large volumes of POL including ~54 MTPA at Vadinar. Other major commodities include thermal coal, fertilizers, food grains, salt and timber logs.

Major commodities

POL

POL crude and product constitute the biggest portion of traffic handled including both Vadinar and Kandla creek. Kandla handles roughly 2 MTPA of POL while majority of the traffic is at Vadinar. At Vadinar ~40 MTPA of crude is imported for the close by refineries and then after processing roughly 15 MTPA of products are exported including coastal and EXIM. The key refineries served by the crude from Vadinar are IOCL Mathura, Koyali, Panipat, Essar Vadinar and BPCL Bina.

Going into the future due to expansion of these refineries will lead to traffic of roughly 60 MTPA by 2020, 74-76 MTPA by 2025 and 84-92 MTPA by 2035. Crude oil imports are expected to rise to ~51 MTPA considering refinery expansions. LPG imports are expected to increase with government's focus on distribution of LPG connections to rural households. By 2025, there is a potential to coastally ship ~5 MTPA of POL product from Kandla to Maharashtra.

Thermal Coal

Currently the port imports 9.7 MTPA of thermal coal primarily for the consumption of non-power plants (>50% of the overall imports). This number is

expected to grow at a healthy rate of 10-15% given the port already having developed a mega coal terminal at Tuna Tekra and further plans of expansion through a mega bulk terminal outside the creek. We project that going into 2020 the volumes handled by Kandla will be roughly around 18 MTPA, 23-25 MTPA by 2025 and 38-46 MTPA by 2035.

Fertilisers

The port primarily imports fertilizers to serve the Punjab, Haryana and UP hinterlands in the country as shown below. The port imported 4.5 MTPA of fertilizers in FY 15 out of which 0.66 MTPA was rock phosphate (used as a raw material for fertilizer plants), 2.71 is urea (finished fertilizer which is primarily government controlled) and 1.14 MTPA is DAP(finished fertilizers). Going into the future given the proposal of mechanization of 1/2 berths for the import of urea and availability of neem coating facilities with the port. The could potentially handle ~6.1 MTPA of fertilizers by 2020, ~8 MTPA by 2025 and 11-13 MTPA by 2035.

Food grains

Kandla is ideally placed to serve the northern hinterlands to export the key food grains. Primarily wheat and rice are exported from the port of Kandla; these grains are primarily grown in the north and central areas of the country (Punjab, Haryana and MP). In the past few years the exports have steadily declined from roughly 4 MTPA in FY 13 to 2.2 MTPA in FY 15. These volumes could remain stagnant due to pulses and rice moving towards containerization.

Containers

Of the 2.5 Mn. TEU produced in North Western region (NCR+ Punjab) ~50% of the same (1.3 Mn. TEU) are handled by Mundra port at the moment due to an advantage of negative turnaround time, call of mother line ships and strong connectivity. Kandla port has an approximate 60 kms advantage over Mundra for container cargo coming from NCR + Punjab, thus in case of Kandla port being able to establish a container terminal with world class efficiency benchmarks (turnaround time, container clearance, etc.) it could attract a sizeable market share from the Mundra port. The traffic projections of container handling are based on the premise of Kandla port being able to provide efficiency and have a strong port to hinterland connectivity.

Other Localized Commodities

Commodities like Salt and Sugar are produced in the nearby hinterlands of the port which are still one of major drivers of port volumes in the country. Roughly 3 MTPA of salt is exported from Kandla which could increase to ~5 MTPA by 2025 and 8-9 MTPA by 2035. Also 1.5 MTPA of sugar traffic is expected to grow to roughly 2.5-3 MTPA by 2025.s

Port led industrialization

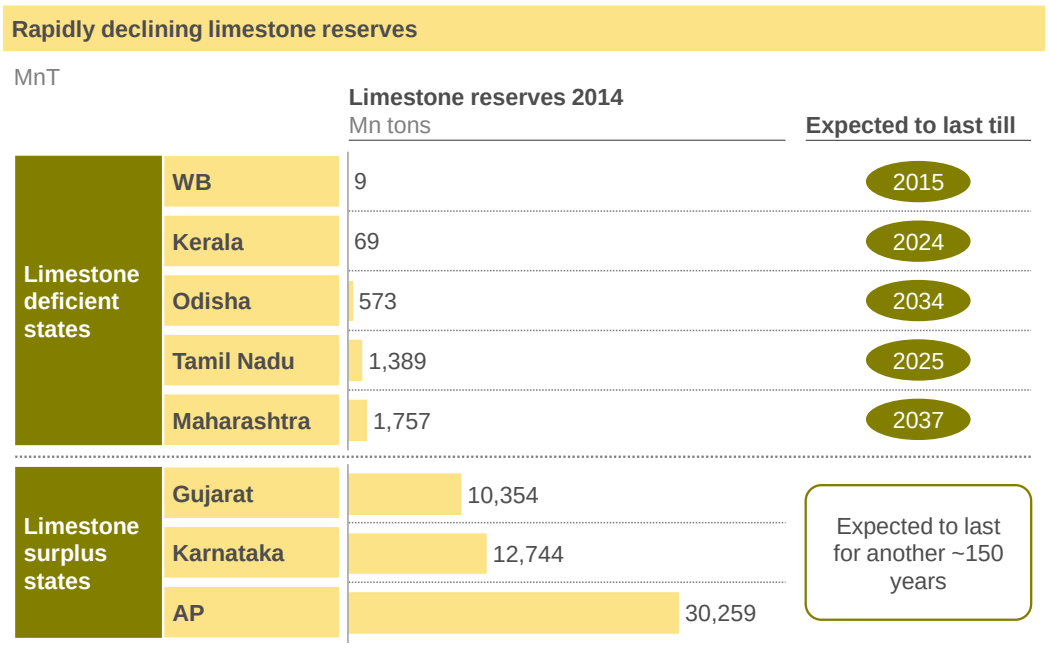
The Kachchh Coastal Economic Zone can have the following components:

■ Cement cluster in Kachchh region

India's geographical diversity endows some states with an excess of natural resources. Limestone—an important raw material in the production of cement—is also unevenly distributed and uneconomical to transport over long distances. Five key maritime states have depleting limestone reserves and will soon have to depend on other states for their cement supply. On the other hand, Gujarat is one of three maritime states having large reserves of limestone that are expected to last at least for another 150 years. A bulk commodity, cement can be easily coastally shipped to meet the deficit of other states.

EXHIBIT 18

Limestone surplus and deficient states



SOURCE: International cement review; Planning commission report

Studies reveal that the most economical mode of serving this demand will be through setting up coastal clinkerisation clusters in Kachchh and grinding units at ports close to demand centres (Mumbai, Cochin, etc.). This configuration would save on average INR 600 per tonne (10 to 15 per cent of total delivered cost of cement) as shown in the exhibit below, compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by lower cost of fly-ash movement (due to better availability at ports), and lower cost of transporting cement to demand centres.

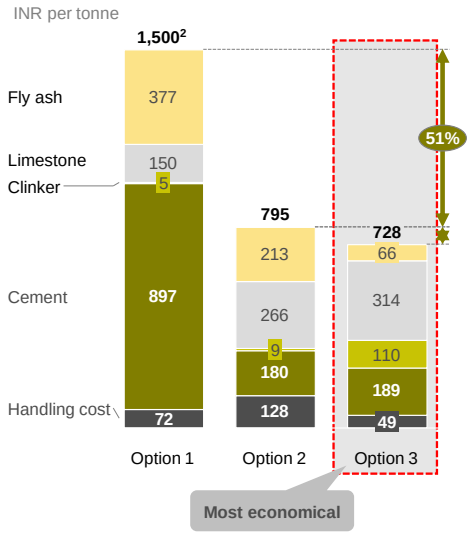
EXHIBIT 19

Coastal clinker capacity with grinding units near coastal demand centers, will be most economical option

Three options evaluated for location of new Cement capacity

Option 1 (Serve through hinterland AP capacity)	▪ Fly-ash: 240 km via road @ INR 3/ton-km, Nellore to Guntur ▪ Limestone: Transported 40 km from pit via road @ INR 3/ton-km to Guntur ▪ Clinker: Transported inside the plant via conveyor belt – @ INR 5/ton ▪ Cement: 400 km via rail @ INR 1.5/ton-km…from Guntur to Chennai by rail
Option 2 (Serve through coastal AP integrated unit)	▪ Fly-ash: 76 Km from Krishna dist. To Macahlipatnam, via road @ INR 3/ton-km ▪ Limestone: Transported 40 km from pit via road @ INR 3/ton-km ▪ Clinker: Transported inside the plant via conveyor belt – @ INR 5/ton ▪ Cement: 450 km via sea @ INR 0.15/ton-km, from Machalipatnam to Chennai
Option 3 (Serve through coastal AP clinker and Chennai Grinding unit)	▪ Fly-ash: 20 km via road @ INR 3/ton-km, from Ennore to Chennai grinding unit ▪ Limestone: Transported 40 km from pit via road @ INR 3/ton-km to clinker plant in Machalipatnam ▪ Clinker: 450 km via sea @ INR 0.15/ton-km, from Macahlipatnam to grinding unit near the Chennai ▪ Cement: 20km via. road @ INR 3/ton-km to demand centers around Chennai

Cement logistics cost for serving limestone demand in Chennai

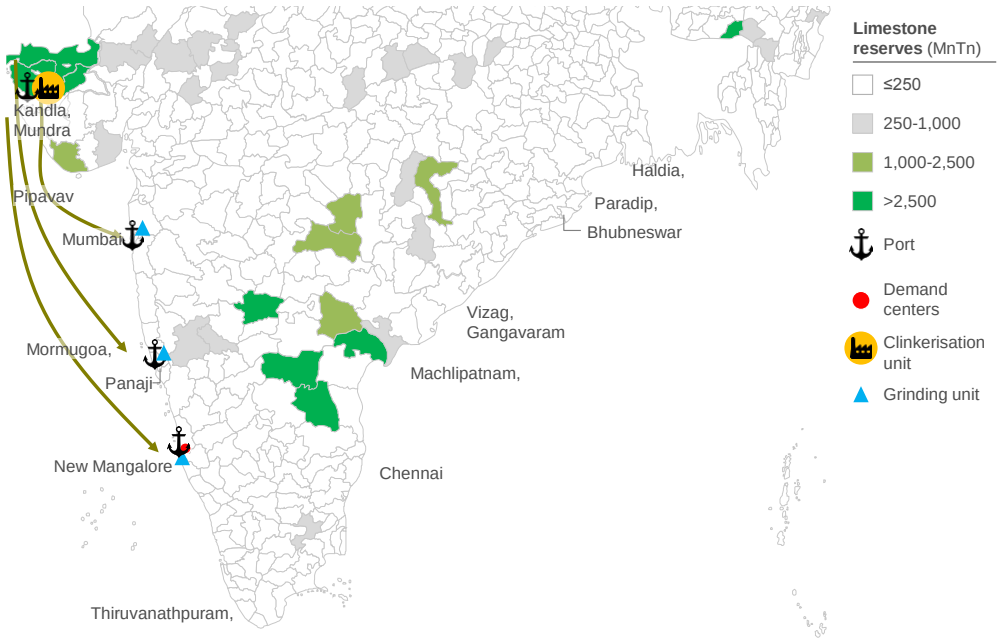


1 Base logistics cost estimated (assuming 25% of total cement cost of INR 6,000/ton) to be INR 1500/ton for hinterland plant, and relatively scaled up for other capacity examples too

The exhibit below shows the probable location for a cement cluster in the Kachchh CEZ—the area already has several units that are coastally shipping to the Maharashtra cluster. This movement can be further enhanced by improving the connectivity of the ports located in these areas. Dredging in the Sewagram area to provide better access to the Sanghi jetty in the region is a key next step to enable larger ships to enter the area and make the economics of coastal shipping even more attractive for suppliers and end customers.

EXHIBIT 20

Kachchh is a potential location for coastal cement clinkerisation clusters with grinding units near demand centres

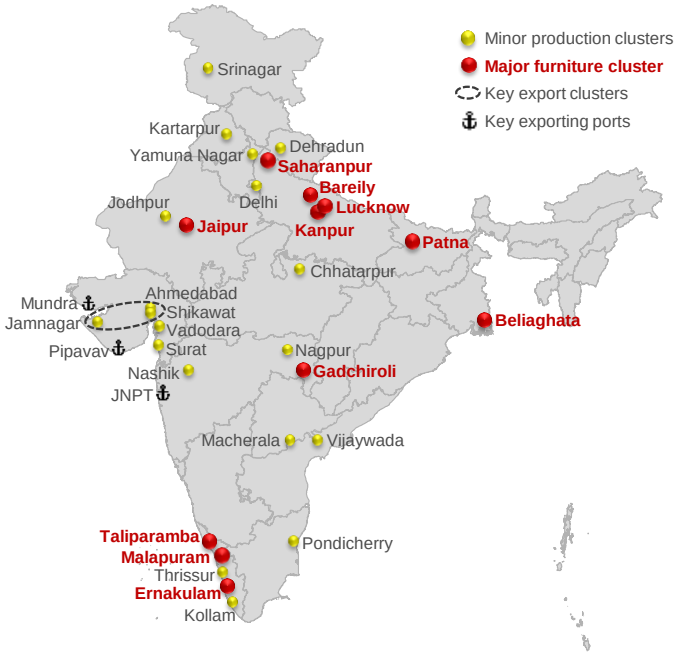


■ Furniture manufacturing hub

The Gujarat cluster is a classic example of the import–re-export industry for furniture. Kandla Port in the cluster imports roughly 70 per cent of all the wood in the country. Which is processed and turned into furniture in clusters outside the city of Kandla and exported using one of the biggest container ports in the country at Mundra. Given existing infrastructure, it will be easy to enable this cluster to export much larger volumes of furniture with institutional support.

EXHIBIT 21

Gujarat is one of the key furniture exporting clusters in India



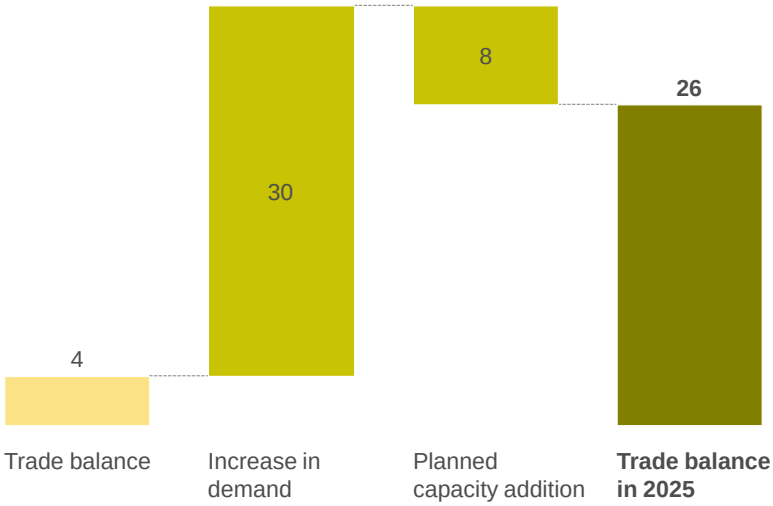
■ Petrochemical plant near Mundra

The consumption of petrochemicals in the country has risen at a consistent rate of around 6 per cent in the last few years. Demand in 2006–07 was around 22 MTPA which rose to around 33 MTPA in 2013–14. As petrochemical demand is strongly correlated to GDP growth in the country, if India's GDP grows by 6 to 7 per cent over the next 10 years, the demand for petrochemicals could be in the range of 60 to 70 MTPA by 2025.

In 2013–14, total installed capacity for petrochemicals production was around 33 MTPA. Operating at around 85 per cent capacity utilisation, the country produced around 28 MTPA of petrochemicals in 2013–14, an increase from 21 MTPA in 2006–07. The rising gap between domestic demand and production of petrochemicals has increased India's dependence on imports. It is expected that around 8 MTPA of petrochemical production capacity may be commissioned in the next 10 years. India is likely to require significant capacity addition to prevent further import dependence. Around 25 MTPA of additional production capacity may be required to eliminate the country's import dependence for petrochemicals. The competitiveness of these plants will need to be carefully examined under various feedstock price scenarios.

EXHIBIT 22

Trade balance in 2025 with planned capacity addition



SOURCE: MLCPCSTAT 14

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed. India produces around 18 MTPA of naphtha, which is around 8 to 10 per cent of refinery crude throughput capacity. As Indian refineries expand capacity from the current around 220 MTPA to around 280 MTPA in 2025, the amount of naphtha produced domestically may grow to around 25 MTPA. Around 20 MTPA of this can be used for petrochemical production in the optimistic case. The domestic gas production was around 25 MTPA in 2013–14, with no significant increase in supply expected in the near future. There is currently around 20 MTPA of operational terminal infrastructure for regasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Projects of around 45 MTPA capacity have been announced to come up in the next 10 years[3].

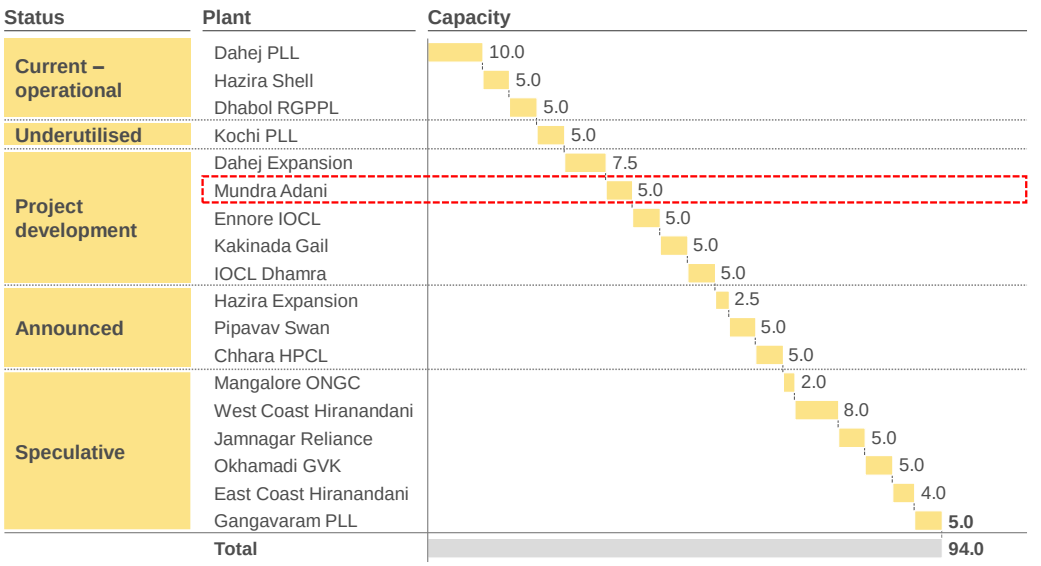
One of these regasification terminals is expected to come up in Mundra. Considering the increased availability of gas in the region, petrochemical plants that use gas as feedstock could come up there.

[3] Natural Gas Infrastructure in India, 2030

EXHIBIT 23

LNG import terminal is expected to come in Mundra

LNG terminal capacity, India; MTPA



1 Expected to be ready by end of 2016/17; 2 Received environment clearance in 2015, pending till completion of Hiranandani facility; 3 Received environment clearance in 2013; 4 In talks with investors; 5 Expected to be ready by 2018

SOURCE: PPAC; press search

Port modernization and connectivity projects

- LPG import terminal at Kandla
- Mechanisation of barge unloading facility at Kandla
- Development of Tuna Tekra container terminal at Kandla
- Development of Tuna Tekra additional bulk terminal at Kandla
- Mechanisation of fertiliser handling facility at Kandla
- Mechanisation of food grains handling facility at Kandla
- RoB on Kandla–Kutch Road

Land parcel availability

District	Land Bank Location [Estate]	Acres
Kutch	Bhuj	117

Also, the Kandla port trust has a significant land bank which can be utilized.

Saurashtra Coastal Economic Zone

The Saurashtra Coastal Economic Zone could potentially include the districts of Jamnagar, Rajkot, Porbandar, Amreli, Junagadh, Bhavnagar and Ahmedabad. These seven districts in Gujarat comprise around 35 per cent of the state's population. The share of these seven districts in the state's GDP is around 40 per cent. The Ahmedabad district itself contributes around 20 per cent to GSDP. While Bhavnagar district is known for its gems and jewellery processing units, Junagadh and Amreli districts have large limestone reserves.

Sikka and Pipavav are the main ports in this region. Pipavav Port is located along the main trade route on the west coast and is used primarily for handling container cargo. On the other hand, Sikka is the largest POL handling port in the country.

EXHIBIT 24

Saurashtra coastal economic zone

Special Economic Zones & Industrial complexes

The Saurashra CEZ has three operational SEZ's.

Name of the SEZ	Location	Type of SEZ-Product
Reliance Jamnagar Infrastructure Limited	Jamnagar, Gujarat	Multi product
Zydus Infrastructure Private Limited	Ahmedabad, Gujarat	Pharmaceuticals

Name of the SEZ	Location	Type of SEZ-Product
Gujarat Industrial Development Corporation	Ahmedabad, Gujarat	Apparel

Along with, multiple industrial estates and complexes:

1. Changodar Industrial Estate
2. The Jhagadia Industrial Estate
3. The Vilayat Industrial Estate
4. The Savli Industrial Estate

Port led industrialization

The Saurashtra CEZ could be further industrialised to make it a more flourishing zone by establishing a few high potential industries in the region.

- **Automotive cluster at Sanand**

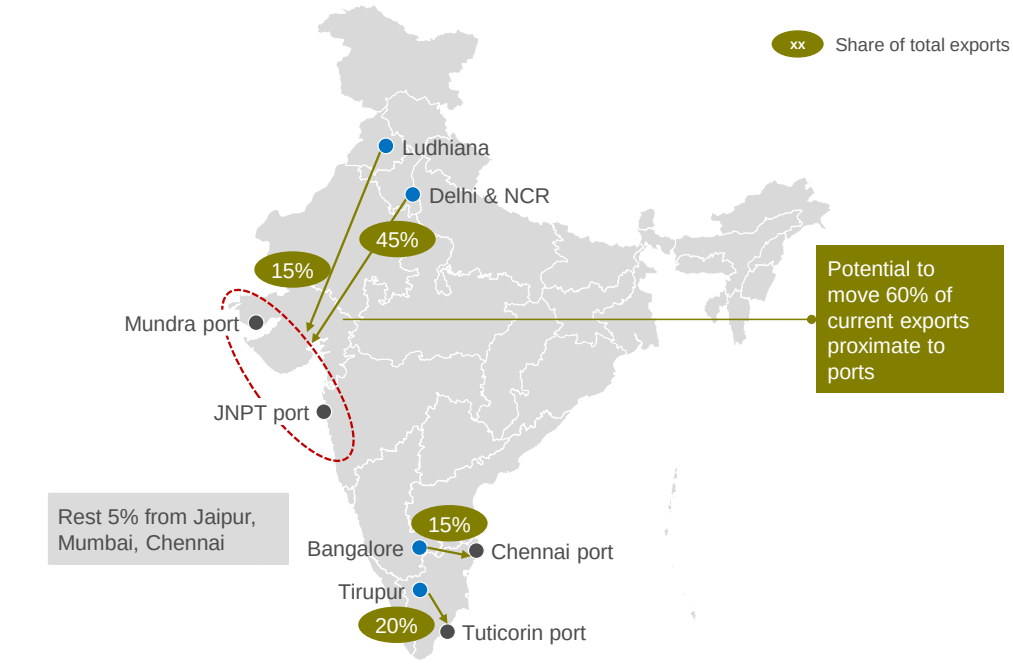
It is optimal for automotive manufacturers to export from port-proximate plants to reduce logistics cost. A significant share of automotive exports happens from the northern cluster far from the coastline. Even though Sanand has come up as a new cluster proximate to the Gujarat ports, it still has a small share in the total exports from India. Considering the relatively nascent stage of the Sanand cluster and potential for expansion, it could focus on export-oriented automotive manufacturing, with adequate linkages to the ports of Mundra and Pipavav.

- **Textile/Apparel park in Saurashtra**

India has a raw material–based competitive advantage in apparel manufacturing—it is the third-largest cotton producer in the world and Gujarat is the highest cotton producing state in India. The cotton produced in Gujarat and Maharashtra region currently moves to North India and finished products are then exported through Gujarat ports.

EXHIBIT 25

Origin–destination pairs for apparel exports in India

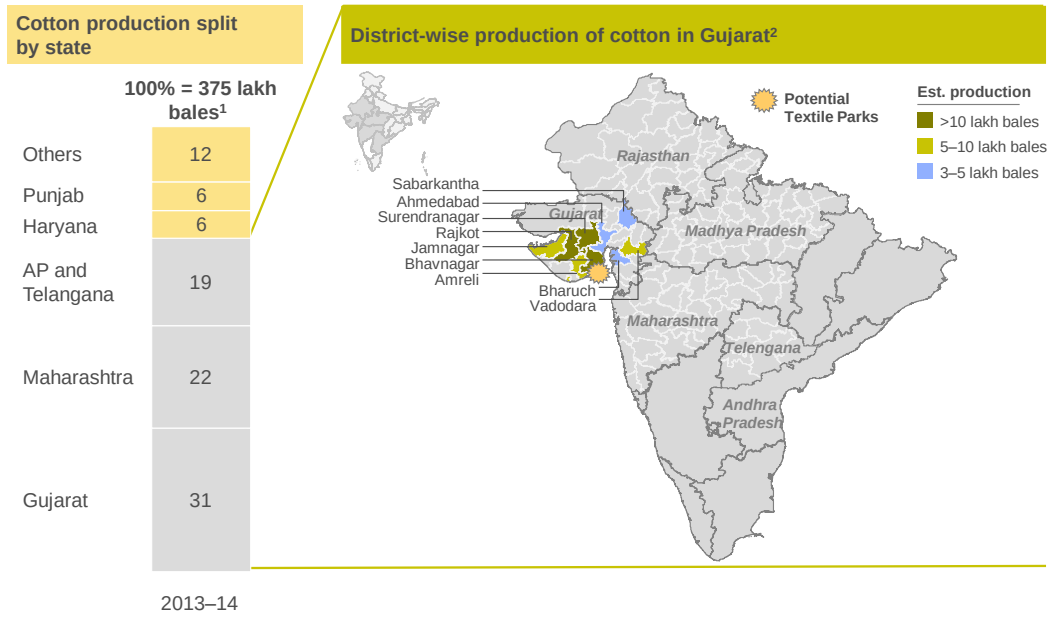


SOURCE: Discussions with industry

Amreli, Bhavnagar, Jamnagar, Rajkot, Surendranagar and Ahmedabad are among the highest cotton-producing districts in India. An export based apparel cluster in the region using the cotton produced in the districts could reduce the overall movement of cotton and corresponding logistic costs. This can improve the competitiveness of apparel exports from the country.

EXHIBIT 26

Potential apparel cluster location



1 of 170kg
2 Based on "Cotton statistics at a glance" published by Directorate of Cotton Development & National Centre for Integrated Pest Management

Port modernization and connectivity projects

- Expressway from Sarkhej (Ahmedabad) to Pipavav
- Connection of Western DFC to Pipavav

Land parcel availability

Rajkot – Bhaktinagar- 89 Acres

In terms of setting up Coastal Economic units under CEZ's, the development can be taken up in a phased process initiating with the districts have larger potential for attracting investments due to already existing industrial muscle and eco-system.

Phase 1 districts: Rajkot, Junagadh,Jamnagar, Ahmedabad

Phase 2 districts: Bhavnagar

Phase 2 districts: Porbandar, Amreli

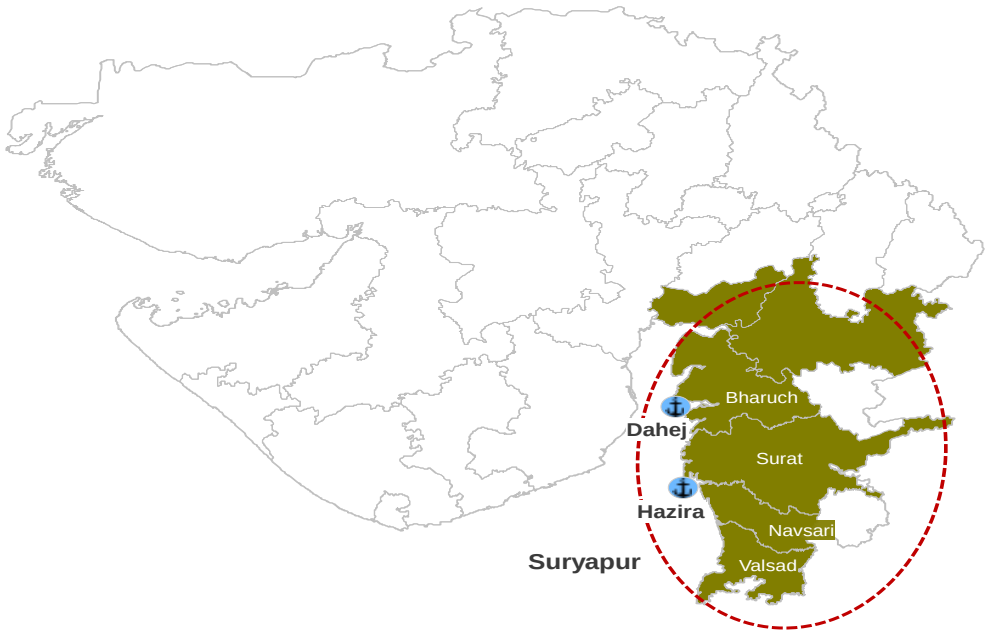
Suryapur Coastal Economic Zone

This CEZ falls under the influence zone of the Delhi–Mumbai Industrial Corridor (DMIC) and could include some of the most prosperous districts in the state—Anand, Bharuch, Surat, Navsari and Valsad. These states combined contribute around 20 per cent of state's population and around 20 per cent of state GDP.

The CEZ has two large non-major ports, Dahej and Hazira. With the presence of GNFC and KRIBHCO, it is also a hub for fertilisers. Halol, on the other hand, is a hub for pharmaceutical products. Surat, the main city in the region, houses the world's largest diamond processing centre. The CEZ is strategically located to serve the export demand of food grains from the North, e.g., Punjab and Haryana, and from Central India, e.g., Madhya Pradesh. Better connectivity with the western dedicated freight corridor (DFC) and a part of the DMIC could lead to an exponential growth in industrial output. However, non-major ports are not well connected via rail to the trunk routes. This will need to be improved to turn the region into a flourishing CEZ.

EXHIBIT 27

Suryapur Coastal Economic Zone

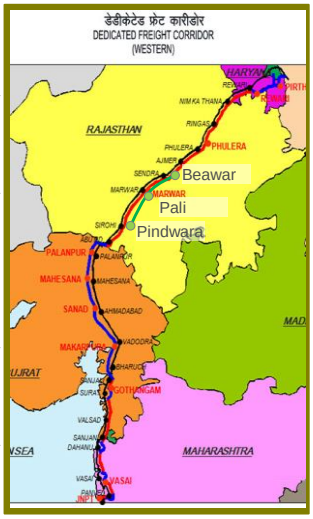


The Western DFC passes through the Suryapur CEZ providing the CEZ a structural advantage of efficient evacuation from the adjacent industrial complexes and zones.

EXHIBIT 28

Western Dedicated Freight Corridor

Major and minor industries in catchment areas	
Location	▪ Covers a distance of 1483 km, JNPT to Dadri via Vadodara-Ahmedabad-Palanpur-Phulera-Rewari ▪ Passes through Haryana (192 kms), Rajasthan (553 kms), Gujarat (588 kms) and Maharashtra (150 kms)
Execution phases	▪ Phase I: Rewari- Vadodara (920 Kms): 2011-2017 (+3 yrs.) ▪ Phase II: Vadodara-JNPT (430Kms): 2012-2018 (+3 yrs.) ▪ Phase III: Rewari–Dadri (140 Kms): 2013-2018 (+3 yrs.)
Freight mix	▪ ISO containers from JNPT and Mumbai Port in Maharashtra and ports of Pipavav, Mundra and Kandla in Gujarat destined for Inland-Container depot's in northern India ▪ POL, Fertilizers, Food grains, Salt, Coal, Iron & Steel and Cement are the likely commodities moving on the route
Timelines & Status	▪ Was expected to be completed by 2019-2020 ▪ Running delayed, 900Km expected to be complete in the next 5 years ▪ 94% land acquired already
Funding & Contractor	▪ JICA (Japan International co-operation agency) has agreed to fully fund the project ▪ L&T- Sojitz has recently won the E&C contract



SOURCE: Capex CMIE database; Web and press search; Team analysis

The CEZ contains 3 operational multi-product SEZ's which could act as throughput generators for the neighboring ports.

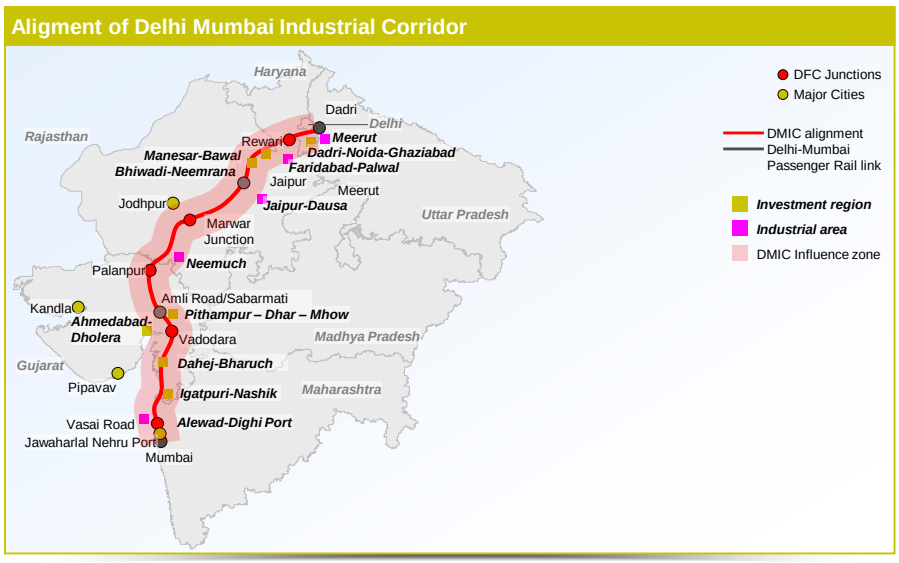
Name of the SEZ	Location	Type of SEZ-Product
Dahej SEZ Limited	Taluke Vagra, District Bharuch, Gujarat	Multi Product
Jubilant Infrastructure Limited	Villages Vilayat and Vorasamni, Taluka Vagra, District Bharuch, Gujarat	Chemical
Sterling SEZ and Infrastructure Limited	Jambusar, District Bharuch, Gujarat	Multi Product

Also, Bharuch region has been identified as the site for the Gujarat PCPIR; which could attract investments and create employment opportunities for the local communities.

In addition, the Delhi- Mumbai Industrial Corridor is also planned along with the DFC and if developed to full potential could act as a pivot to the economy of the CEZ. Delhi Mumbai Industrial Corridor is conceived to be developed as a Model Industrial Corridor of international standards with emphasis on expanding the manufacturing and services base and develop DMIC as the 'Global Manufacturing and Trading Hub'. Multiple investment regions (as shown in image below) have been planned as part of the project, to be executed under multiple phases.

EXHIBIT 29

DMIC



SOURCE: DMIC Website

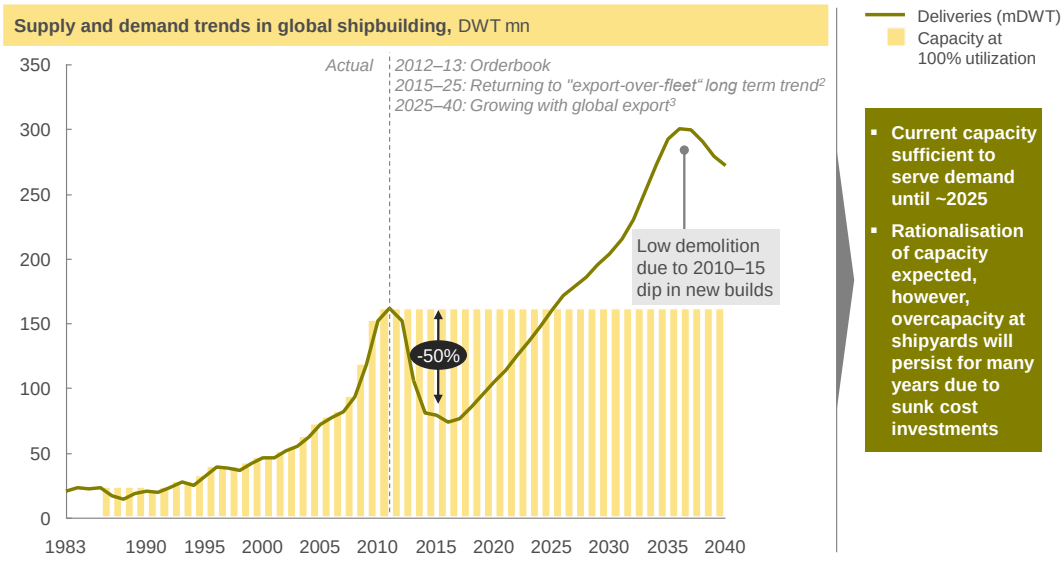
Port led industrialization

■ Shipbuilding cluster

Shipbuilding is a cyclical industry and is currently on a downturn, with excess capacities globally. After the peak in deliveries in 2011, the industry's output is decreasing and reached 91.2 mn DWT in 2014. However, strong demand is expected in the long term, driven by shipping companies' move towards ultra-large vessels, demolition of the old vessel fleet and growth in global exports. This demand is expected to go up to around 150 mn DWT by 2025 and around 300 by 2035.

EXHIBIT 30

Globally, overcapacity at shipyards expected next years, however, strong growth in the longer term is expected



1 Capacity measured as maximum output last 5 years. Capacity at 2011 level in forecast period
2 Oversupply eliminated and shipping market returning to supply-demand balance
3 Fleet growing with global export from 2015, demolition estimated using average 25 year lifetime and

SOURCE: Clarksons; Global Insight; expert interviews; team analysis

India could target 3 to 4 mn DWT shipbuilding industry by 2025, through a combination of some smart choices and government support. Indian shipyards are competent at building smaller size/specialty vessels. They could focus on building specialty and coastal vessels of lengths less than 80 m (e.g., offshore supply vessels, anchor handling tugs, etc.). Opportunities in the defence sector, growth in coastal shipping, and replacement of the existing vessel fleet could the drivers of growth of the shipbuilding industry in India. The cyclical nature of the shipbuilding industry also makes it important to complement shipbuilding with ship-repair facilities.

EXHIBIT 31

Defence: ~USD 23 bn orders under execution and ~USD 51 bn in pipeline

Surface ships

Present orders		Future orders (3-5 years)[3]	
Project	App. value INR cr	Project	App. value INR cr
P15B[1], P17 A[1]	55,000	16 ASW SWC	15,300
6 CG OPVS, 2 SLOPVs, 2 FPV & 11 FICs, MCMV[2]	37,500	Next Gen Missile Boats	12,000
4 ASW Corvette, 8 LCU MK-IV, 4 WJFACs, P17A[1]	28,500	Next Gen Corvettes	24,500
IAC* , 20 CG FPV	3,100	Next Gen Frigates	35,000
IPVs/Midget Submarines	4,000	Next Gen Destroyers	50,000
5 NOPVs	2,500	04 Survey Vessels – Large	3,500
3 Cadet Training Ships	485	Survey Vessel (trg)	2,500
6 Survey Vessels	800	02+02 LPD Vessels	14,500
15 Interceptor Boats	270	Fleet Support Ships/Other Support Vessels	9,000
54 Interceptor Boats, 7 CGOPVs, Floating Dock	2,500		
80 FICs	150		
~USD 20 bn opportunity		~USD 25 bn opportunity	

Submarine

Project	App. value INR cr	Project	App. value INR cr
P 75[1]	10,000	P-75 I	75,000
Nuclear Submarine SSBN[1]	10,000	Other Submarine Projects	>10,000
~USD 3 bn opportunity		~USD 26 bn opportunity	

1 EDC 2022; 2 EDC 2025 3 To be implemented from 2020–2030

SOURCE: Expert interviews; Ministry of Defence, Ministry of Shipping

Logistics costs are a significant component of the overall costs in shipbuilding, automotive, etc., and steel is a major raw material for these downstream industries. Considering the port linkages, it is optimal for these industries to be co-located. Steel contributes 25 to 30 per cent of the cost of a newly-built ship while the engine contributes another 15 to 20 per cent.

There is merit in evaluating Gujarat as a potential location for a shipbuilding cluster due to the presence of a shipyard at Pipavav, Hazira and Dahej and ship-breaking yard at Alang. The cluster could leverage the existing ecosystem created by the already existing shipyard and ship-breaking yard and the proximate steel cluster at Hazira for supply of steel. Shipyards also require a silt-free, dredge-free site with a clear approach from the sea and a minimum draft of 10 m. Gujarat has multiple ports with deep drafts including Dahej and Hazira.

Port modernization and connectivity projects

- Ro–Pax ferry services between Gogha and Dahej in Gulf of Cambay
- Connection of western DFC to Hazira

Besides the above mentioned projects, steel plants in the region could be expanded as brownfield expansion projects.

In terms of setting up Coastal Economic units under CEZ's, the development can be taken up in a phased process initiating with the districts have larger potential

for attracting investments due to already existing industrial muscle and eco-system.

Phase 1 districts: Surat, Vadodara, Valsad, Bharuch

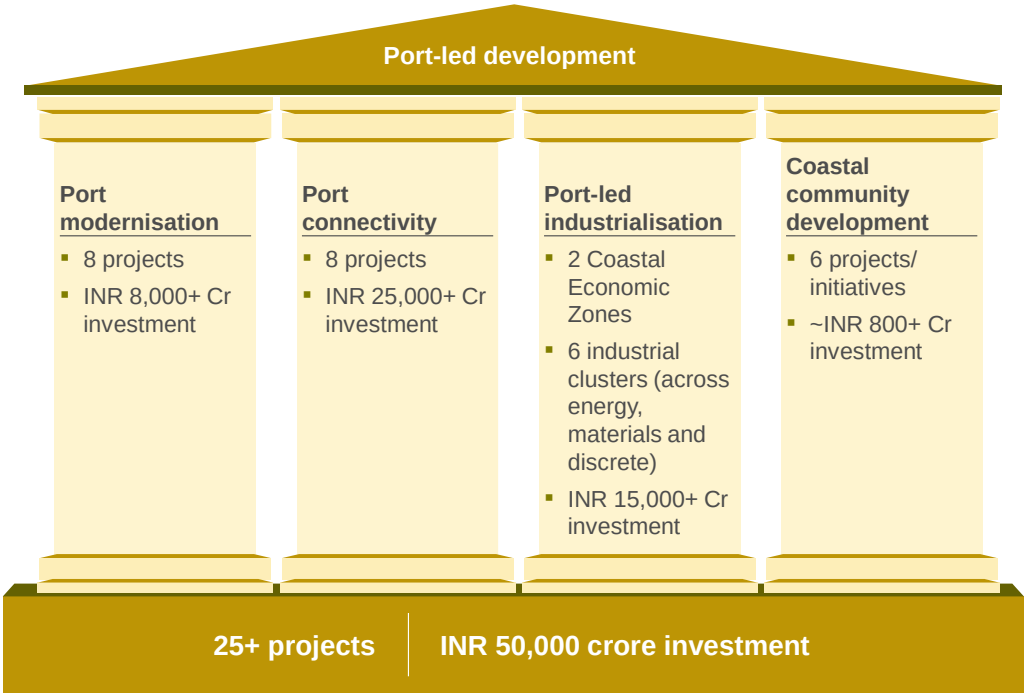
Phase 2 districts: Navsari, Anand

IMPACT

The Sagarmala National Perspective Plan classifies the above mentioned more than 25 projects under the four pillars of port-led development. These projects will require investments of INR 50,000 cr. The industrial clusters could generate 8 to 10 lakh jobs in the next 10 years.

EXHIBIT 32

Sagarmala: Port-led development



KARNATAKA CEZ PERSPECTIVE PLAN

Karnataka[4] has a coastline of ~300 kms between Mangalore in Dakshina Kannada district and Karwar in Uttara Kannada district. The state 10 ports of which New Mangalore port is classified as a major port. The ports handled ~40 MTPA of cargo in 2014-15.

During the 11th five-year plan period, the state's economy grew by 8 per cent. The state has a history of successfully introducing several industrial and technological initiatives.

The state is investing significantly in industrial infrastructure, such as setting up industrial clusters, SEZs and PPP projects to provide an impetus to further industrial development. According to an announcement in September 2015, Karnataka's cities of Mangaluru, Belagavi, Shivamogga, Hubballi-Dharwad, Tumakuru and Davanegere are to be developed as smart cities.

CURRENT ECONOMIC SCENARIO

With just 5 per cent of the country's population, Karnataka contributes to 6 per cent of India's GDP, 7 per cent of the fixed capital and 13 per cent of exports. The state GDP of INR 3,68,967 cr in 2015–16, at constant prices, has grown at around 5 per cent over the last few years. Karnataka occupies fifth place in terms of attracting private sector investments in India.

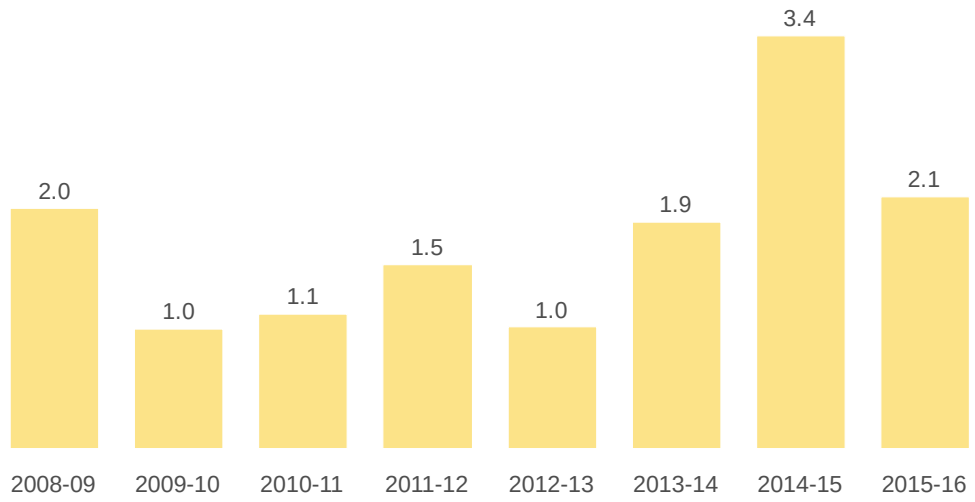
Successive state governments have recognised the importance of industries in the state and have provided a conducive business environment to attract domestic as well as foreign entities. The state government also actively encourages public–private partnerships. According to the Department of Industrial Policy and Promotion (DIPP), between April 2004 and June 2015, cumulative FDI inflows into the state were around USD 18.31 bn—the fourth highest in the country after Maharashtra, Delhi and Chennai—representing 7 per cent of India's cumulative FDI inflows.

[4] All the information in the introduction until "Exports" has been sourced from *Karnataka: The Silicon Valley of India*, a report by the India Brand Equity Foundation and the *Karnataka State Industrial Profile of Maharashtra 2015–16*.

EXHIBIT 33

FDI equity inflows, 2008-09 to 2015-16

US$ billion



MAJOR INDUSTRIES

Karnataka has been spearheading the growth of Indian industry, particularly high-technology industries such as electrical and electronics, information and communication technology (ICT), biotechnology and, more recently, nanotechnology. It is considered one of India's most industrialised states, comprising large public sector industrial undertakings as well as privately-owned industries, e.g., steel, sugar and textiles. It has also recently emerged as the leader in information technology and biotechnology to provide opportunities for industrial development and enable scope of large-scale local employment through private sector.

The state has also evolved as the manufacturing hub for some of the largest public sector industries in India. Hindustan Aeronautics Limited (HAL) employs over 9,500 people, making it one of the biggest public sector employers.

Karnataka's industrial policies have attracted companies to set up their R&D centres in the state. Bengaluru has about 401 R&D centres, the highest concentration anywhere in India. Some of the industrial sectors in Karnataka are:

- Information technology: Karnataka is India's leading IT hub with Bengaluru as the second-largest technological cluster worldwide, after Silicon Valley. Karnataka has 47 IT/ITES SEZs, three software technology parks and dedicated IT investment regions. More than 400 of the global Fortune 500 companies outsource their IT services to Bengaluru. Some of the leading global IT companies have their offices in Bengaluru, including Infosys,

Wipro, Tata Consultancy Services, Oracle, Dell, IBM, Microsoft, Accenture and Cognizant. As of 2014–15, around 85 chip design houses and over 370 R&D institutions provided direct employment to over 10 lakh people and indirect employment to more than 25 lakh people.

- Biotechnology: Karnataka is known as the biotech capital of India. It houses nearly 60 per cent of the country's biotech units and has a large array of biotech-related educational, R&D institutions and enterprises. There are more than 200 biotech firms with BIOCON as the first to go public, as well as a rapidly growing number of promising startup companies. It contributed 26 per cent to India's biotech revenues including high export revenues and domestic sales. India's biotechnology industry is expected to reach USD 100 bn by 2025, with Bangalore forming a significant part of it. The sector employs approximately 19,000 scientists, including around 15.6 per cent women.
- Telecommunications and electronics: Karnataka has excellent telecom infrastructure with 140 of its 170 towns connected by Optic Fibre Cables (OFC) network. Bengaluru district is the major hub of this sector. The districts of Hassan, Tumkur, Mysore, Mangaluru and Shimoga are the other new destinations that promote electronics and hardware industries.
- Automotive: Karnataka has a vibrant auto industry with investments of around USD 713 mn and annual revenues of USD 604 mn. It is the fourth-largest state in India in terms of automotive production and is recognised as a second major hub for automobile production. The sector grew at a CAGR of 15 per cent from 2009 to 2014. Bosch India, the world's largest automotive supplier, has had its headquarters in Bengaluru since 1953. The main locations for automobile industries are Bengaluru, Ramanagara, Kolar, Shimoga, Dharwad and Belgaum. It also has three auto clusters, one industrial valve cluster and one auto component cluster. Two manufacturing hubs are being developed in the Narsapur and Vemagal industrial areas in Kolar District. General Motors Technical Centre, located in Bengaluru, is actively involved in the research, design, analysis and development of vehicles and power trains. The component industry caters to OEMs.
- Textiles: Karnataka contributes over 20 per cent of the national garment production and 45 per cent of the national raw silk production. It is a major apparel sourcing destination for the global market, with around 386,000 manufacturing units (organised and unorganised). The state has 105 skill development centres and 240 private training centres funded by the Department of Handlooms. It is one of the leading producers of the key raw materials required for textile manufacturing units. According to the New Textile Policy 2013–18, the Karnataka government is planning to invest USD 1,650 mn in the sector and incentivise investments such as credit-linked capital subsidy, entry tax reimbursement and power subsidy.
- Aerospace: The state has been seen as the pioneer in the Indian aerospace industry after the establishment of Hindustan Aeronautics Limited (HAL) in Bengaluru in 1940. It produces over a quarter of India's aircraft and spacecraft. The state government plans to invest around USD 1.7 bn to

develop an aerospace park spread over 1,000 acres near the Bengaluru International Airport (BIAL). The park is expected to be operational by 2017. Karnataka is the first Indian state to announce an aerospace policy, which has identified an investment potential of USD 12.5 bn in this sector in the period from 2013 to 2023 and plans to develop aerospace clusters in different regions of the state.

- Chemicals and petrochemicals: Karnataka has been trying to position itself as a major growth centre for the chemical industry with the presence of around 500 companies, such as MRPL and BASF. Mangaluru is evolving as the focal point of all chemical and petrochemical industries in the state. Mangalore Refinery and Petrochemicals Limited (MRPL), the state's leading player and public sector refinery, is undergoing major expansion in refinery capacity from its current 9 mn ton to 15 mn ton.
- Renewable energy: Renewable energy contributes nearly 30.9 per cent of the state's installed power capacity. Karnataka is endowed with high renewable energy resources and potential, estimated at 30.2 GW, primarily from wind, solar, small hydro, co-generation and biomass sectors. The government has allotted projects of 19,284 MW, amounting to nearly 64 per cent of the total potential. Through the Renewable Energy Policy, the state plans to set up renewable energy economic zones by procuring 10 per cent of the land proposed for SEZs and dedicating it for renewable energy.

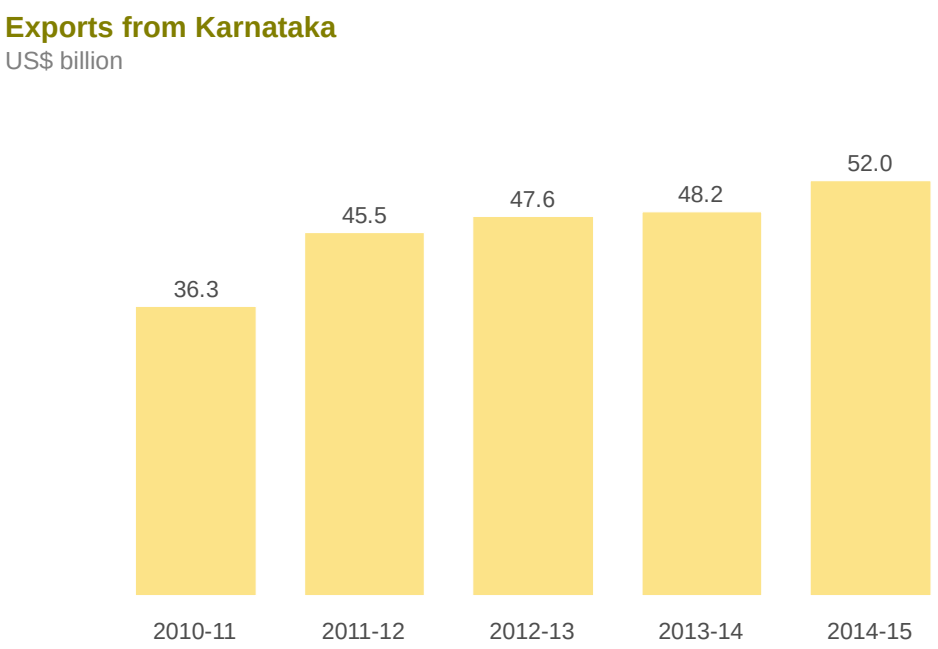
MAJOR EXPORTS

Karnataka has a long tradition of overseas trade. While it has historically been a major exporter of coffee, spices, silk, cashew nuts and handicrafts, over the last two decades it has emerged as a major exporter of commodities such as electronics and computer software, engineering goods, readymade garments, petrochemicals, gems and jewellery, agro and food processing products, chemicals, minerals and ores and marine products.

Karnataka has many incentives and concessions for exports including exemption from entry tax, refund of certification charges as well as cost incurred for export consultancy/market intelligence studies, brand promotion and quality assurance and market development assistance for trade promotion and overseas trade delegations. As of March 2015, the state had around 27 SEZs engaged in exports of IT/ITES services, electronic hardware, pharma, textile, food processing, aerospace and defence, engineering products and biotechnology.

As of 2014–15, total exports from Karnataka reached around USD 52.02 bn, approximately 13.01 per cent of India's total exports. The state's exports increased at a CAGR of 9.4 per cent from 2010–11 to 2014–15.

EXHIBIT 34



- Karnataka is India's largest software exporter. Exports of IT and electronic products reached around USD 32.19 bn in 2014–15, and accounted for 40 per cent share in India's total exports IT and electronic products exports and 62 per cent share in Karnataka's overall exports as of 2014–15. In 2014–15, the domestic production of electronic hardware stood at USD 42.40 bn whereas the export was USD 32.18 bn.
- The engineering segment is the fastest growing sector of the state, seeing a 21.3 per cent CAGR growth between 2010–11 and 2014–15. Exports of engineering products increased from USD 1,605 mn in 2010–11 to USD 3,476.8 mn in 2014–15. The state is exporting engineering products to Germany, China, South Korea, Brazil, the US, Malaysia, Thailand, South Africa and Singapore. Exports include machine tools, industrial machinery, cutting tools, castings, automotive components, electrodes, welding equipment, construction and earthmoving equipment, and helicopter spares.
- Karnataka leads in the exports of silk in India accounting for approximately 25 per cent of the total Indian export market.
- Export of agriculture and processed food in the state grew at a CAGR of 11.8 per cent between 2010–11 and 2014–15. The export value increased from USD 146.9 mn in 2010–11 to USD 229.4 mn in 2014–15.

Investment opportunities

"Invest Karnataka" is a platform where the best minds across industries meet, exchange ideas and drive forward the state's vision of prosperity for all—

employing technology, innovation, inclusivity and sustainability as key factors for development. Over the years, this event has come to signify successful partnerships and comprehensive and sustained developments. Invest Karnataka 2016 (held in February) successfully concluded with more than 1,000 approved projects and MoUs valued at INR.3,08,810 cr. MoUs and investments were signed across sectors for companies setting up units in the state.[5]This was the culmination of several months of effort by the state government, which organised road shows at several Indian cities in India as well as worldwide.

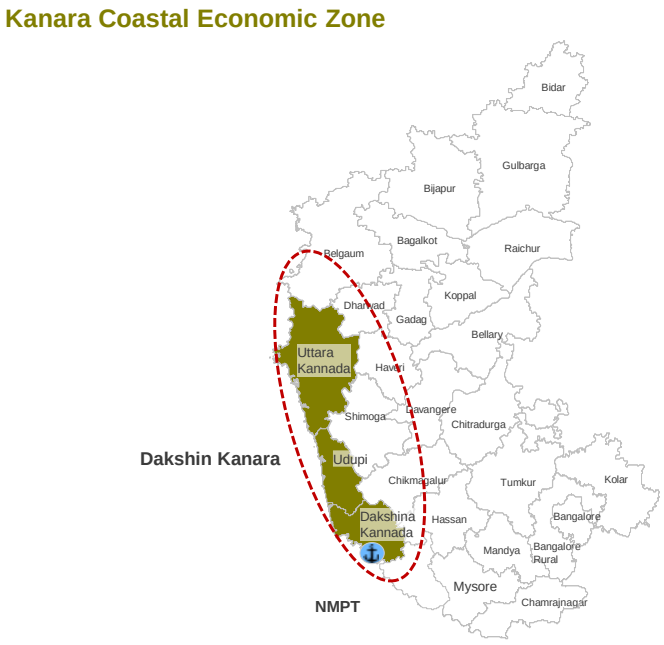
COASTAL ECONOMIC ZONE

The coastline of Karnataka stretches 300 km between Mangaluru in Dakshina Kannada district and Karwar in Uttara Kannada district along the eastern shore of the Arabian Sea.

The Kanara Coastal Economic Zone in Karnataka could cover three districts of the state: Dakshina Kannada, Udupi and Uttar Kannada. These districts cumulatively contribute around 19 per cent to the total state GDP and 9 per cent to the state population.

The CEZ includes a major port, Mangalore, which handled around 37 MTPA of cargo in 2014–15 (of which POL and coal formed the majority share). The volume of POL cargo handled at the port is expected to grow from 23 to around 30 MTPA in the next 10 years. This will be primarily due to the augmented refining capacity of the Mangalore refinery. The port also handles around 8 MTPA of coal with the Udupi power plant as the primary customer for imported thermal coal. There is limited scope for additional traffic of coal volumes at New Mangalore Port Trust (NMPT), mainly because of connectivity issues to Bellary and Hospet (Shiradi Ghat). The Udupi power plant is likely to push coal volumes to around 9 MTPA by 2020 and around 13 MTPA by 2025.

EXHIBIT 35



Special Economic Zones and Industrial complexes

Karnataka has three dedicated industry bodies Karnataka State Industrial and Infrastructure Development Corporation, Karnataka Industrial Areas Development Board and Karnataka State Small Industries Development Corporation which contribute towards operating industrial complexes in the state.

The Kanara CEZ will have two operational SEZ's:

Name of the SEZ	Location	Product
Aspen Infrastructures Limited	Nadasalu, Nandikooru, Polimaru and Hejamadi villagesin Udupi Taluk, Karnataka	Hi-tech Engineering Products and related services
Mangalore SEZ Limited	Baikampady Near Mangalore, Dakshina Kannada District, Karnataka	Multi Product

The CEZ will also benefit from the presence of around 12 industrial complexes set up by the industrial bodies:

1. Baikampady Industrial complex

2. EPIP, Ganjimutt Industrial complex
3. Karnad Industrial complex
4. Puttur Industrial complex
5. Thannirbhavi Industrial complex
6. Canara Industrial complex
7. Kushalanagar Industrial complex
8. Shirwad Industrial complex
9. Shivally Industrial complex
10. Nandikur Industrial complex
11. Belupu Industrial complex
12. Miyaru Industrial complex

Also, to accelerate connectivity infrastructure the proposed South-West Dedicated Freight Corridor is proposed between Chennai to Goa is has a node branching to Mangalore from Bangalore.

Apart from the existing infrastructure and industrial nodes, the Sagarmala Programme has identified the following opportunities for Karnataka:

- Karnataka can significantly improve its maritime capacity through three key connectivity projects which will unlock the economic potential of Uttara Kanara
  - Mangaluru–Bengaluru road corridor through Shiradi Ghat
  - Hubballi–Ankola rail link
  - Hubballi–Mormugao rail link via Castle Rock and Tinaighat
- The CEZ could leverage the region's strength in the energy sector.
- There is significant potential for coastal shipping as a key recipient port.
- There is potential for coastal community development through strategic fishing harbours and growth centres.

These opportunities have helped to identify some of the high-potential sectors for the Kanara Coastal Economic Zone.

Port led industrialization

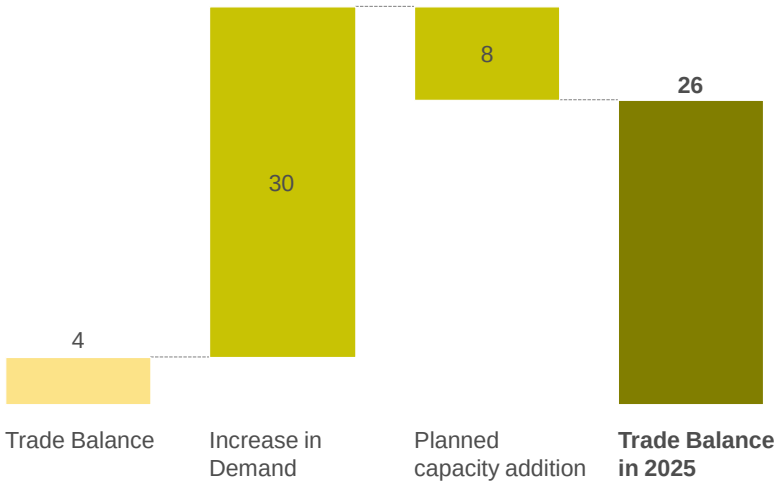
- **Petrochemical manufacturing cluster near Mangalore**

India's consumption of petrochemicals has risen at a consistent rate of around 6 per cent in the last few years, bringing demand to around 33 MTPA in 2013–14. This demand is strongly correlated to GDP growth—if India's GDP grows by 6 to 7 per cent over the next 10 years, the demand for petrochemicals could be in the range of 60 to 70 MTPA by 2025. In 2013–14, total installed capacity for petrochemicals production was around 33 MTPA. Operating at around 85 per

cent capacity utilisation, the country produced around 28 MTPA of petrochemicals in 2013–14, an increase from 21 MTPA in 2006–07. India is increasingly dependent on imports because of the rising gap between domestic demand and production of petrochemicals. Around 8 MTPA of petrochemical production capacity is expected to be commissioned in the next 10 years. India may require significant capacity addition (around 25 MTPA) to curtail import dependence. The competitiveness of these plants will need to be carefully examined under various feedstock price scenarios.

EXHIBIT 36

Trade balance in 2025 with planned capacity addition



SOURCE: MLCPCSTAT 14

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed. India produces around 18 MTPA of naphtha—around 8 to 10 per cent of refinery crude throughput capacity. As Indian refineries expand capacity from around 220 MTPA to around 280 MTPA in 2025, the amount of naphtha produced domestically may grow to around 25 MTPA, with around 20 MTPA of it being usable for petrochemical production (optimistic scenario). The domestic gas production was around 25 MTPA in 2013–14 and no significant increase in supply from domestic sources is expected in the near future. There is currently around 20 MTPA of operational terminal infrastructure for regasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Projects of around 45 MTPA capacity will be undertaken over the next 10 years.

It is also expected that the Mangaluru region may receive gas from either a pipeline from Kochi LNG terminal or from an LNG regasification terminal/FSRU

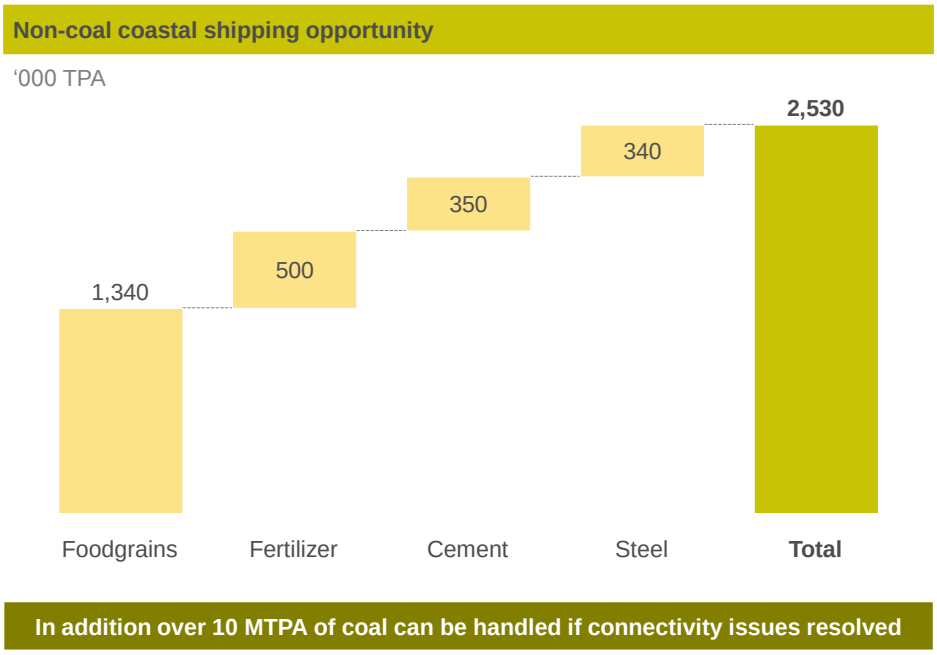
at NMPT. Considering the increasing availability of gas in the region, it could be viable to set up petrochemical plants that use gas as a feedstock, either as an additional facility or through expansion of the existing petrochemical plants in the city.

Port modernization and connectivity projects

Karnataka offers significant potential for coastal shipping. NMPT could act as a receiving port for the state for multiple commodities.

EXHIBIT 37

There is significant potential for coastal shipping in Karnataka



Based on the traffic projections for the port, various port modernization and port connectivity projects have been identified

- Mechanised food grain handling facility at Mangalore: There is a proposal to put up a mechanised grain unloading terminal at NMPT, which will include a mobile tyre-mounted grain unloader, transporting grains through a closed pipe conveyor to storage silos. Stored grains will be evacuated through an automatic grain evacuator and an automatic bagging machine, which will transport bags directly to lorries without any manual handling.
- Mechanised fertiliser handling facility at Mangalore: For clean cargo handling, there is a proposal to provide mobile hoppers, where the grab/ship gear transfers the cargo from the ship to the hopper for truck loading. This arrangement is suitable until the traffic reaches a threshold level of about 1.5 MTPA utilising the potential offered by coastal shipping. To handle any

capacity beyond this level, it has been suggested to fully mechanise Berth 3 for fertiliser handling by adding unloaders (mobile harbour cranes), conveyor belts to feed fertiliser into covered storage facilities and thereafter to the mechanised bagging plant which has bagging and stitching machines.

- New port at Belekeri: A new port could be constructed at Belekeri to cater to the potential coastal shipping traffic. According to estimates, this new port could have around 15.5 MTPA of traffic in 2015 in the base case and around 36 MTPA of traffic in the optimistic case. These figures could rise to around 21.5 MTPA and 64.5 MTPA respectively by 2025. The project IRR (pre-tax) for constructing this new port would be around 14 per cent.
- Major connectivity projects are affecting the potential of Karnataka's ports, e.g., NMPT and Belekeri. Ports in north Karnataka, such as Belekeri, have a rich hinterland:
  - NTPC mega power plant in Kudgi
  - Bellary–Hospet iron and steel cluster

Rail evacuation from port to Hospet and Bellary (Hubli–Ankola link): Ankola on the Konkan Railway is 5 km from the proposed port location at Belekeri. The Hubli–Ankola railway line of 167 km is vital for connectivity to the port, but it needs environment clearances to develop. Recent National Green Tribunal has ruled to permit Indian Railways to submit its proposal to the state government. Some of the other connectivity projects include Bellikeri port to Ankola railway line, four-laning of Shiradi Ghat Road by concretising to ease flow of traffic, and NH169 for conversion of two-lane roads into four-lane roads from Mangaluru to Mudabidri.

A fishing harbour at Kulai near Mangaluru: When NMPT was commissioned, the displaced mechanised fishing vessels belonging to Kulai and nearby villages started operating from old Mangalore fishing harbour. At present, fishing vessels take shelter inside the NMPT during monsoons, impeding port operations, creating security issues and hindering the development of port infrastructure. An alternative fishing harbour is needed, therefore, at Kulai. This will help to address the difficulties of displaced fishermen and provide them a modern fishing harbour with allied facilities in hygiene conditions. There is also a proposal for a Fisheries Growth Centre to develop fisheries at Uppada in East Godavari District, AP and Majali in Uttara Kannada, Karnataka.

Land parcel available

District	Land Bank Location [Estate]	Size [Acres]
Udupi	Nandikur Industrial Area	34.67
Dakshsin Kannada	EPIP IA	52.19
	IT SEZ, Mangalore	44.1

District	Land Bank Location [Estate]	Size [Acres]
	IT Indl.Area- Non SEZ, Mangalore	6.17
	Canara I Phase IA, Mangalore	182.88

In terms of setting up Coastal Economic units under CEZ's, the development can be taken up in a phased process initiating with the districts have larger potential for attracting investments due to already existing industrial muscle and eco-system.

Phase 1 districts: Dakshin Kannada

Phase 2 districts: Udupi

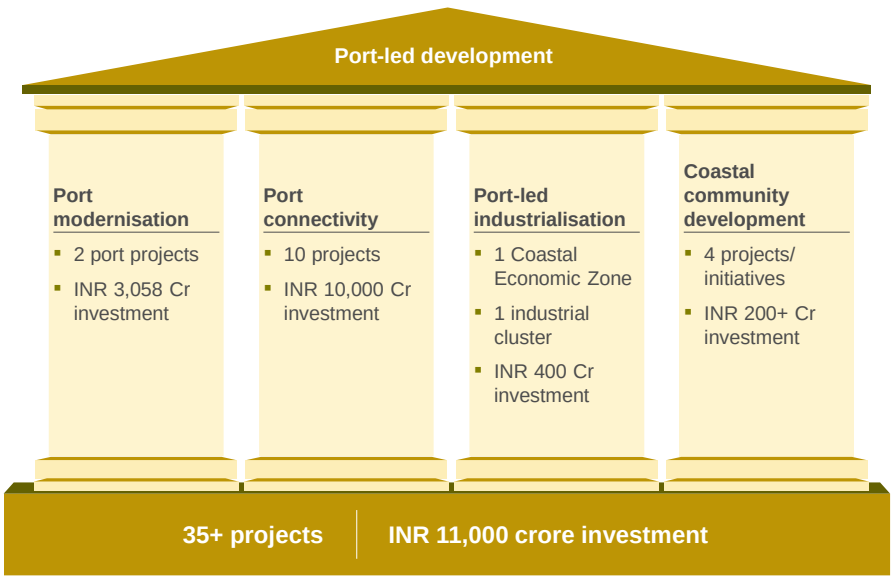
Phase 3 districts: Uttara Kannada

IMPACT

In the Sagarmala National Perspective Plan, the above mentioned more than 15 projects have been classified under the four pillars of port-led development. These projects would require investments of ~INR 11,000 cr.

EXHIBIT 38

Sagarmala: Port-led development



Annexure:

Detailed project notes for all relevant CEZ projects categorized by state attached at the end of the document.

KERALA CEZ PERSPECTIVE PLAN

Kerala has a coastline of 580 KM comprising 9 coastal districts. It has a total of 18 ports including 1 Major Port at Cochin. Kerala currently handles ~22 MTPA of traffic across all ports within the state which mainly includes container and POL cargo.

The state is marked by a high proportion of services in the economy, high level of social development indices and significant amount of overseas remittances

Cochin is a major port among Kerala's 18 ports. The state also has three intermediate and 14 minor ports. Kerala has the first international transhipment terminal in India. Kerala's strategic location on the transnational trade corridor favours investments in key sectors, such as tourism, IT/ITES, manufacturing and mining.

CURRENT ECONOMIC SCENARIO

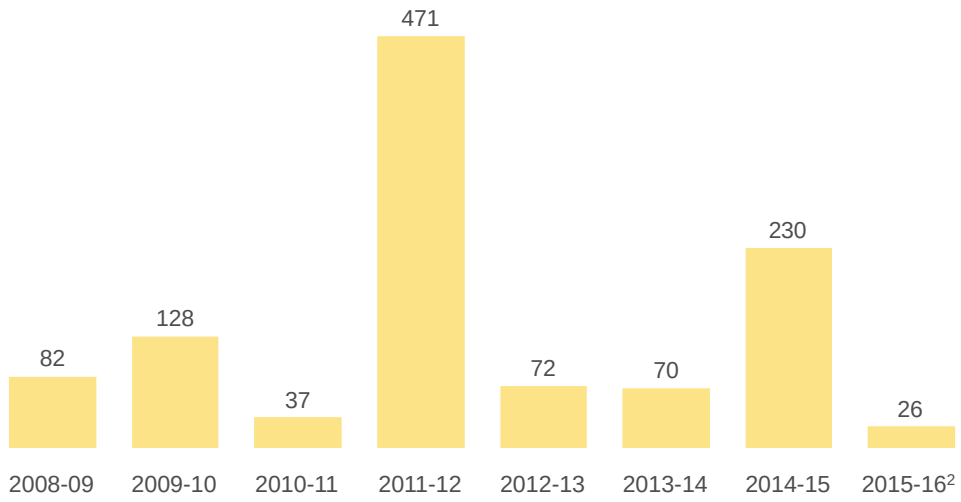
Kerala's GDP in 2015–16, at 2004–05 constant prices, was around INR 2,84,417 crore. It contributed roughly 4 percent to India's GDP. Kerala's services sector contributed more than 75 per cent to the state's economy in 2015–16. The share of the manufacturing and agriculture sector was 17 per cent and 7 per cent respectively.

According to DIPP, FDI inflows into the state (including Lakshadweep) were over USD 1 bn between April 2000 and September 2015.

EXHIBIT 39

FDI equity inflows, 2008-09 to 2014-15[1]

US$ billion



1 Including Lakshadweep, Government of Kerala
2 From April 2015-September 2015

SOURCE: Department of Industrial Policy & Promotion (DIPP)

MAJOR INDUSTRIES

Kerala primarily manufactures rubber, pepper, coconut and coir in India. Traditional industries include handloom, cashew, coir and handicrafts, which have been discussed subsequently. Over 2015–16, the state government proposed an outlay of around USD 310 mn for the growth of agricultural sector. The proposed "Make in Kerala" program could enable domestic and international investments in the state.

- Spices: Kerala is the largest producer of pepper in India, accounting for the main share in the total production. In 2014–15, pepper production was around 40,690 tonne from only 85,431 hectare (ha) of cultivated land. Other spices produced in the state include ginger, cardamom, nutmeg and tamarind. During the annual budget of 2015–16, more than USD 1 bn was proposed for the development of the spices sector.
- Handloom and handicrafts: The handloom sector ranks second (after coir) in providing employment opportunities in Kerala, engaging nearly 2 lakh people directly or indirectly. The industry is dominated by the co-operative sector, covering 94 per cent of the total looms. Industrial entrepreneurs own the remaining 6 per cent of handlooms units.
- Cashew industry: Overall production in India during 2010–11 saw an increase of 6.53 per cent, as it was estimated at 6,53,000 MT against the

production of 6,13,000 MT in 2009–10; ~60% of the production came from the state.

- Coir and coir products: As of 2014–15, the state accounts for approximately 51.7 per cent (in terms of value) and about 84.8 per cent (in terms of volume) of the total coir and coir products produced in India. The coir industry provides employment to around 375,000 people in the state. the state expects to export aroundINR 2,500 in 2016–17. An amount of roughly USD 20 mn has been sanctioned to develop the coir sector by the state government in the 2015–16 annual budget.
- Rubber: Kerala leads rubber production in India. Kottayam is the state's major rubber cluster. It accounted for nearly 70 per cent of India's total rubber production. In 2014–15, rubber production in Kerala was around 507.70 thousand MT against the 648.22 thousand MT during 2013–14. The area under rubber production also increased from 5.482 lakh ha in 2013–14to 5.499 lakh ha in 2014–15. According to the 2015–16 budget, the state government created total tax exemption for rubber wood, and plans to invest more than USD 3 mn to expand the rubber industry in the state. The government also provides tax exemptions on the purchase of rubber in the state.

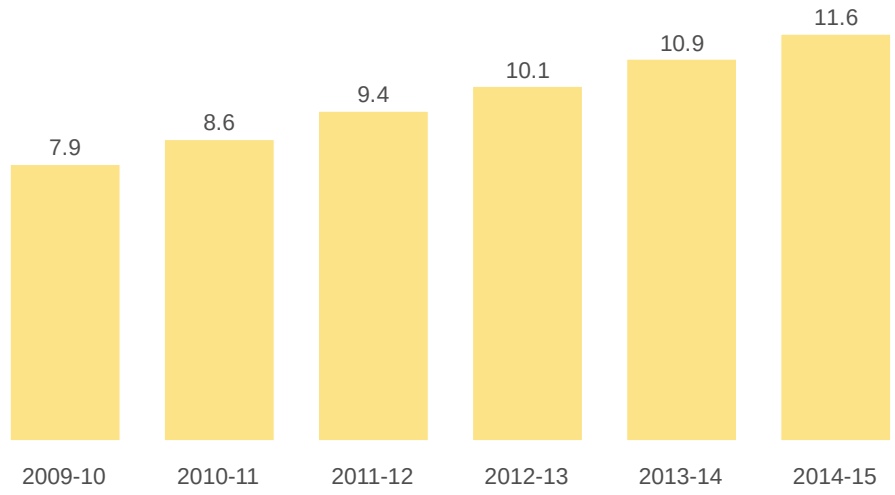
Kerala tourism

Kerala's culture and traditions, coupled with its varied demography and rich natural beauty, have turned it into one of the most popular tourist destinations in the world. Growing at a rate of around 13 per cent, the tourism industry is a major contributor to the state's economy. With the rise in foreign tourists, foreign exchange earnings for 2014 increased by roughly 15 per cent to reach around INR 6,500 crore. During the 2013–14 fiscal year, the total revenue from tourism was estimated at more than INR 24,000 crore, showing an increase of 12 per cent.

EXHIBIT 40

Domestic tourist arrivals in Kerala

US$ million

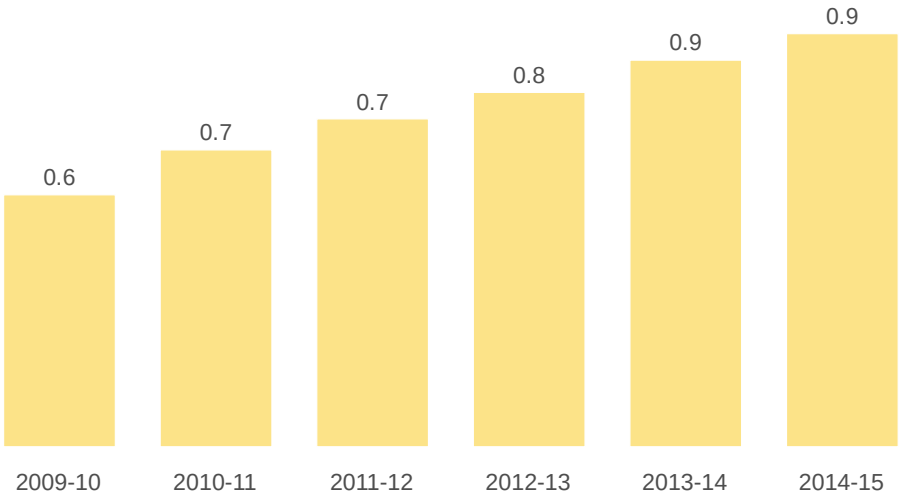


SOURCE: Economic survey 2014-15

EXHIBIT 41

Foreign tourist arrivals in Kerala

US$ million



SOURCE: Economic survey 2014-15

The 12th Five Year Plan offered heavy investments to further develop Kerala's tourism infrastructure. These include: (a) Investment of around USD 1 mn for the Kerala waste-free destination scheme; (b) investment of over USD 2 mn for promotion and marketing activities of the state's tourism sector; and (c) investment of around USD 1 mn for strengthening and modernising tourism institutions.

Industrial and commercial policy

Kerala offers fiscal and policy incentives for businesses under the Industrial and Commercial Policy (amended in 2015), with sector-specific policies with the aim of generating more investments and employment.

In 2015, to aid industrial development further, the state government decided to make certain additional amendments in the existing policies. These include: (a) simplifying regulatory procedures for setting up and operating enterprises; (b) Attracting micro, small and medium enterprises particularly in rural areas to achieve employment generation and utilisation of local resources; (c) Ensuring higher value addition of the locally available resources, and improving industrial, allied and ancillary infrastructure through public and PPP modes; (d) Strengthening the services and commerce sectors and providing in-house employment to skilled and semi-skilled manpower; (e) Introducing globally accepted standards in technology, quality and management to rejuvenate public sector enterprises; (f) Encouraging environment-friendly practices in enterprises; and, (g) adopting a participatory approach in industrial and infrastructure investments.[6]

Forming industrial clusters and developing infrastructure, including rubber parks, electronics hardware parks, coconut industrial parks, organic industrial parks and food processing parks, have been integral to the state's strategies to attract investments in various industries.

MAJOR EXPORTS

The value of exports from the state increased from USD 4,028 mn in 2013–14 to USD 4,220 mn in 2014–15.

6 Kerala: Industrial and Commercial Policy Amended–2015, Department of Industries and Commerce, Kerala

EXHIBIT 42

- Exports of spices, through Cochin and Thiruvananthapuram ports, grew at a CAGR of 7.76 per cent between 2007–08 and 2014–15. As of 2013–14, the overall export of spices from India was recorded as 8,17,250 tonnes, reaching 8,93,920 tonnes in 2014–15, with Kerala as the major contributor. Under the 2015–16 budget, the state government introduced a scheme for encouraging the cultivation of spices and allocated USD 3.32 mn for its implementation. In terms of value, pepper exports from Cochin port were recorded at USD 183.6 mn during 2014–15. For the same period, the export values of cardamom, nutmeg, ginger and turmeric were recorded as USD 20.56 mn, USD 16.30 mn, USD 7.93 mn and USD 7.57 mn respectively.
- Coir and coir products: Exports of curled coir, coir fibre, coir pith, coir rope, coir yarn, coir geo-textile, handloom matting, power loom mats and rubberised coir from India increased in terms of quantity and value during 2014–15. In value terms, exports of coir products from Kerala grew from roughly USD 245 mn in 2013–14 to around USD 270 mn in 2014–15. During 2015–16, the value of exports from the state was recorded at around USD 165 mn. In 2014–15, the state's share of total coir exports was around 14 per cent per cent in quantity and 48 per cent in value. The US is the largest importer of coir products from India, followed by Germany, the UK, France, Netherlands and Italy.
- Cashew: The total export of cashew kernels from Kerala during 2010–11 was 49,692 MT, valued at more than INR 1,400 crore. Nearly 54 per cent of Kerala accounts for around 60 per cent of India's cashew exports and more than 95 per cent of its total exports come from private players.

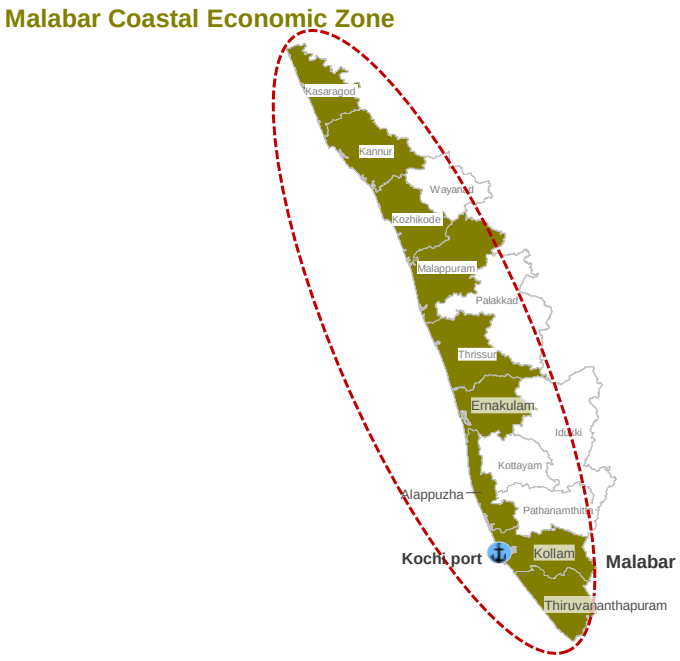
- Tea: India has around 564 thousand ha of area under tea production, as of December 2013. Tea production is led by Assam, followed by West Bengal, Tamil Nadu and Kerala. Major markets for Indian tea include countries in the Commonwealth of Independent States—Russia (the single largest importer of Indian tea), Kazakhstan, Ukraine and Uzbekistan—as well as the UAE, the UK, the US, Iran, Afghanistan, Germany, Australia, Japan, the Netherlands, Ireland, Poland, Sri Lanka and Pakistan.
- Rice: Exports of non-basmati rice from the state increased from around USD 26 mn in 2013–14 to around USD 27 mn in 2014–15. Exports of non-basmati rice from Cochin SEZ were valued at roughly USD 27 mn in 2014–15. In 2014–15, exports of floriculture products from the state were more than USD 3 mn, while for fruits and vegetables it was a little more than USD 1 mn.
- Software: In 2007–08, software exports from Kerala through registered units, such as the Software Technology Parks of India (STPI), were valued at around USD 300 mn, reaching more than 620 mn by 2014–15. Exports of IT and ITES products from the Cochin SEZ increased from around USD 55 mn in 2010–11 to more than USD 77 mn in 2014–15. IT exports increased at a CAGR of around 11 per cent between 2007–08 and 2014–15.

MALABAR COASTAL ECONOMIC ZONE

Kerala has a coastline of around 580 km. The Coastal Economic Zone in the state of Kerala comprises nine coastal districts of the state Kasaragod, Kannur, Kozhikode, Malappuram, Thrissur, Ernakulam, Alappuzha, Kollam, Thiruvanthapuram. Thiruvananthapuram alone contribute more than 50 per cent of Kerala's industrial GDP and around 34 per cent of the state's overall GDP.

The CEZ is mapped to the Kochi major port which catered to around 22 MTPA of traffic in 2014–15. Most of this traffic was POL and container cargo. The Kochi refinery imports its crude (around 10 MTPA) at the Kochi port and this volume is expected to go up to around 16 MTPA by 2020. Similarly the container traffic at the port is also expected to double in the next 10 years. Another large non major port, Vizhinjam, is also expected to come up in the CEZ.

EXHIBIT 43



Special Economic Zones & Industrial complexes

The proposed CEZ would have six already existing SEZ's.

Name of the SEZ	Location	Type of SEZ-Products
Cochin Port Trust	Vallapadom, Mulavukadu/Fort Kochi Village, Ernakulam District, Kerala	Port Based
Cochin Port Trust	Puthuvypeen, Eranakulam District, Kerala	Port Based
Kerala Industrial Infrastructure Development Corporation. (KINFRA)	Ayiroopara and Kazhakoottam Villages, Trivandrum District, Kerala	Animation & Gaming
Kerala Industrial Infrastructure Development Corporation (KINFRA)	Chelembra Village, Thirurangadi Taluk, Malappuram District, Kerala	Agro Based Food Processing

Name of the SEZ	Location	Type of SEZ-Products
Kerala Industrial Infrastructure Development Corporation (KINFRA)	Thrikkakara village, Kanayannur Taluk, Ernakulam District, Kerala	Electronics Industries
Carborundum Universal Ltd.	Village Thrikkakara North, Taluka Kanayannur, District Ernakulam, Kerala.	Solar Photovaltaic

Additionally, there are around 17 industrial complexes developed by the Kerala state industrial development corporation, which belong in the CEZ and could act as a catalyst to investments in the zone.

1. KINFRA Textile Centre, Thaliparamba
2. KINFRA International Apparel Park, Thumba
3. KINFRA Export Promotion Industrial Park, Kakkanad
4. KINFRA Techno Industrial Park, Malappuram
5. KINFRA Industrial Park, Nellad
6. KINFRA Techno Industrial Park, Malappuram
7. KINFRA Park, Seethangoli, Kasaragod
8. KINFRA Industrial Park, Wayanad
9. KINFRA Industrial Park, Thalaserry
10. KINFRA Industrial Park, Nellad
11. KINFRA Industrial Park, Kunnamthanam, Pathanamthitta
12. KINFRA Industrial Park, Koratty
13. KINFRA Industrial Park, Adoor
14. KINFRA Integrated Industrial & Textile Park, Palakkad
15. WISE KINFRA Park, Palakkad
16. KINFRA Seafood Park, Aroor
17. KINFRA Rubber Park, Irapuram

Cochin port and key commodities

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

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

Major commodities

POL

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

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

Containers

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

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

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

However, this traffic might reduce only to traffic from Kochi's hinterland by 2025 if Enayam and/or Vizhinjam come up since most of the other cargo would preferably go to the gateway port

Fertilizers

Current traffic of ~0.45 MTPA of fertilizers at Cochin port is dominated by imports of fertilizer raw material including rock phosphate, MOP, etc. The finished fertilizer forms a very small share of ~ 0.04 MTPA in the traffic. The volume of imports of fertilizer raw materials and finished products is estimated

to grow to ~0.7 MTPA by 2020, 0.8-0.9 MTPA by 2025 and 1.3-1.4 MTPA by 2035. FACT-Kochi is the biggest consumer of the fertilizer raw material imports at Cochin port.

Proposed projects for the Kerala CEZ

The Kerala CEZ is envisaged to provide a thrust to the traditional stronghold industries in the state which have a significant EXIM orientation and linkages with the port. It aims to provide an impetus to the economy of the state, taking into account the favorable conditions it enjoys both as a location for light manufacturing and as a tourist destination.

Given this context, 2 sets of projects has been proposed for the state. The first comprises projects aimed at Port led industrialization and coastal economic/community development. The second set of projects includes infrastructure development in the form of port modernization and/or port connectivity projects. These are initial sets of projects which will be further detailed in the Master Plan to be prepared for the CEZs based on this perspective plan. During this activity additional projects proposed by the state can be considered for inclusion.

Port led industrialization

Potential has been identified for Kerala CEZ in two high-potential industries – Furniture manufacturing/processing and passenger cruise tourism at the Kochi port.

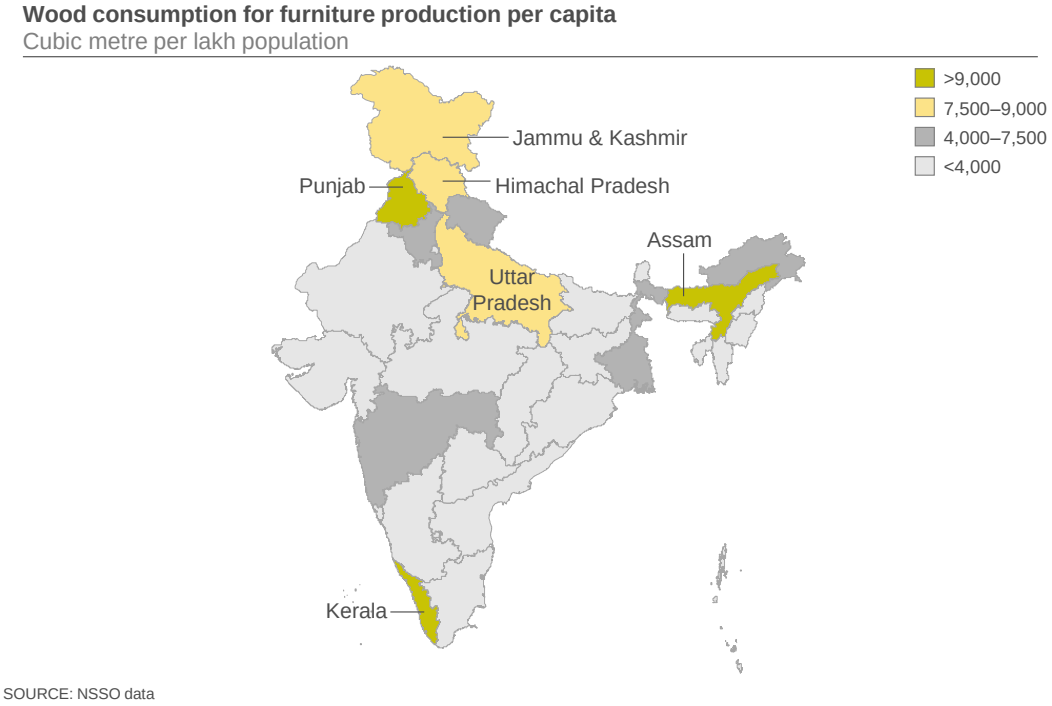
- **Furniture manufacturing hub**

Demand for furniture in India surged at 12 per cent annual rate between 2007 and 2014, creating a USD 25 billion market. The increase in organised retail also drove the growth of home furnishings. Other major factors were the rising demand for housing, increased consumer interest in home décor products and a growth in demand for premium brands. Home furniture is the largest segment in the Indian market contributing to roughly 65 per cent of the overall market, whereas the other large sectors of the global market like lighting and seating contribute only 2.5 per cent and 8 per cent respectively.

The key furniture-producing states in India are Kerala, Assam Punjab, Uttar Pradesh, Jammu Kashmir and Himachal Pradesh. These states supply to consuming states like Odisha, Karnataka, Bihar, Jharkhand, Madhya Pradesh, and Rajasthan. Kerala currently has major furniture clusters in Taliparamba, Malapuram and Ernakulam and minor furniture clusters in Kollam and Thrissur.

EXHIBIT 44

Punjab, Kerala, and Assam have highest furniture production per capita



SOURCE: NSSO data

The furniture sector in Kerala depends largely on imported wood. Logistics costs are the major cost in the overall value chain. Inbound raw material logistics costs contribute around 5 per cent and finished product logistics contribute around 10 to 12 per cent of the overall value of the product. This reinforces the need for efficient logistics for the furniture industry to be competitive. Port-led industrialisation has grown across the globe in the last 20 years. In China, 70 per cent of the overall capacity is installed coastally, underscoring the fact that port-based imports and re-exports production is one of the most economic options for the sector.

It therefore makes sense to develop coastal clusters for exports-based manufacturing. Kerala, due to its location and already established ecosystem, would be best suited for a port-based or port-proximate furniture manufacturing cluster. Ernakulam could be developed as a furniture manufacturing hub and linked to Kochi port for evacuation.

A concerted effort in trying to make this cluster competitive in terms of exports can go a long way to boost export volumes and make this cluster the export hub. Further enablers to develop the clusters could include:

- Greater export incentives to the industry
- Technology enablement of the existing units
- Improvement of logistics infrastructure

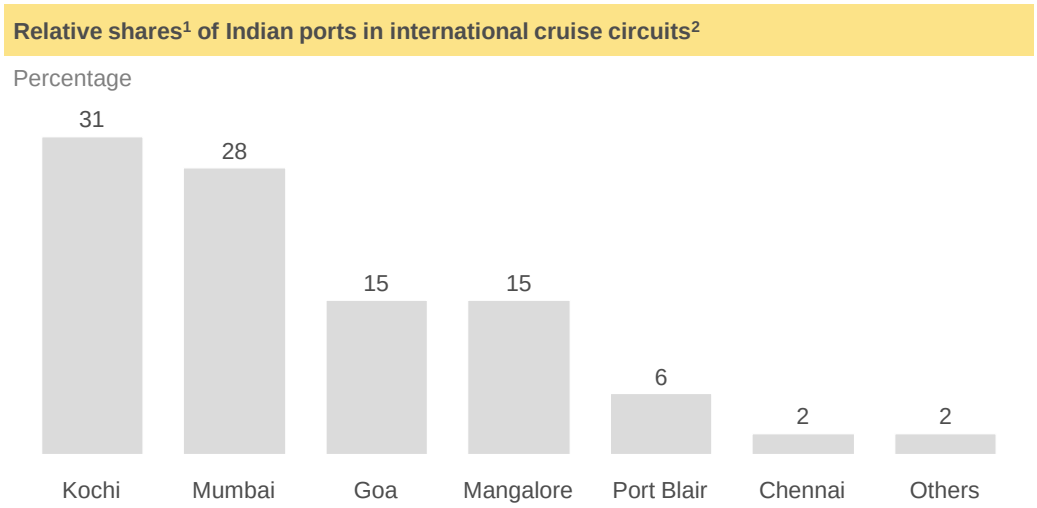
- Simplification of export processes including faster documentation and custom clearance

Cruise tourism terminal in Kochi port

Kerala has significant competitive advantages in tourism because of its natural beauty. Kochi is a popular tourist destination for foreigners and domestic tourists alike. It is already a port of call for cruises connecting South Asia and Middle East and North Africa (MENA). Kochi has the highest relative share (31 per cent) as "port of call" among Indian ports. This reinforces Kochi's popularity as a tourist destination amongst cruise liners.

EXHIBIT 45

Kochi and Mumbai ports are the most visited "ports of call" for international cruises



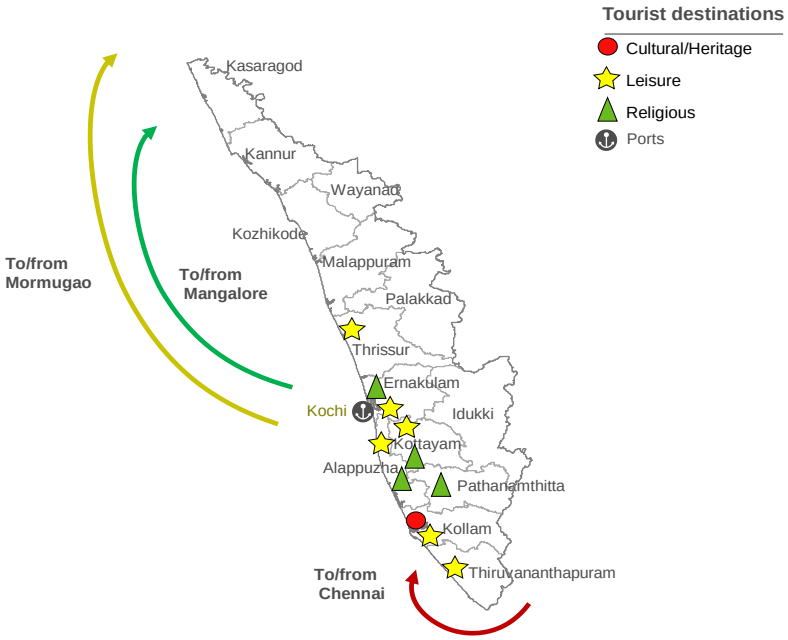
1 Share is defined as number of times a port appears in the cruise itinerary. There might be multiple trips to a port by a cruise line on the same itinerary over different time frames. However, for this analysis it has been counted only once
2 Cruise itineraries for future announced by the cruise lines as on Dec, 2015 have been taken for this analysis

SOURCE: Cruise itineraries of RCL, CCL, NCL and other cruise lines

Considering Kochi's strategic location and the existing tourism ecosystem in the state, Kochi Port can be an option for a home port. Located on the south-western coast, it is an ideal location to be linked to domestic cruise circuits that connect Kochi, Mangalore, Goa and Mumbai offering cultural and heritage, religious as well as leisure destinations.

EXHIBIT 46

Potential of marine tourism in Kerala



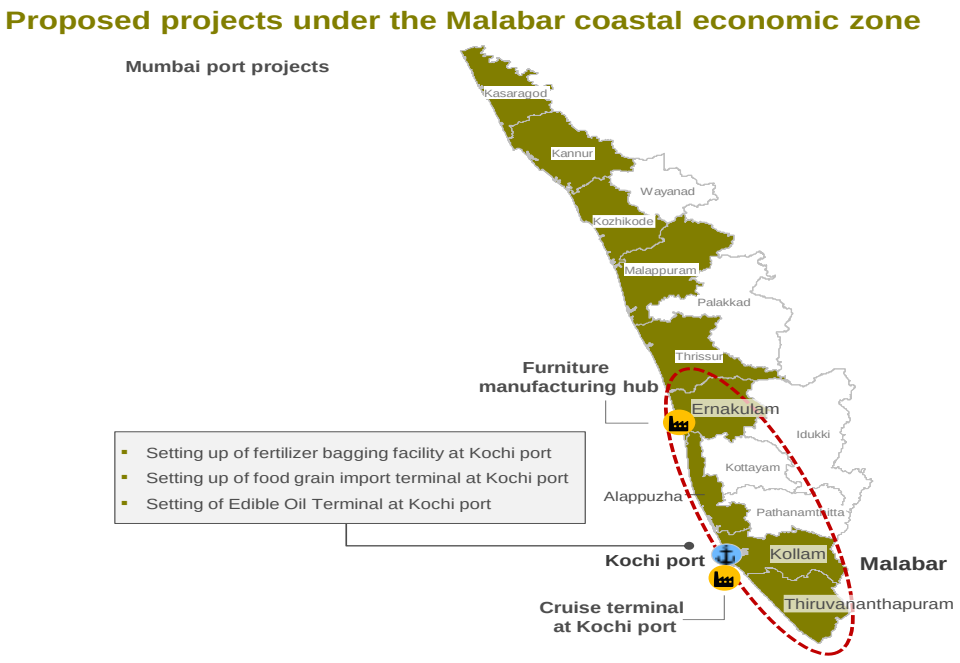
Although international cruise tourism mainly earns revenue through foreign exchange, it has positive spillovers for coastal communities. It creates a demand for food items, especially, seafood, and fresh fruits and vegetables, handicrafts, etc. As a result, less skill-intensive industries like fishing, food processing, and cottage industries can engage coastal communities and help them thrive. In addition, the huge earnings from the cruise business can be used to support local communities and offer alternative livelihood support systems through policy mechanisms.

Port Modernization and Connectivity

Other port modernization and connectivity projects include

- Setting up of fertiliser bagging facility at Kochi port
- Setting up of food grain import terminal at Kochi port
- Setting up of edible oil terminal at Kochi port
- Azhikkal Port - Proposed NH – Bypass and widening of 2 km.

EXHIBIT 47

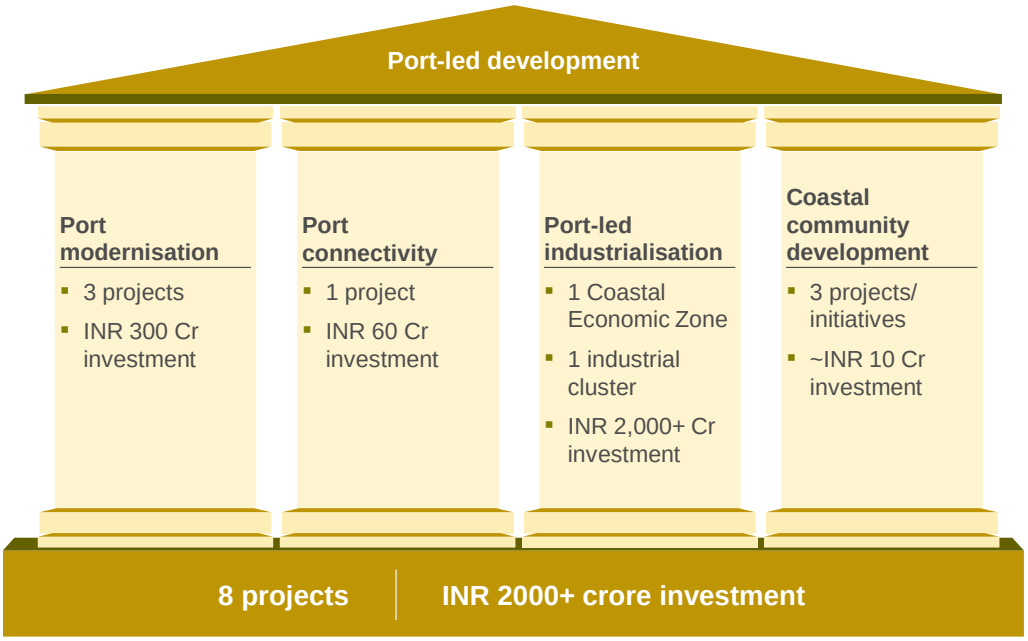


■ Impact

The Sagarmala National Perspective Plan has classified the above mentioned eight projects under the four pillars of port-led development. The industrial cluster could also generate around one lakh jobs in the next 10 years.

EXHIBIT 48

Sagarmala: Port-led development



ODISHA CEZ PERSPECTIVE PLAN

Odisha, India's ninth-largest state (by area), serves as a link between eastern and western India through the rail network. The state has 485 kms coastline with one major port port Paradip. Minor ports include Dhamra, Gopalpur and Behrabalpur (Balasore). Paradip Port is connected with the broad-gauge rail link of the East Coast Railway and is also served by NH5A.

Containing over 35 per cent of India's natural resources, Odisha sees a large part of its population earning a livelihood from forest-based products. Agriculture and allied sectors employ (directly or indirectly) more than 60 per cent of the total available workforce. Odisha also has large mineral reserves—iron ore, bauxite, nickel and coal—making it an attractive destination for mineral-based industries. It is one of the top producers of aluminium in the country, in terms of production capacity as well as actual production.[7]

CURRENT ECONOMIC SCENARIO

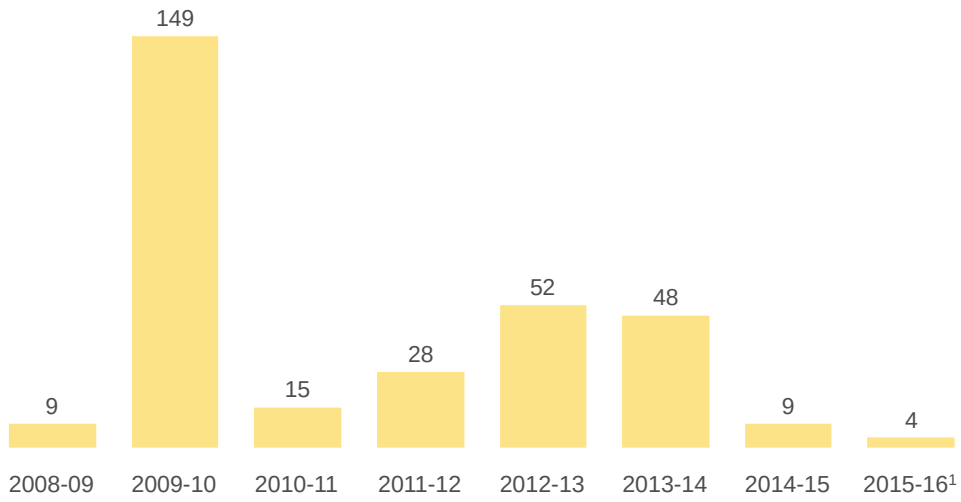
Odisha had a GDP of INR 1,96,174 crore in 2015–16, at 2004–05 current prices. In 2014–15, the services sector contributed around 50 per cent per cent to the state GDP, followed by the manufacturing sector (29 per cent) and the agriculture sector (20 per cent). The state contributed around 3 per cent to India's economy in the previous year. Cumulative FDI inflows in the state from April 2000 to September 2015 amounted to USD 402 mn.

[7] All the information given in the introduction until "Exports" has been sourced from *Odisha*, a report by the India Brand Equity Foundation.

EXHIBIT 49

FDI equity inflows, 2008-09 to 2015-16

US$ million



1 During April-September 2015

SOURCE: Department of Industrial Policy & Promotion (DIPP); economic survey, 2014-15; news articles

In June 2015, the state government announced plans to facilitate growth in the manufacturing sector with a yearly capex increase of 15 per cent until 2020. The state government has also declared its intention to invest around USD 30 bn. in the manufacturing sector. This will aim to generate nearly 3 lakh job opportunities by 2020 to improve and increase employment opportunities in the state.

MAJOR INDUSTRIES

As part of the state government–enacted Orissa Industries (Facilitation) Act, 2004, a single-window clearance system was implemented in the state to facilitate the growth of industries and create an attractive environment for both domestic and international investments. Odisha is also home to a large number of MSME units, and features among the top 10 Indian states for the highest number of MSME enterprises. For industrial development, the state government announced plans to invest around USD 20 mn in the MSME sector.

The Petroleum, Chemicals and Petrochemicals Investment Region (PCPIR) is being developed in Paradip to provide a conducive business environment, promoting and attracting exclusive investments in the petroleum, chemicals, petrochemicals and allied sectors. It is one of the four proposed PCPIRs in India and is located near Paradip Port, one of the largest freight ports in India and the gateway to all the markets in the Indo-Chinese region and eastern Asia.

Odisha's industries rely mainly on available natural resources, making it a key destination for minerals and metal-based industries. During 2014–15, the state had 173 mines. Major minerals found in the state include iron ore deposits, coal, bauxite, manganese, nickel, chromite, limestone, dolomite and tin ore. As of 2014–15, Odisha accounted for over 55 per cent of India's bauxite reserves, making it an ideal location for setting up aluminium and aluminium-based companies. Bauxite production in the state increased from 7.7 mn tonnes in 2013–14 to 9.3 mn tonnes in 2014–15. Some of Odisha's major industries are:

- Biotechnology: Odisha has a robust research and education infrastructure in the biotechnology sector—the Institute of Life Sciences, Regional Medical Research Centre, Regional Plant Resource Centre and the National Institute of Science Education and Research. The state is developing a state-of-the-art Biotech Pharma IT park over an area of 65 acres in Andharua, Bhubaneswar, in PPP mode with an investment of USD 20 mn. This park will house a Biotechnology Incubation Centre spread over an area of 30,000 sq ft. Other developments in this sector include the development of a biotech park in Khurda district and a marine biotechnology park at Ganjam district. In addition, a sub-scheme—"Germplasm and DNA bank"—has been prepared for the development of germplasm and DNA/gene bank in the state.
- Agro and food processing: Odisha is one of India's agriculturally rich states, and one of the largest producers of fruits, rice and pulses. With all these available resources, the state wants to develop into a major destination for investments in the agro and food processing sector. The agricultural sector contributed about 15.4 per cent to the state's GSDP in 2014–15. For cultivating vegetables and spices in 2014–15, the state government sanctioned a subsidy of USD 1.66 mn. As an initial step to encourage food processing infrastructure, Odisha currently has 274,000 MT of cold storage facilities. It houses a large poultry industry, which is recognised as an agricultural activity. It also has excellent potential in developing value-added products from dairy material.
- Minerals and metal-based industry, ancillary and downstream: Odisha is also one of the largest producers of iron and steel in the country and accounted for a 10 per cent share in the country's steel production in 2015, making it a favoured investment destination for domestic and international iron and steel players. It also has about 25 per cent of the overall iron reserves in India. Odisha is the largest aluminium-producing state in the country with 54 per cent of the aluminium smelting capacity. It also has huge potential for ancillary and downstream industries in the metal sector. The government has been pro-active, promoting an array of investment regions and industrial parks such as the Kalinganagar National Investment and Manufacturing Zone, the Downstream Aluminium Park and the Downstream Steel Park at Angul and the Stainless Steel Industrial Park at Kalinganagar.
- IT, ITES and ESDM: The IT sector is dominated by over 300 SMEs and employs around 12,000 software professionals. The state produces 40,000 technical and management professionals and 50,000 general graduates

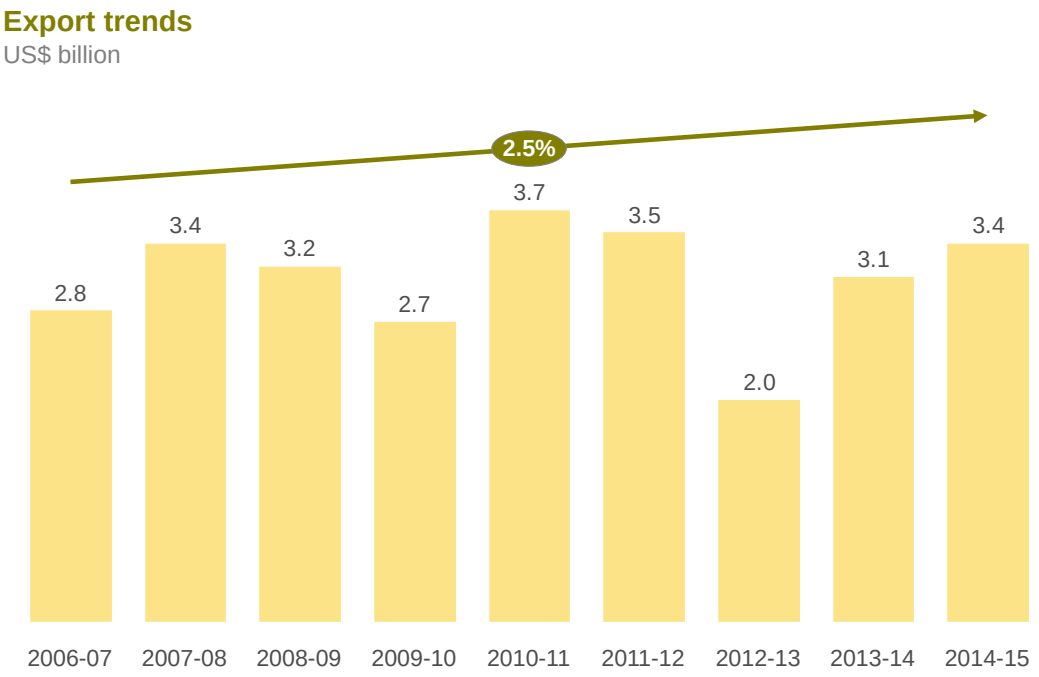
(bachelor's degree) every year, amply serving the needs of the sector. Bhubaneswar is home to the four largest IT companies in India—TCS, Infosys, Wipro and Mahindra Satyam. Odisha has developed IT-specific SEZs to cater to the rising demands of the sector and has state-of-the-art infrastructure facilities equipped with plug-n-play facilities and abundant power supply to ensure smooth operations. Large IT infrastructure initiatives, such as Info Park, Info Valley, Infocity and IT investment regions are also under development. To attract ICT investments, the centre is considering a mega project in Bhubaneswar. Recognising the strong footprint of the IT sector, the state has identified ESDM as a priority sector. The IT ecosystem together with an exclusive electronics manufacturing cluster will help establish Odisha as a major destination for ESDM investments.

- Textiles: Odisha handlooms have a global reputation for design and quality, and the state is known for its indigenous designs and weaves. The state government is planning to set up two textile parks to encourage investments in these regions in the form of integrated textile parks with common facilities and infrastructure to support the entire value chain in the sector. The abundance of cotton will ensure a regular supply of raw material. Odisha's government also proposes to set up cotton processing, spinning and weaving units as well as textile and garment plants.
- Seafood: Odisha has set up suitable facilities and infrastructure for seafood processing along its coastline—marine fish landing centres, processing plants, marine crafts, ice plants, cold storages and peeling sheds. The greenfield cluster at Deras has excellent infrastructure for collective processing of seafood products, such as cold storage, a pre-processing centre, block ice factory, a skill development centre, a polythene unit and an R&D centre.

MAJOR EXPORTS

According to the Ministry of Commerce and Industry, total exports from Odisha in 2014–15 were valued at USD 3.4 bn. between 2006–07 and 2014–15, value exports from the state increased at a CAGR of 2.5 per cent.

EXHIBIT 50



SOURCE: Economic survey of Odisha, 2014-15; Ministry of Commerce and Industry, Government of India; news articles

The state is a major exporter of both mineral and metallurgical products, which account for around 19 per cent and 41 per cent of the state's total exports, respectively. The seafood industry is one of the fastest growing segments in the total exports of the state with a share of about 9 per cent.

The state government has recognised various sectors, such as agriculture and processed food products, readymade garments, electronics, IT, engineering goods, arts and crafts as well as minerals and mineral-based products, for Odisha's export commodities:

- Petrochemicals: In 2013–14, Odisha exported INR 865.90 crore of engineering, chemical and allied products. This sector has been growing significantly, with a 400 per cent increase in the value of chemical exports in 2012–13 and 2013–14.
- Minerals: According to the provisional data collected by the Directorate of Export Promotion and Marketing (DEPM), exports of minerals surged by 97.62 per cent to INR 6226.64 cr in 2013–14. Exports of goods from the state increased by 44.22 per cent in 2013–14 to reach INR 17661.39 crore, primarily as a result of increased mineral exports.
- Metallurgical goods: Metallurgical goods continue to have the largest share in state exports. In 2013–14, metallurgical goods worth INR 6308.13 crore were exported to different countries, showing an increase of 17.2 per cent, as compared to INR 5382.60 crore in 2012–13.

- Textile products: In 2013–14, Odisha exported textile products worth INR 10 crore, software products of around INR 2306.10 crore and marine products amounting to roughly INR 1942.80 crore. During 2014–15, total exports of seafood products reached around USD 381 mn, largely due to high demand for Indian shrimps in the international market as well as the weakening of the Indian rupee against the US dollar.

INDUSTRIAL POLICY RESOLUTION

In 2007, the state government introduced the Industry Policy Resolution (IPR) to promote industrial development and set up a climate conducive to business to accelerate investment in industry and infrastructure projects, raise incomes, generate employment opportunities, promote economic growth, reduce regional disparities in economic development within the state and attract domestic and foreign investors. IPR 2015 aims to reinforce this process to make Odisha "a destination of choice" for all domestic and foreign industrial enterprises.

The new policy aims to further this objective by creating an enabling environment for the development of industrial and related social infrastructure, with the active participation of the private sector. Special incentive packages will be given to endorse priority sectors and MSMEs. The policy will also focus on developing entrepreneurship activities and opportunities.

Industrial complexes

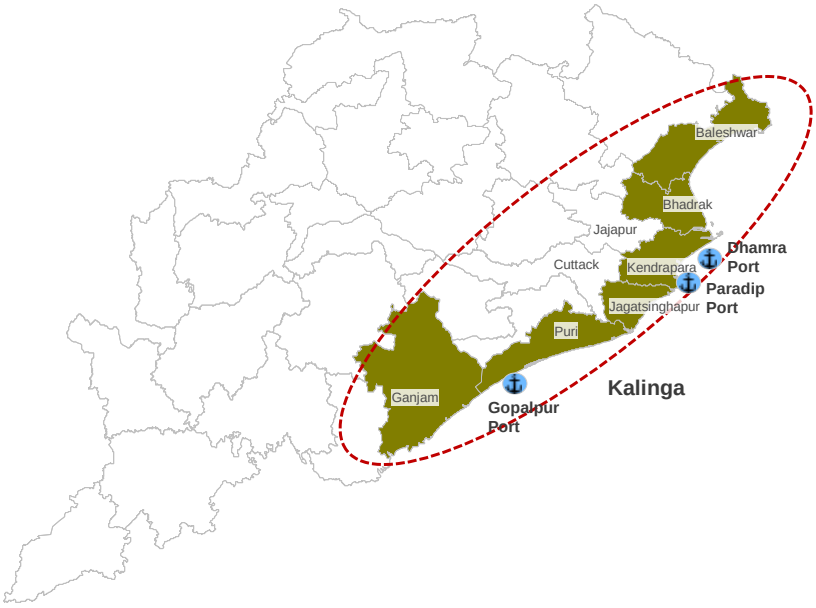
The Odisha Industrial Infrastructure Development Corporation is responsible for development and operation of industrial complexes in the state. The state currently has around 58 industrial complexes; of which around 16 are in the districts which form the CEZ, details of which have been provided under the CEZ.

COASTAL ECONOMIC ZONES

The coastline of Odisha stretches around 480 km along the Kalinga Coastal Economic Zone, which could cover the districts of Puri, Jagatsinghapur, Ganjam, Kendrapara, Bhadrak, and Baleshwar. These districts combined contributed around 25 per cent to state GDP in 2015–16 and are home to around 26 per cent of the state population.

EXHIBIT 51

Kalinga Coastal Economic Zone



The CEZ is located in a mineral-rich state with significant bulk industries that are relevant to the ports. Odisha has three ports: Dhamra, Gopalpur and Paradip.

One of the largest ports in the country, Paradip handles more than 70 MTPA of cargo, which primarily consists of coal and POL. Together, these three ports handle a cargo of around 85 MTPA. Roughly 23 MTPA of coal is coastally shipped to the South and the western states of India, and more than 20 MTPA is imported (primarily coking coal). The cluster also imports around 18 MTPA of POL, primarily to serve the IOCL Paradip and Haldia refineries.

Key growth themes for the Odisha ports include

- Import of crude oil to support the refineries in Paradip and Haldia
- Coastal shipping of thermal coal to power plants in the coastal states
- Meeting the requirement of the steel cluster in the hinterland for coking coal import and coastal shipping of steel

Based on these themes, the traffic at Paradip port is expected to more than triple in the next 10 years. By 2025, the traffic at the port could grow to around 230 MTPA, largely driven by the incremental coal traffic, which is expected to rise from 23 MTPA at present to 135 MTPA. Besides coal, POL traffic is also expected to go up to around 42 MTPA from the current 18 MTPA.

The Sagarmala Programme identified two major opportunities for Odisha:

- It could emerge as one of the major hubs for coastal shipping of thermal coal from Mahanadi Coalfields limited down to the southern states. It could also coastally ship steel to Maharashtra, Tamil Nadu and Andhra Pradesh.

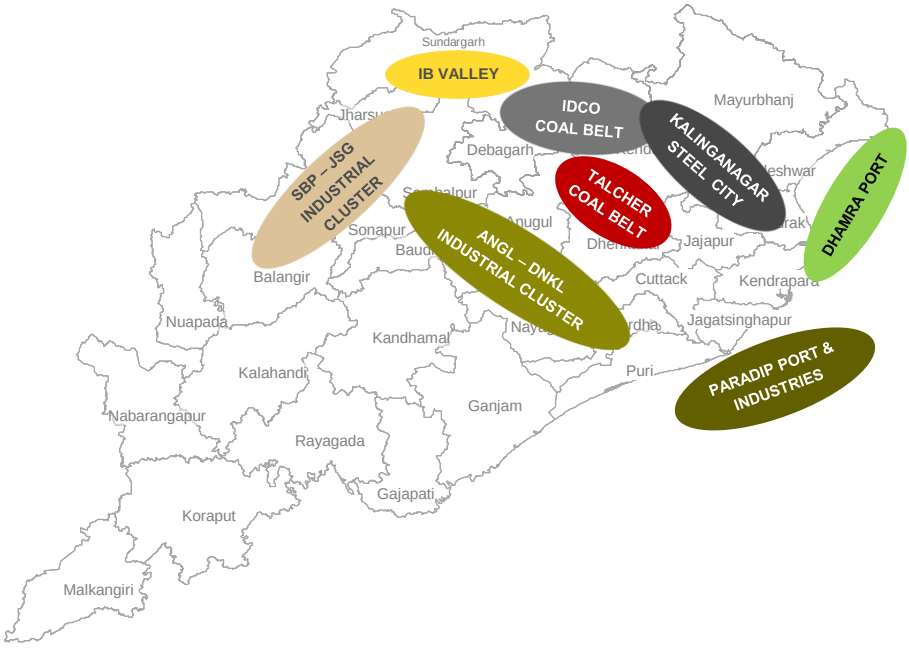
- It has significant potential for port-led industrialisation:
  - It's strategic coastal location, demand dynamics and availability of raw material could be leveraged to set up a steel cluster.
  - The presence of refineries could enable the development of a petrochemical cluster.
  - The state could also leverage its coastline to develop a marine-processing cluster at Deras.

Special Economic Zones & Industrial complexes

Major industrial clusters in the state include the IB valley, IDCO coal belt, Kalinganagar Steel City, Dhamra Port, Paradip Port and industries, Talcher coal belt, ANGL–DNKL industrial cluster and SBP–JSG industrial cluster.

EXHIBIT 52

Odisha – Key industrial clusters



The industrial complexes under OIDCO which fall under the CEZ are

1. Balagopalpur
2. Balasore
3. Baliapal
4. Bampada
5. Ganeswarpur

6. Panapana
7. Somanthpur
8. Srikona
9. Ampore
10. Bhadrak
11. Balabhadrapur
12. Kendrapara
13. Bodhei
14. Paradip
15. Kurki
16. Palashree

Also, a Petroleum, chemicals and petro-chemicals region has been announced near the Paradip port; although the project is still under consideration. IOCL (15 MMTPA) has been identified as the anchor tenant, the project complex will be spread in ~ 285 Sq kms. The preliminary Master Plan & preliminary Environmental assessment of the PCPIR completed by L&T Ramboll and IDCO is the nodal agency for development PCPIR.

Paradip port and relevant cargo items

Paradip is one of the largest major ports in the country handling more than 70 MTPA of cargo. Paradip is strategically in the mineral rich state of Odisha.

Currently the major commodities handled in the port are coal and POL. Roughly 23 MTPA of coal is exported from the port and is coastally shipped to the South and the Western hinterlands of the country. Additionally, the port imports around 16 MTPA of POL primarily to serve the IOCL refineries at Paradip and Haldia.

Major Commodities

Coal

Coal deposits are mainly confined to eastern and south central parts of the country. The states of Jharkhand, Odisha, Chhattisgarh, West Bengal, Madhya Pradesh, Andhra Pradesh and Maharashtra account for nearly all of the total coal reserves in the country. The State of Jharkhand is the largest producer of coal in the country as of March 2014 followed by Odisha and Chhattisgarh. Since one of the key objectives of Sagarmala is optimizing logistics efficiency for mega-commodities, the main focus area is thermal coal.

Presently, the power plants located in Maharashtra consume the highest quantity of coal- about 77 MTPA, followed by power plants in Chhattisgarh and Uttar

Pradesh, at 62 MTPA and 60 MTPA respectively. Overall, ten states account for more than 80% of current thermal coal requirement for power generation.

Therefore, while coal production is concentrated mostly in Eastern and Central parts of India, it is transported for power generation to nearly all corners of the country as shown below. For example, 26 MTPA is sent from Odisha to Tamil Nadu. Similarly, volumes of coal also move from Chhattisgarh to Maharashtra (19 MTPA) and Gujarat (14 MTPA). Coal imported from Indonesia and South Africa arrives at various ports and then moves inland.

Rail is currently the preferred mode with 61% share in overall domestic volume movement, while coastal shipping has a negligible share.

Coking Coal

Another major commodity imported in Paradip is coking coal. To service the demand of blast furnace-based steel production, around 60 to 65 MTPA of coking coal is transported in the country, and around 54 MTPA is consumed for the production of steel. Around 80 percent of the coking coal consumed is imported due to insufficient coking coal reserves in India.

Eastern India (West Bengal, Jharkhand, Odisha and Chhattisgarh) is the biggest cluster of steel production in the country with 45 MTPA (around 40 percent) of total installed steel capacity.

According to estimates, the coking coal demand for steel would reach around 130-140 MTPA in 2035 based on increased steel demand in the country for programs like Make in India and construction impetus. Also, historically the steel growth has been growing faster than GDP with the multiplier being GDP: 1.14. However, it is also important to note that steel being a cyclical industry is subject to ups and downs of the economy.

The evacuation capability at the relevant unloading ports and the railway routes will need to be improved for optimal evacuation of coking coal.

Based on these projections we expect the traffic at Paradip to increase to 16 MTPA in the next 5 years, ~20 MTPA by 2025 and ~30 MTPA by 2035. The growth till 2020 will primarily be driven by the new Tata Kalinganagar plant and the expansion of the Bhushan Steel plant in Meramandali.

POL

In addition to coal and coking coal, POL is another key commodity for Paradip port. The port currenty handles ~18 MTPA of POL which includes ~16 MTPA of crude import at IOCL refineries and ~2 MTPA of coastal movement of POL products from Paradip. By 2025, crude oil import is expected to rise to ~34 MTPA considering Paradip refinery getting operational. LPG imports are expected to rise considering government's focus on distribution of LPG connections to rural households. Additional 4-5 MTPA of MS/HSD is expected to be coastally shipped from Paradip to cater to the demand of Andhra Pradesh and Telangana.

Other commodities

Other key commodities handled at Paradip port include iron ore, limestone, fertilizers, gypsum, etc. In the base case scenario we expect the exports of Iron Ore from the port to be depressed due to the crashing of the global prices and the non-competitiveness of the Indian ore in the export markets.

Fertilizer traffic is also projected to grow to roughly 7 MTPA by 2025 due to the presence of IFFCO and good connectivity to agricultural areas in Bihar and UP. The table below summaries the traffic potential for key commodities for Paradip port

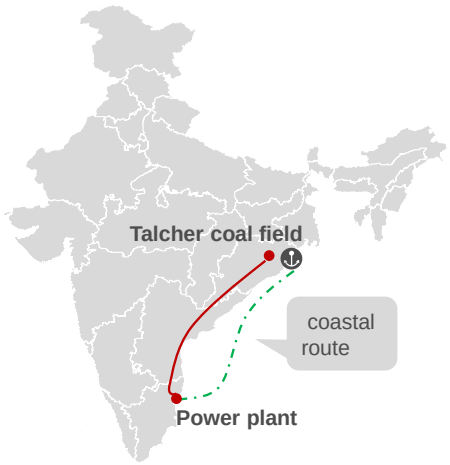
COASTAL SHIPPING OPPORTUNITY FOR COAL

Coastally shipping coal is more cost-effective than transporting it via road/rail. MCL is best placed to supply coal to power plants along the coast, empowering Odisha ports to leverage their proximity to coal mines. Nine railway projects have been planned in the region, including heavy-haul for mine to port evacuation. Capacity buildout is also seen in the Odisha cluster (berth mechanisation, Paradip Satellite Port).

EXHIBIT 53

Rail supported coastal shipping can prove to be much cheaper to transport coal as opposed to pure rail routes

ILLUSTRATIVE



OD routes example analyses

Rank	Mode combinations	Distance Kms	Cost Rs/tonne	Cost[1] PTPK[2]
1	Road-Rail-Port	1,275	1,237	0.97
2	Road-Rail-Port-Rail	1,281	1,594	1.20
3	Road-Port	1,304	1,736	1.35
4	Road-Port-Rail	1,310	2,119	1.62
5	Road-Rail	1,323	2,428	1.83
6	Road	1,332	5,062	3.80

1 Inbuilt costs of handling to arrive at fully landed cost;
2 Per tonne per kms

SOURCE: Sigma Insights

MCL currently supplies 60 MTPA of coal to the northern states, which could be better served by South Eastern Coal limited expansion. More than 200 MTPA of the projected 1,000 MTPA production is still unallocated. As per the CIL forecast,

SECL can supply to the northern hinterland, while the MCL supply can be coastally shipped to the coastal states. The increased capacity of SECL could free up MCL capacity to supply more to the southern states.

Under the four pillars of port-led development, the following projects have been outlined for Odisha

- Port modernisation
  - Development of Paradip outer harbour for coastal coal and capesize handling capability
  - Development of IWT terminal at Paradip port for thermal coal unloading
  - LPG import terminal at eastern ports (Haldia, Paradip and Dhamra)
  - Expansion of the MCHP stackyard for additional coal storage at Paradip
  - Conversion of IOB berth into coal exporting berth at Paradip
- Connectivity
  - 16 rail projects
  - 3 road projects
  - 1 pipeline project
  - 1 multi-modal hub at Jharsuguda
  - Development of NW5 for thermal coal movement from Talcher to Paradip port
- Port-led industrialisation
  - Expansion of current steel clusters because of proximity to iron ore
  - Petrochemical cluster by IOCL
  - Marine-processing cluster
- Coastal community development: Development of domestic cruise circuit connecting Puri to Visakhapatnam and Sagar.

Together, these projects would potentially require an investment of INR 36,000 cr. Further details follow

South Paradip Satellite Port

To leverage the significant opportunity for the coastal shipment of thermal coal, capacity at Paradip port needs to be upgraded by developing the outer harbour, which could cater to capesize handling and also increase the potential for importing coking coal. The main components of developing the South Paradip satellite port include

- Construction of two breakwaters (North 1,140 m long; South 4,150 m long)
- Building an approach channel with a width of 300 m and draft of 21 m

- Possibility of developing 12 deep draft berths in the final phase

The cost estimation of Phase 1, comprising two export terminals and one import terminal, is about INR 4,179 cr.

Challenges in port–rail connectivity capacity for coal

The current rail line from Talcher to Paradip port operates at more than 100 per cent utilization, carrying 25 MMTPA of coal. The current and planned capacity, i.e., the addition of third and fourth lines will not be enough to meet the complete demand. A heavy-haul rail line will be required between Talcher/Ib valley and Paradip Port to support coastal volumes. Furthermore, while Talcher and Paradip/Dhamra are connected by NW5, these ports face navigation and draft issues.

Development of IWT Terminal at Paradip to leverage NW5

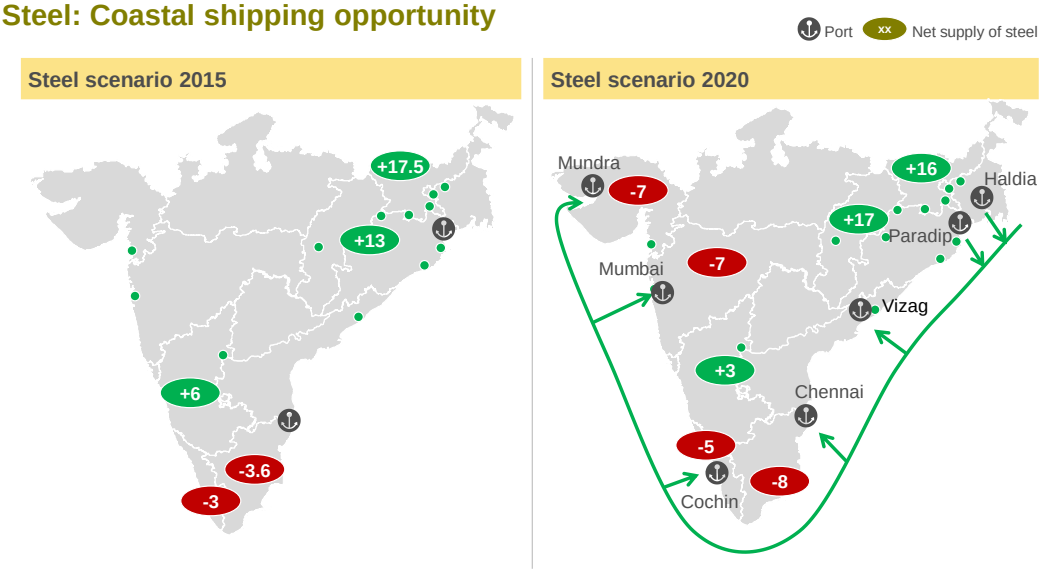
Part of the coal could be brought to Paradip through NW5 to ease the congested rail lines in the region. Coking coal imported at the port could be transferred to the IWT terminal being developed at Irada near Kalinganagar steel plants. The stackyard at the IWT terminal could be connected to Paradip's stackyard for onward loading to the ship. The estimated cost of developing this terminal is INR 300 crore.

COASTAL SHIPPING OPPORTUNITY FOR STEEL

Coastal steel plants could help save logistics costs of around INR 1,000 per tonne. Surplus states like Odisha and Jharkhand could supply the southern and western states via coastal shipping. Odisha has the potential to coastally ship 10 to 12 MTPA of steel. In the long term, about 40 MTPA of steel capacity will be developed close to demand centres in coastal areas such as northern Tamil Nadu and southern Maharashtra. A coastal steel cluster of 10 MTPA capacity has been proposed in Odisha owing to the region's proximity to iron ore reserves and steel demand centres.

EXHIBIT 54

Steel: Coastal shipping opportunity



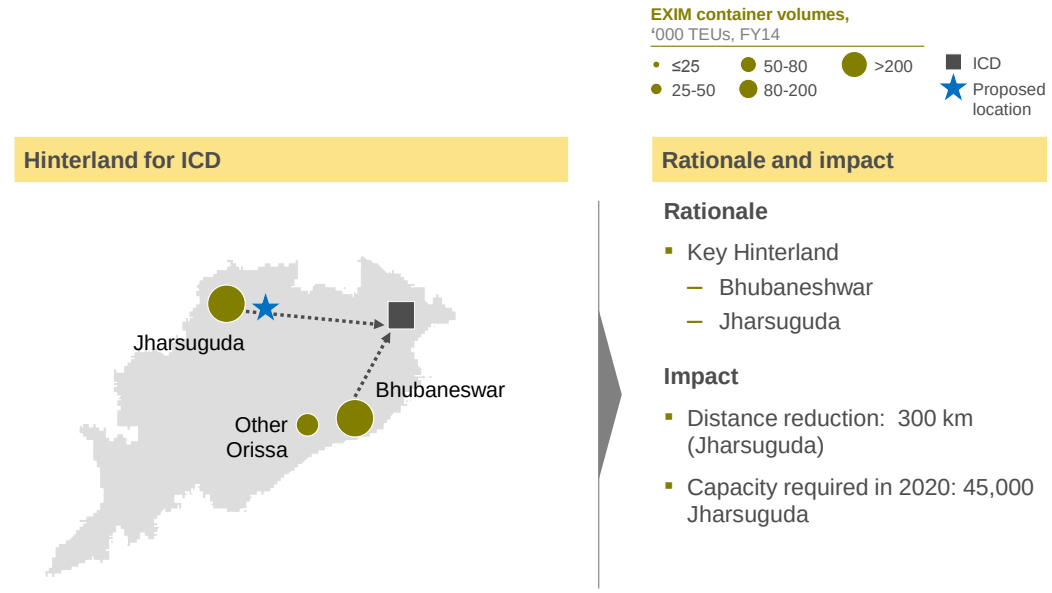
Key findings	
	▪ Southern and western states can be supplied from surplus states (Odisha, Jharkhand) via coastal shipping
	▪ 10-12 MTPA of coastal shipment of steel potential
	▪ Over long term, about 40 MTPA new steel capacity close to demand centres in coastal areas (Northern TN, Southern Maharashtra)

Other opportunities

Seven new ICD locations/dry ports have been recommended including one in Jharsuguda. The hinterland for these locations includes Darjeeling, Bhubaneswar and Farraka. The nearest alternate locations are Balasore or Kolkata. The new location will help reduce the distance by 200 km (Bhubaneswar) and 300 km (North Bengal). In 2020, the capacity required will be 90,000 in Bhubaneswar and 120,000 in North Bengal.

EXHIBIT 55

Location justification for Jharsuguda ICD



A product pipeline with roughly 5 MTPA capacity has been proposed from Paradip to Hyderabad. While the demand for MS/HSD in the eastern region will be around 21 MTPA, and production will be around 27 MTPA by 2025, the AP region is expected to face a deficit of nearly 6 MTPA. The proposed pipeline is expected to cater to this deficit.

EXHIBIT 56

Product pipeline proposed by IOCL with ~5MTPA capacity from Paradip to Hyderabad will cater to the AP deficit

Proposed product pipeline

Rationale

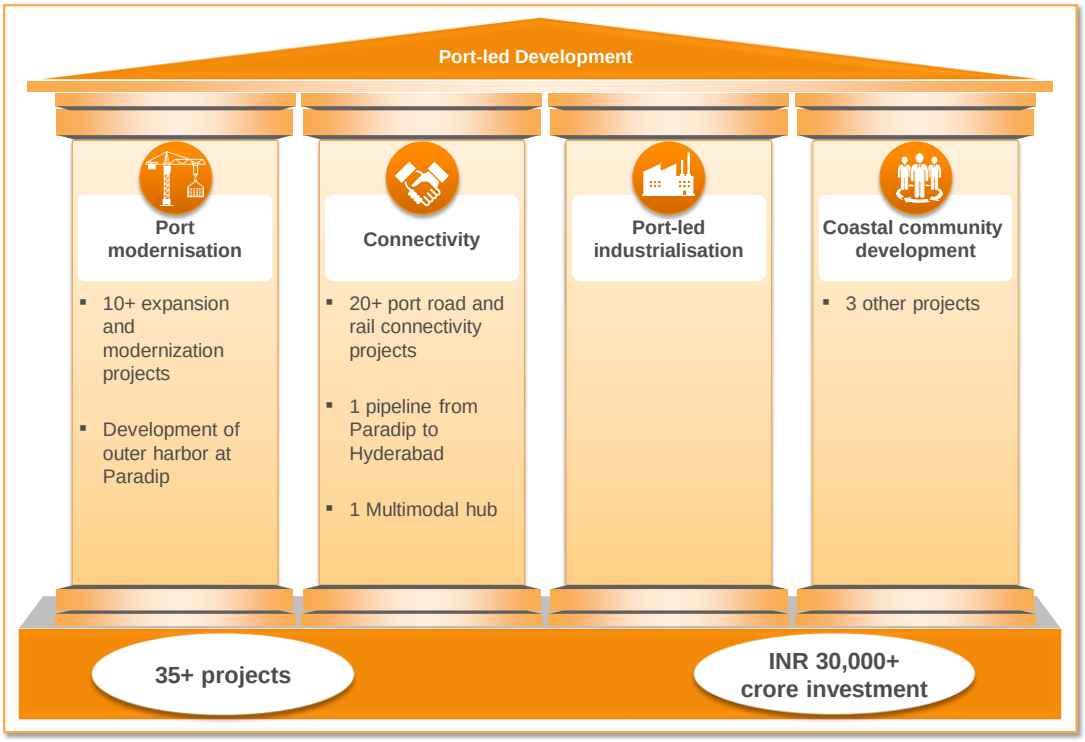
- Product pipeline from Paradip to Hyderabad
  - By 2025, demand for MS/HSD in East would be ~21MTPA and production would be ~27MTPA
  - On the other hand, AP region is expected to face deficit of ~6MTPA
  - Pipeline from Paradip to Hyderabad with ~5MTPA capacity will help meet this deficit

SOURCE: IOCL; press research

Summary and Impact

EXHIBIT 57

Components of Odisha



TAMIL NADU STATE PERSPECTIVE PLAN

Tamil Nadu has the second-longest coastline in India (1,076 km) and is an important centre for sea trade. Chennai, the state capital, is also an important port, making it a strategic point for trade.1 With a combined cargo handling capacity of over 110 mn tonnes per annum, Chennai and the other major ports—Ennore and Tuticorin—account for over 15 per cent of India's major port capacity, connecting the country with trade centres across the world.

Tamil Nadu has nearly 200,000 km of road network and 60,000 km are maintained by the national and state highways department. Its railway network of about 6,700 km connects 690 railway stations and transports freight and people between major urban zones as well as rural areas across the country. The only state in India with four international airports, Tamil Nadu offers direct air connectivity with more than 20 states countries.

CURRENT ECONOMIC SCENARIO

Tamil Nadu is one of the most developed states in India. The GDP of Tamil Nadu was around USD 85 bn in 2015–16 at 2004–05 constant prices with a CAGR growth of around 9 per cent over the last 10 years. It received a cumulative foreign direct investment (FDI) of USD 16 bn between April 2000 and December 2014, and occupies the third rank in terms of cumulative FDI inflows. UNCTAD's World Investment Prospects Survey 2013–2015 ranks the state as the seventh preferred investment destination.

EXHIBIT 58

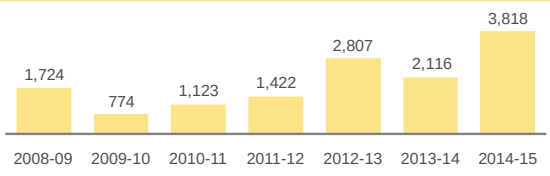
Economic snapshot – FDI inflows and investments

According to the DIPP, cumulative FDI inflows to the Tamil Nadu during April 2000 to March 2015 amounted to US$ 17,014million[1]

Urban development projects – As of March 2015

Projects sanctioned	65
Number of projects completed	24

FDI equity inflows, 2008-09 to 2014-15, US$ million[1]



Tamil Nadu NSDP at constant prices, US$ million

Sector	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Agriculture	5,003.2	5,182.9	5,774.1	6,292.7	4,614.9	4,499.8	4,711.7
Manufacturing	9,352.4	12,122.3	14,457.0	14,224.3	12,286.6	11,576.8	11,875.3
Construction	6,078.4	6,192.5	7,859.2	8,322.9	6,961.9	6,349.0	6,715.0
Transport, storage and communication	6,263.5	6,967.9	8,340.5	8,618.8	7,698.9	7,403.8	7,827.8
Trade, hotel and restaurants	11,833.4	12,001.1	14,096.3	14,681.1	12,921.8	12,495.8	13,447.7
Banking and insurance	6,129.6	6,145.1	7,328.0	7,830.4	7,615.0	7,728.4	8,335.1
Real estate	8,084.6	8,366.6	9,564.1	10,713.4	10,470.6	10,847.7	12,632.6

1 Including Pondicherry, Directorate of Economics and Statistics of Tamil Nadu, Central Statistics Office

Tamil Nadu is characterised as a state with high per capita income and an increasing standard of living. It is an important hub for manufacturing industries, especially automotive, textiles and software. The state At 15.1 per cent, the state accounts for 15.1 percent of micro, small and medium enterprises (MSMEs) in the country; which is the highest contribution by any state.

MAJOR INDUSTRIES IN TAMIL NADU

Tamil Nadu has a stronghold in the major Indian industrial sectors, such as auto and auto components, engineering goods, leather, textiles, information technology and biotechnology. The New Policy aims to maintain and improve this competitive edge and turn Tamil Nadu into the manufacturing hub of India as well as one of the top three destinations for investment in Asia.

- Auto and auto components sector: The Indian automobile sector receives the greatest industrial output from Tamil Nadu (worth USD 20 bn in 2013–14). The sector also contributed approximately 20 per cent to the total installed capacity of vehicle production. It also attracts the second highest cumulative FDI inflow among the various sectors (11 per cent of the total FDI inflow) between 2000 and 2012 in the state.
- IT/ITES sector: The contribution of the service sector to GSDP was more than 60 per cent in 2013–14. Tamil Nadu has over 1,780 software units. The state government is in establishing an IT Investment Region near Chennai, covering an area of 1,600 sq km with a total investment of USD 1.7 bn. There are 28 operational IT special economic zones (SEZs), while 22 IT parks have been approved.

- Textiles sector: Tamil Nadu houses over 40 per cent of the total installed capacity of India's spinning industry. In the last five years, it contributed 35 to 40 per cent to the country's total yarn production. The textiles and apparel sectors together provide employment to around 35 per cent of the state's population. The districts of Coimbatore, Tirupur and Erode are known as the "Textile Valley of India".Around 25 per cent of India's hand processing units are in the state (2,614 units), as are 40 per cent of all power processing units (985 in number). Of the total number of textile mills in the country, 58 per cent are in Tamil Nadu (SSI).
- Heavy engineering sector: Tamil Nadu ranks second in the "general purpose" and "special purpose" machinery categories, contributing 18 per cent and 11 per cent respectively to India's total output. It also ranks fifth in the "heavy electrical" machinery sector, contributing 6 per cent to India's total output. Tamil Nadu's competitive advantage includes:
  - Industrial infrastructure, both available and proposed
  - Priority sector in the state's Vision 2023
  - Large vendor base of MSMEs
  - Existing engineering clusters
  - Availability of skilled workforce
- Electronics hardware sector: Tamil Nadu was the third largest manufacturer of electronic hardware in India in 2013–14. Its contribution to the national electronics hardware output increased from 10 per cent in 2008–09 to 18 per cent in 2012–13. The state has over 23 electronics hardware technological parks located in major IT SEZs, e.g., Sriperumbudur, Oragadam and Mahindra World City.
- Leather industry: The state accounts for more 70 per cent of the tanning capacity in India, fulfills 6 per cent of the global leather requirement, and provides direct employment to 2.5 mn people. The leather cluster in Chennai featured among the top 10 most dynamic industrial locations globally, according to the 2009 UNIDO report. The Central Leather Research Institute (CLRI) in Chennai is the world's largest leather research institute. There are plans to establish mega leather clusters in Perambalur.
- Renewable energy: Renewable is a growing sector in rural areas. The Tamil Nadu Energy Development Agency (TEDA) is the nodal agency of the Ministry of New and Renewable Energy (MNRE) for promoting renewable energy schemes in the state.

Major exports

Tamil Nadu's exports totalled USD 27.9 bn in 2014–15 and grew at a CAGR of 4.7 per cent between 2007–08 and 2014–15. The state is a major exporter of a variety of manufactured goods, such as automobiles, auto components, engineering goods, textiles and garments, and leather products. Tirupur and Erode are the country's largest exporters of knitwear. A majority of software

exports from Tamil Nadu consist of application software. According to the industrial policy released in 2014, the state plans to double its exports from the current level by 2016.

- Auto and auto components: The state had a contribution of 21 per cent to India's automobile exports. Chennai is rapidly developing into a major export hub of cars for the Southeast Asian and South African markets.
- Electronics hardware and IT/ITES: Tamil Nadu has a 46 per cent share in the export of electronics hardware from India. An important IT hub, it is one of the largest software exporters by value in India—IT exports nearly doubled from USD 7.1 bn in 2007–08 to USD 13.4 bn in 2014–15, at a CAGR of 9.5 per cent. Software and electronic goods exports have grown at a CAGR of 18 per cent over the last three years.
- Engineering goods: Exports of engineering products increased from USD 4.7 bn in 2009–10 to USD 5.3 bn in 2014–15.
- Textiles: The state contributed 20 per cent to India's total export of readymade garments in 2013–14. A large number of textile mills and engineering units are present around the city of Coimbatore. Tirupur is the biggest knitting cluster with around 90 per cent contribution (nearly USD 2 bn) to Indian knitwear exports.
- Leather industry: Tamil Nadu accounts for nearly 35 to 38 per cent of the leather industry's revenues in the country and roughly 40 to 45 per cent of exports, which saw a 10.4 per cent increase to around USD 6.6 bn in 2014–15.

Road infrastructure

Chennai being the capital city is connected by 3 primary expressways connecting it to high potential market cities of the country:

1. Chennai- Kolkata Highway (part of the Golden Quadrilateral)
2. Chennai- Mumbai Highway (part of the Golden Quadrilateral)
3. Chennai-Bangalore Expressway

Industrial complexes

Tamil Nadu has 2 dedicated industry bodies SIPCOT (State Industries Promotion Corporation of Tamilnadu Ltd) and TIDCO (TamilNadu Industrial Development Corporation), which have enabled creation of around 25 industrial complexes spread across the state. The relevant Industrial complexes have been referred to under each proposed CEZ.

TAMIL NADU: VISION 2023

The Vision 2023 Tamil Nadu document lays out the state's development road map. It aims to achieve a consistent economic growth rate of 11 per cent per annum in a highly inclusive manner, to identify and remove bottlenecks in development, and to prioritise critical infrastructure projects. Vision 2023 envisages a 14 per cent annual growth in the manufacturing sector and an investment of INR 15 lakh crore over the next 10 years.

These growth targets make it imperative to formulate a new industrial policy that will aim to: (a) position Tamil Nadu as the most preferred state for manufacturing, with a reputation for efficiency and competitiveness and to attract incremental investments of more than 10 per cent every year in manufacturing; (b) achieve an annual average growth rate of ~14 per cent in the manufacturing sector; (c) to gradually raise the investment in infrastructure from the existing 4 to 5 per cent of the GSDP to ~10 per cent by 2015 and ~11.5 per cent by 2019; (d) make Tamil Nadu the innovation hub and the knowledge capital of India on the strength of world-class institutions in various fields and the best human talent; (e) enhance Tamil Nadu's position in high technology industries, including aerospace and nano technology; (f) achieve rapid industrialisation of the southern districts; (g) achieve inclusive and sustainable industrial development; (h) create gainful employment opportunities for an additional 2 mn people before 2016; and (i) to double exports from the state by 2016.

The main strategies for achieving these include augmenting infrastructure, prioritising the core sectors for future development with an emphasis on advanced technology, improving skill development, creating a modified structured package of assistance and focusing on balanced regional development with a renewed thrust on the southern districts of the state; caused by upcoming industries and manufacturing plants.

COASTAL ECONOMIC ZONES

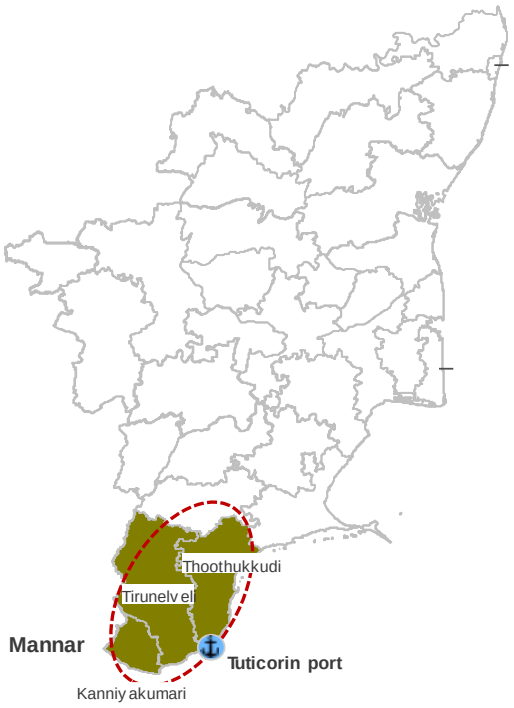
The Sagarmala National Perspective Plan identified three coastal economic zones—Mannar, Poopuhar and VCIC South in Tamil Nadu.

Mannar Coastal Economic Zone

This could contain three districts: Tirunelveli, Kanniyakumari and Thoothukkudi, which account for around 7 per cent of state GDP. Around 10 per cent of Tamil Nadu's population lives in these three districts.

EXHIBIT 59

Mannar coastal economic zone



Tuticorin is the only major port in this coastal economic zone which handled around 33 MTPA of cargo in 2014–15, around 50 per cent of which consisted of thermal coal and containers. The second biggest port in Tamil Nadu after Chennai, Tuticorin mainly handles containers, catering to the industrial regions in central and southern Tamil Nadu and thermal coal for the power plants in the hinterland. Its cargo traffic is expected to increase to 50 MTPA by 2020 and 70 MTPA by 2025.

With the power sector growth resulting in higher power load factors (PLFs) and the new capacity expected to come up around Tuticorin, along with import substitution on the back of rising domestic coal production, thermal coal imports can reach around 27 MTPA by 2020 and around 38 MTPA by 2025. Similarly, industrial activity is expected to increase in Tamil Nadu and container volumes are expected to touch around 0.9 mn TEUs by 2020 and around 1.18 mn TEUs by 2025. Tuticorin is a feeder port and the containers are transshipped at international locations like Colombo and Singapore.

A significant shift in the volume handled by Tuticorin could be anticipated in the scenario of a transshipment port coming up at the southern tip of India.In which case, the cargo could directly go to the transshipment port; severely impacting the container volumes at Tuticorin.

High potential sectors linked to ports have been identified for the southern Tamil Nadu region based on their traditional strength, comparative advantage and employment generation potential.

Special Economic Zones & Industrial complexes

The proposed CEZ would have two existing SEZ's in the periphery

Name of the SEZ	Location	Industry
AMRL International Tech City Ltd.	Nanguneri Taluk, Tirunelvel, Tamil Nadu	Multi Product
State Industries Promotion Corporation of Tamil Nadu	Tirunelveli District, Tamil Nadu	Transport engineering goods including manufacture of tyres and tubes for all purposes and for transport industry sector

It also has an industrial complexed managed by SIPCOT:

1. Tuticorin Industrial Complex

Proposed projects for the Mannar CEZ

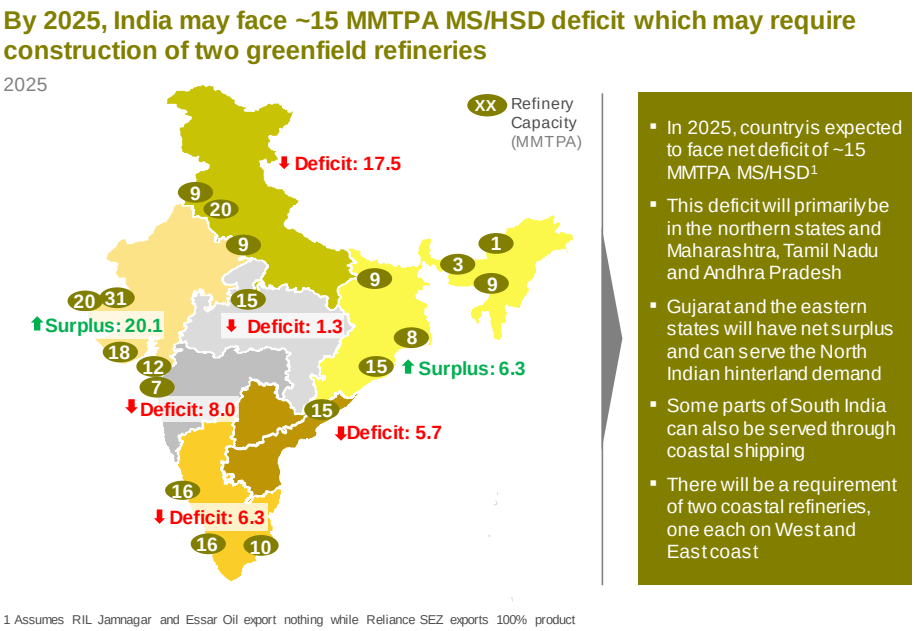
High potential sectors linked to ports have been identified for the southern Tamil Nadu region based on their traditional strength, comparative advantage and employment generation potential.

Port led industrialization

- **Refining and petrochemical manufacturing hub**

It is expected that around 150 MMTPA MS/HSD will be available to the domestic consumption market by 2025. The projected MS/HSD demand by then would be between 156 and 172 MMTPA, which could be translated into an potential deficit of 12 to 13 MMTPA of MS/HSD. This deficitcould be particularly pronounced in Maharashtra and Tamil Nadu region.

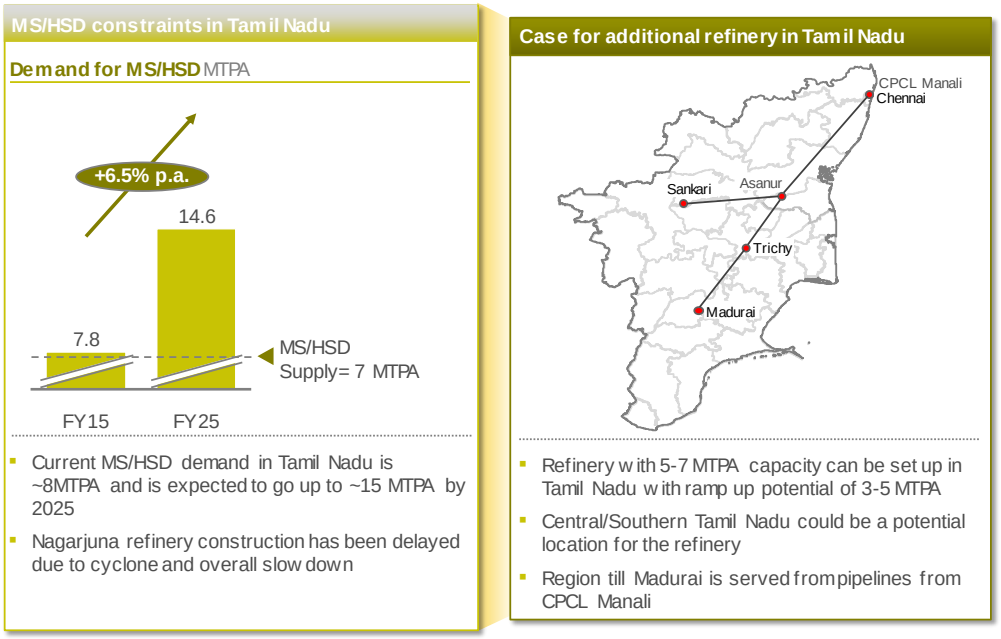
EXHIBIT 60



Southern Tamil Nadu could be a potential location for a greenfield refinery. The current demand for MS/HSD in the state is around 8 MMTPA and is expected to rise to 15 MMTPA by 2025. With current supply at 7 MMTPA, there is already a deficit. Moreover the CPCL refinery in Chennai is not expected to expand in the near future. A refinery with 10 MMTPA capacity could thus come up in the region in the next 10 years to serve the demand of the state and region.

EXHIBIT 61

A greenfield refinery can come up in Tamil Nadu with ~10MTPA capacity



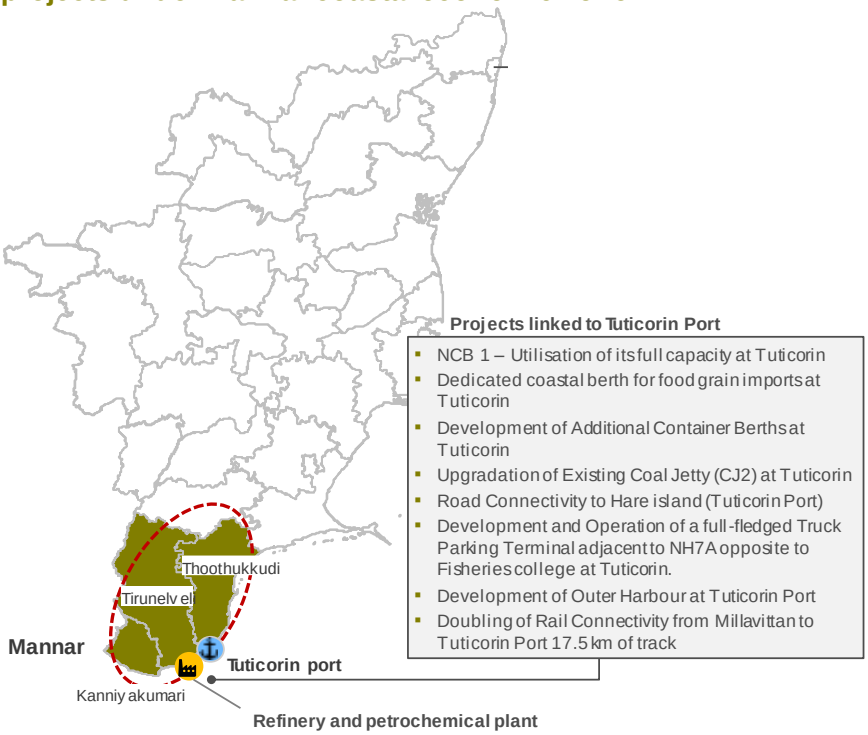
Other port modernization and connectivity projects

Besides the industrial clusters, various port modernization and connectivity projects have been identified under the Sagarmala programme:

- NCB 1 – Utilisation of its full capacity at Tuticorin
- Dedicated coastal berth for food grain imports at Tuticorin
- Development of additional container berths at Tuticorin
- Upgradation of existing coal jetty (CJ2) at Tuticorin
- Road connectivity to Hare island (Tuticorin Port)
- Installation of buoys at Pamban channel
- Development and operation of a full-fledged truck parking terminal adjacent to NH7A opposite Fisheries College at Tuticorin
- Development of outer harbour at Tuticorin Port
- Doubling of rail connectivity from Millavittan to Tuticorin Port: 17.5 km of track

EXHIBIT 62

Proposed projects under Mannar coastal economic zone



In terms of setting up Coastal Economic units under CEZ's, the development can be taken up in a phased process initiating with the districts have larger potential for attracting investments due to already existing industrial muscle and ecosystem.

Phase 1 districts: Thoothukudi

Phase 2 districts: Tirunelveli

Phase 3 districts: Kanniyakumari

Land parcel availability

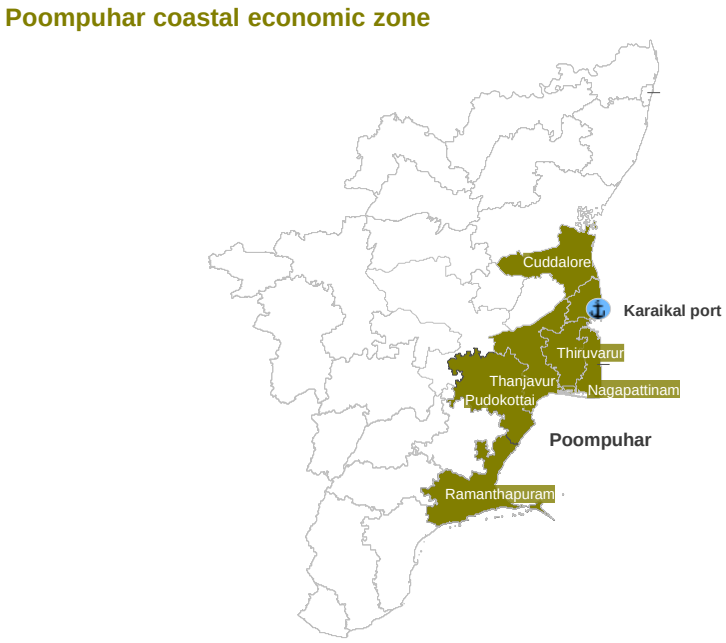
District	Land Bank Location [Estate]	Size [acres]
Tirunelveli	Gangaikondan Industrial Growth Centre	541
Tuticorin	Tuticorin	924

Poompuhar Coastal Economic Zone

The Poompuhar Coastal Economic Zone is linked to the port of Karaikal, and could probably cover 6 districts of Tamil Nadu: Cuddalore, Nagappattinam, Thiruvarur, Thanjavur, Pudokkottai and Ramanathapuram.. These districts

account for around 17 per cent of the state's population but only 9 per cent of the state's GDP.

EXHIBIT 63



The CEZ is envisaged to provide a thrust to the traditional stronghold industries in the state which have significant EXIM orientation and linkages with the port.

The Chennai Bangalore Industrial Corridor funded by Japan International Cooperation Agency will have a starting node in the same CEZ. The master planning of the Industrial corridor is underway currently. The Petro Chemicals, Petroleum and Chemicals hub planned under CBIC will be situated in the CEZ. The PCPIR complex. Spread over an area of 257 sq. km. of brown field area in the coastal districts of Cuddalore and Nagapattinam. The region is planned by Tamil Nadu Industrial Development Corporation (TIDCO)

The complex will house:

1. Gas based power plant Petrochemicals complex through partnership with Private co-promoters
2. Petrochemical downstream plants and fertilizer complex- The anchor tenant; Nagarjuna Oil Corporation Limited, has announced a 6 MMTPA petroleum refinery, the refinery will is anticipated to expand to 12 MMTPA capacity by 2020-2025.

Special Economic Zones & Industrial complexes

The CEZ has an industrial complexed managed by SIPCOT

1. Cuddalore Industrial Complex

2. Pudukottai Industrial Complex

Potential industry clusters in the CEZ

The CEZ is best placed to create industry clusters of leather processing and thermal power due to already existing plants.

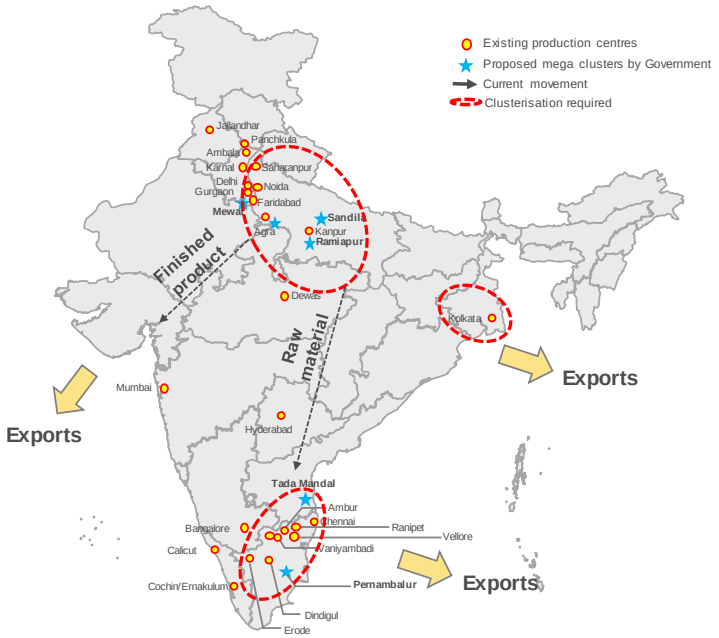
Port led industrialization

- **Leather processing**

The leather industry is one of the major foreign exchange earners to the country. India exported around USD 6 bn of leather and associated products in 2014. Tamil Nadu contributes to these figures, with 33 per cent of all exporting units concentrated in the state. The Tamil Nadu state cluster accounts for more than 70 per cent of tanning done in the country. This cluster primarily uses Chennai port to export leather-related products.

EXHIBIT 64

Leather production centres in India



Under the Vision 2023 Tamil Nadu industrial policy, the state aims for a 14 per cent annual growth in the manufacturing sector and an investment of INR 15 Lakh cr in the next 10 years. Besides creating the requisite infrastructure, the state is also keen on export promotion, technology development and skill development to attract the requisite investment.

The port-based approach has played an important role in building the competitiveness of leather footwear and leather goods manufacturers in China.

Wenzhou is one such example of a port-based footwear cluster in China and is known as the shoe capital of the world. To increase the export competitiveness of Indian manufactured leather and leather products, building a leather cluster near ports would reduce the transportation costs for product exports. Additionally, most chemicals used in the leather industry are imported, so a leather cluster near the port can cut down hinterland travel cost for these chemicals. Input water for the desalination process can also be taken directly from the sea. A leather processing park could thus come up in the CEZ, exports from which could be evacuated using the three major ports.

- **Power**

India's demand for coal in 2014–15 was around 850 MTPA, primarily from coal-fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent. Power demand in the country is expected to reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then with "24/7 power to all", the peak demand could be as high as 280 GW. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal-based thermal power plants will continue to meet more than 70 per cent of the country's requirement.

Tamil Nadu is an industrial state with high power demand—current consumption is 93 bn units, one of the highest in the country. As the state is expected to continue to dominate the urban and industrial landscape of the country, power demand is expected to witness steady growth for the next 10 years, reaching around 300 bn units by 2025. This will require significant capacity expansion of power complexes in the state.

A coastal power complex can leverage the coastal shipping of thermal coal from MCL to coastal power clusters to significantly reduce logistics cost—which could be as high as 30 per cent of the cost of power production. The logistics costs of transporting thermal coal via coastal shipping are around 40 per cent cheaper than via rail. Tamil Nadu is already a successful model, with plants at Tuticorin port, in Ennore, Cuddalore and Chennai getting thermal coal via coastal shipping. It is imperative to set up plants in and around the ports to ensure minimal last-mile connectivity to make coastal shipping viable by controlling the logistics costs. Sirkazhi in Tamil Nadu could be a potential location for building a power complex to support the power demand of the state.

In terms of setting up Coastal Economic units under CEZ's, the development could be taken up in a phased process initiating with the districts have larger potential for attracting investments due to already existing industrial muscle and ecosystem.

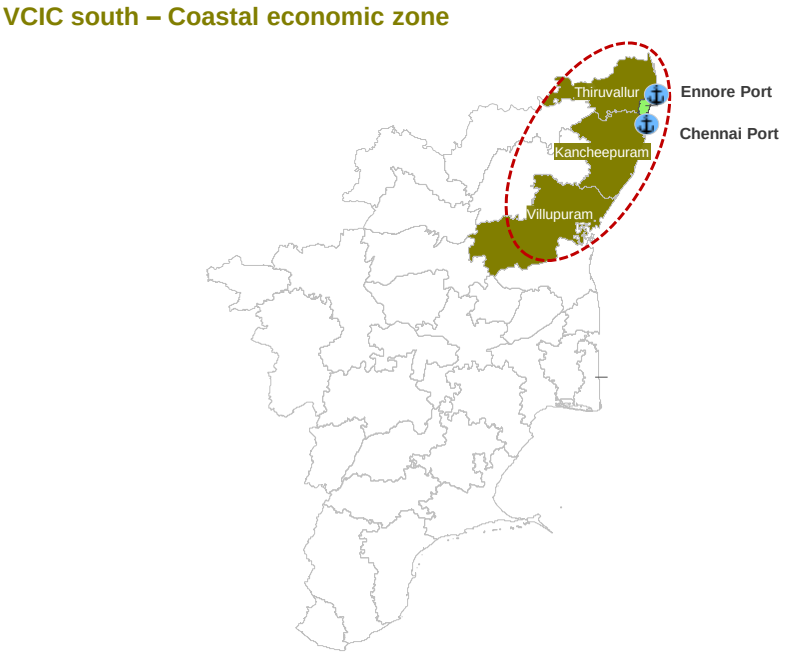
Phase 1 districts: Cuddalore,Pudukottai,Ramanathapuram

Phase 2 districts: Nagapattinam, Thanjavur, Thiruvarur

VCIC South Coastal Economic Zone

The VCIC South Coastal Economic Zone could possibly cover three districts of Tamil Nadu: Thiruvallur, Chennai and Kancheepuram, which together have a population of around 12 mn (nearly 16 percent of the overall population of the state). On the other hand, these districts combined have 40 per cent of the state's GDP.

EXHIBIT 65



The VCIC South CEZ has two prominent ports - Chennai and Ennore. Chennai is a city port handling containers while Ennore predominantly handles bulk cargo. The primary hinterland for these ports includes Tamil Nadu, Karnataka and southern Andhra Pradesh.

Chennai port currently handles around 52 MTPA of cargo—this is expected to rise to around 100 MTPA by 2025. Similarly, Ennore port currently handles around 30 MTPA of cargo, which is expected to grow to around 61 MTPA in the next 10 years.

The majority of this increase is expected to come from container and thermal coal traffic. The main hinterlands that the port serves for containers are Chennai and nearby SEZs (around 1 mn TEUs), Bangalore (around 150,000 TEUs), southern AP and Hyderabad (around 100,000 TEUs) and parts of southern Tamil Nadu (around 200,000 TEUs). By 2020, container volume is expected to reach 2.32 mn TEUs and 3 mn TEUs by 2025. The thermal coal traffic for these ports could go up from around 24 MTPA to around 46 MTPA, primarily due to coastal shipping.

The region contains the automotive corridor between 50 km north of Chennai to 35 km south of Chennai. This corridor alone accounts for 33 percent of commercial vehicles, 21 percent of all passenger cars, and 35 percent of auto components manufactured in India. It is a major export hub of cars for the Southeast Asian and South African markets. An electronic cluster with hi-tech SEZs exists in Sriperumbudur Industrial Park and an industrial growth centre is coming up at Oragadam.

Special Economic Zones & Industrial complexes

The CEZ also comprises of seven manufacturing based Special Economic zones which could contribute to attracting jobs and investments in the CEZ.

Name of the SEZ	Location	Industry
Flextronics Technologies (India) Private Limited	Sriperumbudur, Kancheepuram, Tamil Nadu	Electronics Hardware and related services
State Industries Promotion Corporation of Tamilnadu Limited	SIPCOT Industrial Area Sriperumbudure, Tamil Nadu	Electronics/Telecom hardware and support services, including trading and logistics activities
L&T (Arun Excello Infrastructure Pvt. Ltd.)	Vallancheri and Potheri Villages, Chengalpet Taluk, Kancheepuram District, Tamil Nadu	Electronic Hardware & software including ITES
New Chennai Township Private Limited	Seekinakuppam Village, Cheyyar Taluk, Kancheepuram District, Tamil Nadu	Engineering Sector including Auto Ancillaries.
New Chennai Township Private Limited	Seekinakuppam (Paramankeni and Vellur Villages), Cheyyur Taluk, Kancheepuram District, Tamil Nadu	Multi services
J. Matadee Free Trade Zone Private Limited (formaly - J.Matadee Eco Parks Pvt. Ltd)	Mannur Village, Sriperembdur Taluk, Kancheepuram Distt., Tamil Nadu	FTWZ

Name of the SEZ	Location	Industry
State Industries Promotion Corporation of Tamil Nadu	SIPCOT of Tamil Nadu Industrial Growth Centres, Sriperumbudur Taluka, Kancheepuram District, Tamil Nadu	Electronic hardware

Port led industrialization

The CEZ is envisaged to synergise with manufacturing hubs along the VCIC being developed with technical assistance from Asian Development Bank. The Srikalahasti–Yerpedu node in the VCIC Central CEZ falls on the corridor. Similarly, the Krishnapatnam node in Nellore district is being developed under the CBIC, which is known for its automotive cluster stretching from Nellore district to south of Chennai.

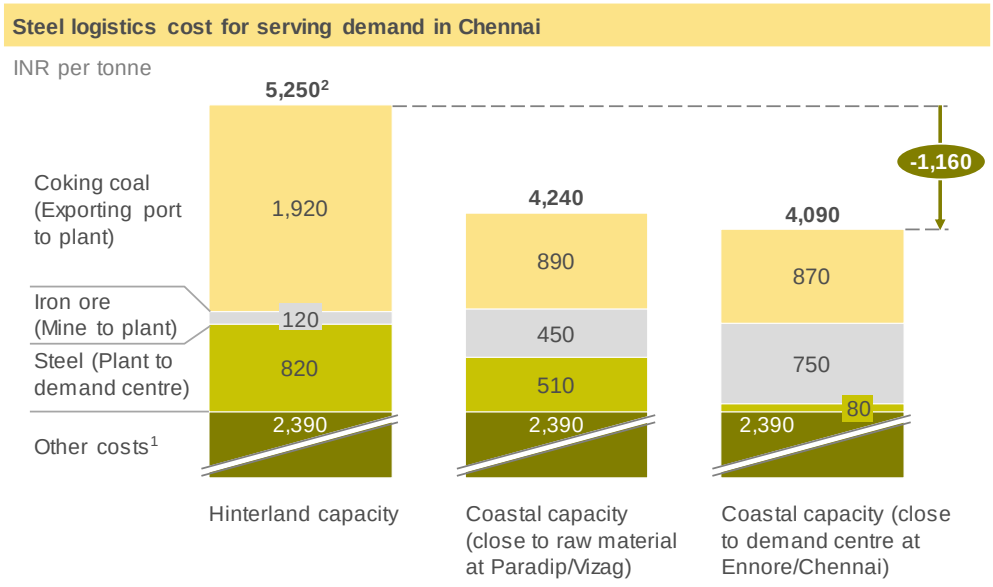
Some of the high potential industries that could come up in this region are steel, shipbuilding and petrochemicals.

- Steel

Coastal steel plants located close to iron ore reserves connected via a slurry pipeline could, on average, save INR 900 per tonne. Coastal capacities near demand centres could be even more cost effective.

EXHIBIT 66

Coastal steel plants provide logistics cost saving of ~INR 1,000 per tonne



1 Other cost includes internal logistics cost and logistics cost for other materials such as refractory, spares, etc.
2 Base case logistics cost is estimated as 15% of total steel production cost

SOURCE: DGCIS data – 2013-14

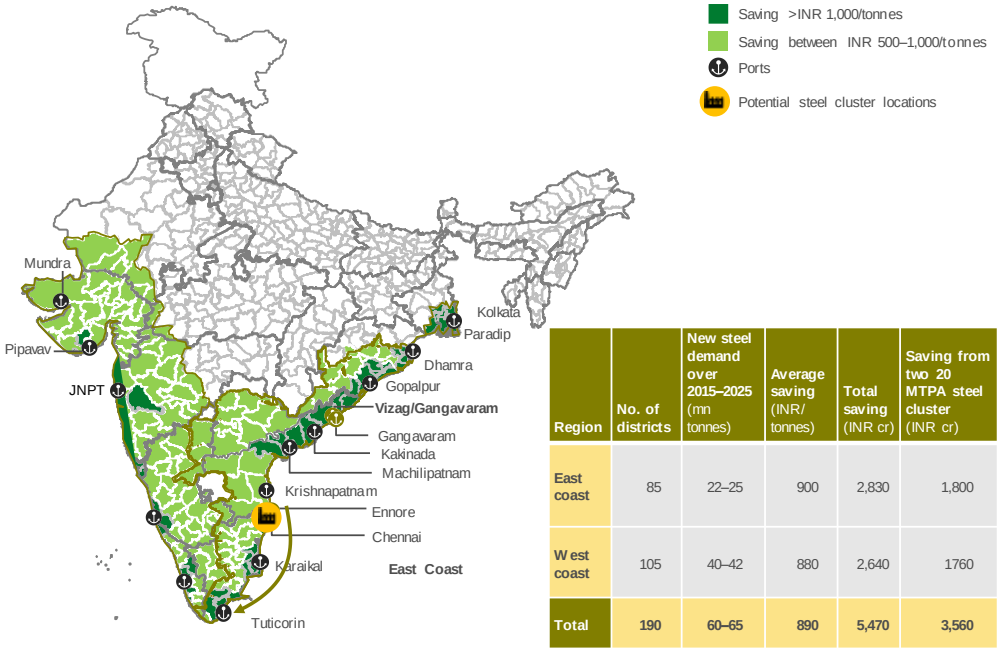
Based on demand projections till 2025, Greenfield steel clusters with 20 MTPA capacity could be developed and existing coastal clusters could be further advanced. These could result in cost savings due to:

- Minimised inland logistics for coking coal: Saves INR 1.5 per tonne-km due to import of coking coal directly at steel plants.
- Reduction in steel transportation through coastal shipping: Saves INR 1.30 per tonne-km in steel transportation due to coastal shipping.
- Use of new technology (slurry pipelines): Offers a low-cost method of transporting iron ore fines from mine to coast—INR 0.70 per tonne-km compared to INR 1.50 per tonne-km for rail. In addition, pelletisation at the dispatch port location also leads to valuable iron-ore fines being utilised for domestic production.

The North Tamil Nadu belt with its large auto hubs and other SEZs around Chennai is one of the biggest consumers of iron and steel. Even in coastal shipping, Chennai ranks as one of India's biggest importers of steel. The steel cluster in Ennore could be developed using the import of iron ore pellets from Vizag and Paradip via a slurry pipeline and importing coking coal.

EXHIBIT 67

Proposed cluster at Northern Tamil Nadu



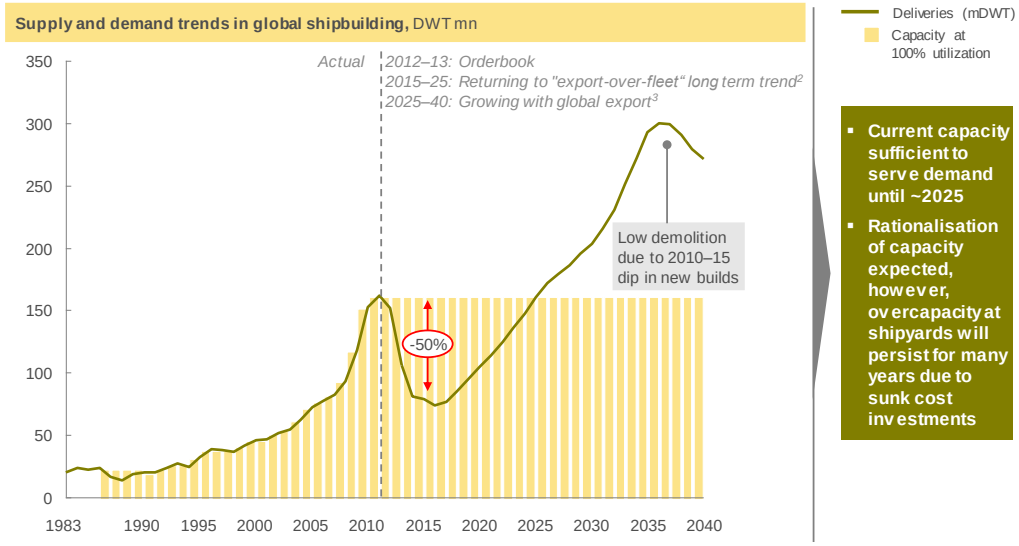
Region	No. of districts	New steel demand over 2015–2025 (mn tonnes)	Average saving (INR/ tonnes)	Total saving (INR cr)	Saving from two 20 MTPA steel cluster (INR cr)
East coast	85	22–25	900	2,830	1,800
West coast	105	40–42	880	2,640	1760
Total	**190**	**60–65**	**890**	**5,470**	**3,560**

■ Shipbuilding

Shipbuilding is a cyclical industry and is currently on a downturn with excess capacities globally. After the peak in deliveries in 2011, the industry's output is decreasing and reached 91.2 mn DWT in 2014. However, strong demand is expected in the long term, driven by shipping companies' move towards ultra-large vessels, demolition of the old vessel fleet and growth in global exports. This demand is expected to go up to around 150 mn DWT by 2025 and around 300 by 2035.

EXHIBIT 68

Globally, overcapacity at shipyards expected next years, however, strong growth in the longer term is expected



1 Capacity measured as maximum output last 5 years. Capacity at 2011 level in forecast period
2 Oversupply eliminated and shipping market returning to supply-demand balance
3 Fleet growing with global export from 2015, demolition estimated using average 25 year lifetime and
SOURCE: Clarksons; Global Insight; expert interviews; team analysis

India could target 3 mn to 4 mn DWT shipbuilding industry by 2025, through a combination of some smart choices and government support. Indian shipyards are competent at building smaller size/specialty vessels. They could focus on building specialty and coastal vessels less than 80 m long (e.g., offshore supply vessels, anchor handling tugs, etc.). Opportunities in the defence sector, growth in coastal shipping, and replacement of the existing vessel fleet could be the drivers of growth of the shipbuilding industry in India. Given the cyclical nature of the shipbuilding industry, it becomes important to complement shipbuilding with ship-repair facilities.

EXHIBIT 69

Defence: ~USD 23 bn orders under execution and ~USD 51 bn in pipeline

Surface ships

Present orders		Future orders (3-5 years)[3]	
Project	App. value INR cr	Project	App. value INR cr
P15B[1], P17 A[1]	55,000	16 ASW SWC	15,300
6 CG OPVS, 2 SLOPVs, 2 FPV & 11 FICs, MCMV[2]	37,500	Next Gen Missile Boats	12,000
4 ASW Corvette, 8 LCU MK-IV, 4 WJFACs, P17A[1]	28,500	Next Gen Corvettes	24,500
IAC* , 20 CG FPV	3,100	Next Gen Frigates	35,000
IPVs/Midget Submarines	4,000	Next Gen Destroyers	50,000
5 NOPVs	2,500	04 Survey Vessels – Large	3,500
3 Cadet Training Ships	485	Survey Vessel (trg)	2,500
6 Survey Vessels	800	02+02 LPD Vessels	14,500
15 Interceptor Boats	270	Fleet Support Ships/Other Support Vessels	9,000
54 Interceptor Boats, 7 CGOPVs, Floating Dock	2,500		
80 FICs	150		
~ USD 20 bn opportunity		~ USD 25 bn opportunity	

Submarine

Project	App. value INR cr	Project	App. value INR cr
P 75[1]	10,000	P-75 I	75,000
Nuclear Submarine SSBN[1]	10,000	Other Submarine Projects	>10,000
~ USD 3 bn opportunity		~ USD 26 bn opportunity	

1 EDC 2022; 2 EDC 2025 3 To be implemented from 2020–2030

SOURCE: Expert interviews; Ministry of Defence, Ministry of Shipping

Logistics costs are a significant component of the overall costs in shipbuilding, automotive, etc., and steel is a major raw material for these downstream industries. Considering the port linkages, it is optimum for these industries to be co-located. Steel contributes 25 to 30 per cent of the cost of a newly-built ship while the engine contributes another 15 to 20 per cent.

A marine cluster at Tamil Nadu has been evaluated for its suitability in terms of availability of industrial infrastructure, proximity to steel manufacturing, availability of labour and social infrastructure and distance of automotive factories and auto component hubs from the location. The proposed location is in Kancheepuram district, on the northeastern coast of Tamil Nadu, between state highways. The cluster could leverage the existing ecosystem created by the already existing shipyard in Kattupali and the proximate proposed steel cluster at Ennore for the steel supply. It is connected to the major cities of Cuddalore and Pondicherry and connectivity extends to Tuticorin. It is also connected with major ports like Chennai, Ennore and Tuticorin through NH45 and NH5.

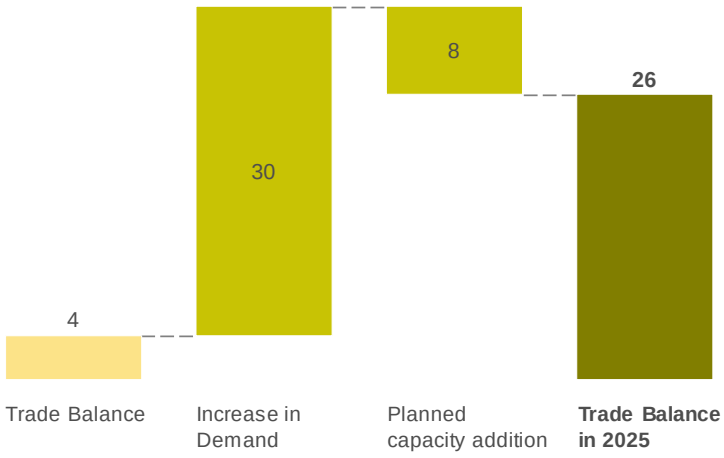
■ Petrochemicals

The consumption of petrochemicals in India has risen at a consistent rate of around 6 per cent in the last few years. Demand in 2006–07 was around 22 MTPA which rose to around 33 MTPA in 2013–14. Petrochemical demand is strongly correlated to GDP growth in the country—if India's GDP grows by 6 to 7 per cent over the next 10 years, the demand for petrochemicals could be in the range of 60 to 70 MTPA by 2025.

In 2013–14, total installed capacity for petrochemicals production was around 33 MTPA. Operating at around 85 percent capacity utilisation, the country produced around 28 MTPA of petrochemicals in 2013–14, an increase from 21 MTPA in 2006–07. The rising gap between domestic demand and production of petrochemicals has increased India's dependence on imports. It is expected that around 8 MTPA of petrochemical production capacity may be commissioned in the next 10 years. It is evident that India may require significant capacity addition (of around 25 MTPA) to prevent increasing import dependence. The competitiveness of these plants will need to be carefully examined under various feedstock price scenarios.

EXHIBIT 70

Trade balance in 2025 with planned capacity addition



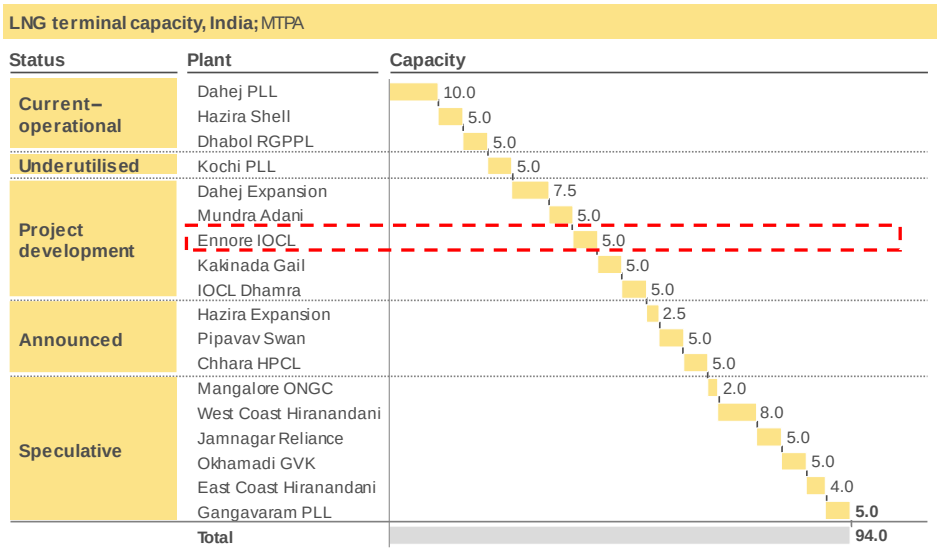
SOURCE: MLCPCSTAT 14

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed. India produces around 18 MTPA of naphtha, which is around 8 to 10 per cent of refinery crude throughput capacity. As Indian refineries expand capacity from the current around 220 MTPA to around 280 MTPA in 2025, the amount of naphtha produced domestically may grow to around 25 MTPA; around 20 MTPA of it can be used for petrochemical production in the optimistic case. The domestic gas production was around 25 MTPA in 2013–14 and no significant increase in supply from domestic sources is expected in the near future. There is currently around 20 MTPA of operational terminal infrastructure for regasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Projects of around 45 MTPA capacity have been announced over the next 10 years.

One of these regasification terminals is expected to come up in Ennore. IOCL has signed a contract for an LNG berth at Ennore Port. Considering the increased gas availability in the region, petrochemical plants that use gas as feedstock could come up in the region.

EXHIBIT 71

LNG import terminal is expected to come in Ennore



1 Expected to be ready by end of 2016/17; 2 Received environment clearance in 2015, pending till completion of Hiranandani facility; 3 Received environment clearance in 2013; 4 In talks with investors; 5 Expected to be ready by 2018

SOURCE: PPAC, Press Search

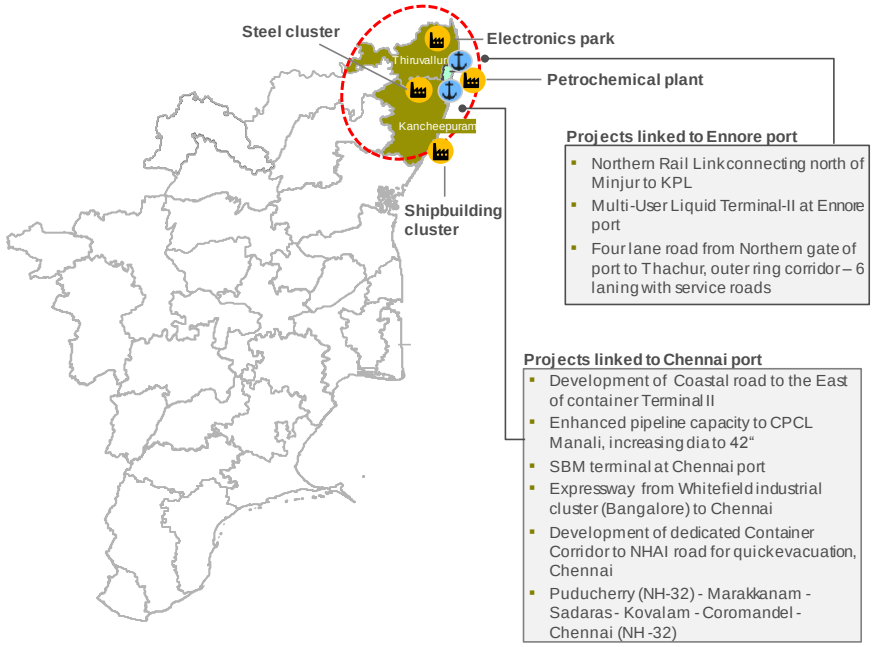
Other port modernization and connectivity projects

Besides the industrial clusters, various port modernization and port connectivity projects have been identified under the Sagarmala programme.

- LNG import terminal at Ennore
- Northern rail link connecting north of Minjur to KPL
- Expressway from Whitefield industrial cluster (Bangalore) to Chennai
- Multi-user liquid terminal-II at Ennore Port
- SBM terminal at Chennai Port
- Four lane road from northern gate of port to Thachur, outer ring corridor: six-laning with service roads
- Enhanced pipeline capacity to CPCL Manali, increasing dia from 30 to 42 inches
- Development of coastal road to the east of container terminal II at Chennai Port
- Southern port access road for connectivity to Ennore Port
- Development of dedicated container corridor to NHAI road for quick evacuation, Chennai
- Puducherry (NH32)–Marakkanam–Sadaras–Kovalam–Coromandel–Chennai (NH32)

EXHIBIT 72

Proposed projects under VCIC south coastal economic zone



In terms of setting up Coastal Economic units under CEZ's, the development could be taken up in a phased process initiating with the districts have larger potential for attracting investments due to already existing industrial muscle and ecosystem.

Phase 1 districts: Thiruvallur, Chennai, Kancheepuram

Phase 2 districts: Viluppuram

Land parcel availability

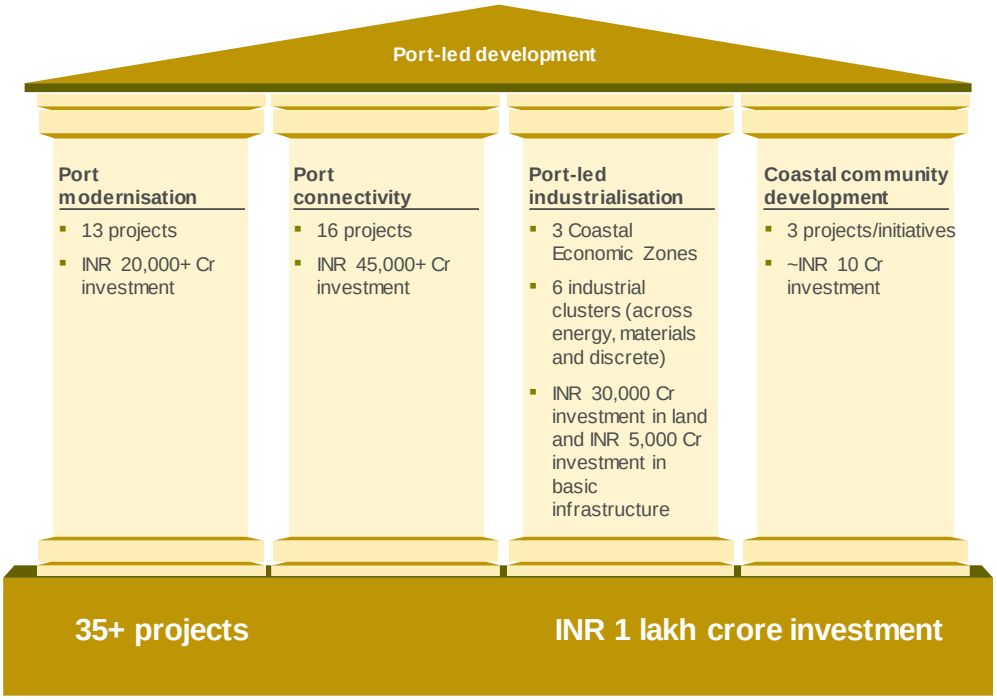
District	Land Bank Location [Estate]	Size [acres]
Chennai	Vallam-Vadagal	540.28
Chennai	Sriperumbudur	137.57
Thiruvallur	Thervoykandigai	204.88

Impact

In the Sagarmala National Perspective Plan, the above mentioned, more than 35 projects have been classified under the four pillars of port-led development. These projects would require investments of~ INR 1 lakh crore. The industrial clusters could generate 8 lakh to 10 lakh jobs in the next 10 years.

EXHIBIT 73

Sagarmala: Port-led development



WEST BENGAL CEZ PERSPECTIVE PLAN

West Bengal is a strategically positioned state that operates as India's gateway to the Northeast and also the port entry point for the land-locked states of central India as well as Nepal and Bhutan. It occupies a tactically important location on the trade route to Southeast Asia and the ASEAN countries.[8]

The state has two major ports, Kolkata and Haldia, situated along its long coastline of over 950 km, while another deep sea port is being developed. In 2014–15, the combined volume of goods handled by both ports was around 46.29 mn tonnes (31 mn tonnes at Haldia and 15.3 mn tonnes at Kolkata).

The capital, Kolkata is the location for various corporate headquarters and is one of the four important cities of the state that are designated for development as Smart Cities.

CURRENT ECONOMIC SCENARIO

West Bengal is India's sixth-largest economy, and it contributed roughly 6 per cent to the country's economy in 2014-15. E-governance initiatives in taxation helped state revenues to grow by 30 per cent in the year 2012–13.

The contribution of the manufacturing industry to the state's GDP was around 17 per cent in 2015–16. Agriculture contributed around 14 per cent to the state GDP in 2015–16. The state is rich in natural resources of minerals and has suitable agro-climatic conditions for agriculture, horticulture and fisheries. Kolkata also has the third highest GDP based on purchasing power parity among other Indian cities. The cost of operating a business is lower in Kolkata than in other metropolitan cities.

According to the Department of Industrial Policy and Promotion (DIPP), West Bengal saw FDI inflows of around USD 3.69 bn between April 2000 and September 2015. This represents around 2 per cent of India's total FDI inflows.

MAJOR INDUSTRIES

Natural resources, policy incentives and infrastructure in West Bengal support investments in major sectors such as iron and steel, biotechnology, coal, leather, jute products, tea, IT and gems and jewellery. Haldia, Kolkata, Kharagpur and the

[8] All the information given in the introduction until "Exports" has been sourced from *West Bengal*, a report by the India Brand Equity Foundation, http://www.ibef.org/states/west-bengal.aspx, and the *Investment and Industrial Policy of West Bengal 2013*, a report by the state government.

Asansol–Durgapur regions are the major industrial areas. West Bengal has around 3,000 acres of land to set up industries.

West Bengal occupies a predominant position in the development of micro and small-scale enterprises. Its more than 900 small-scale enterprises account for 7 per cent of the total units in the country. There are 3.5 mn working micro, small and medium enterprises, both registered and unregistered, employing around 8.6 mn people. There are 12 growth centres for medium and large-scale industries, set up by the West Bengal Industrial Development Corporation (WBIDC), as well as exclusive growth centres for electronics, software technology and export processing.

Suitable climatic conditions have supported West Bengal's emergence as a major centre for the cultivation and production of tea, jute and related industries.

Some of these industries are discussed here in greater detail:

- Agriculture: In 2014–15, agriculture contributed 18.8 per cent to the state's GSDP. It is also the primary occupation for the people of West Bengal. The state is the largest producer of rice in India (15.35 mn tonnes in 2014–15). West Bengal contributes nearly 79.6 per cent of the country's total jute production. Tea is also an important cash crop, with the major tea gardens located in Darjeeling and Jalpaiguri.
- Petrochemicals and downstream industries: The state accounts for almost 4 per cent of petroleum products and 13 per cent of polymer production in the country. Production has nearly doubled in the last decade. It also accounted for around 3.8 per cent of the country's refinery crude throughput in 2014–15. Haldia Petrochemicals Limited (HPL) is one of India's largest integrated petrochemical complexes. Of the total number of HPL downstream industries set up from January 1998 to December 2005, 705 are in West Bengal. The growth of the petrochemical sector has been very impressive in terms of units set up and investment volume. The main reason for the recent growth of this industry is due to upstream and downstream industry linkages by the oil refining and petrochemical units set up in the state. The industry will receive another boost as a USD 1 bn gas pipeline project has been announced to bring natural gas to the state.
- Electronics and information technology: West Bengal has always been regarded as a state with high intellectual capital and immense potential to emerge as one of the most attractive investment destinations for the IT/ITES sectors. But it contributes only about 2.6 per cent to the country's software turnover. In 2014–15, more than 550 IT and ITES companies were operating in the state, employing approximately 135,000 professionals, mainly in Kolkata. By 2020, the state aspires to feature among India's top three states by turnover and employment in the IT and ITES and ESDM sectors. It also aims to create an investor-friendly climate to increase its share in the production of electronic goods in the country to 15 per cent by value.
- Iron and steel: Owing to rich reserves of iron ore in the neighbouring states as well as local coal deposits, West Bengal has historically had a stronghold

in this sector and is home to some of the country's leading public and private firms. Iron ore deposits have helped attract new projects. The state has also emerged as a favoured destination for the steel industry and accounts for about 10 per cent of the country's total steel capacity. Durgapur, popularly known as the Steel City of Eastern India, has two major steel plants: Durgapur Steel Plant and Alloy Steel Plant. Projects involving the modernisation and expansion of Durgapur Steel Plant are in progress. These are expected to increase its capacity to around 2.12 mn tonne of saleable steel from the current 1.6 mn tonne. Coal production reached 21.66 mn tonne in 2014–15, and stood at 5.33 mn tonne between April to June 2015 alone.

- Leather and leather products: West Bengal is one of the country's leading states for the export of finished leather goods and accounts for almost 25 per cent of the country's leather exports. The state has more than 500 manufacturing units for leather and leather goods. The West Bengal Leather Industrial Development Corporation supports small and micro scale industries for the development and marketing of leather goods. Kolkata is home to the second most important tanning centre in the country, accounting for 22 to 25 per cent of the country's tanning activity.

MAJOR EXPORTS

Total exports stood at about USD 9.02 bn in 2014–15. EXIM data shows that exports and imports through the major ports were doing very well before decelerating in 2010–11 due to the economic slowdown. Some of West Bengal's export commodities are:

- Leather: West Bengal is one of the leading exporters of finished leather goods.
- Software and engineering: West Bengal plans to raise its share in the country's IT exports from 8.2 per cent in 2014–15 to 25 per cent by 2030. It also accounts for about 60 per cent of engineering goods export from Eastern India.
- Petroleum products: West Bengal accounts for around 4 per cent of the country's production of petroleum products and 13 per cent of polymer production.
- Fisheries: West Bengal is the largest fish-producing state and accounts for about 18.51 per cent of the total fish production in India, as of December 2014.
- Agriculture and floriculture: The state is the leading exporter of potatoes to Sri Lanka and Bangladesh. Other export products include jute, tea and rice. Exports of non-basmati rice from the state increased from around USD 440 mn in 2013–14 to nearly USD 548.86 mn in 2014–15. Floriculture exports from the state have also been growing steadily.

INDUSTRIALISATION AND INVESTMENT CLIMATE IN WEST BENGAL

The post-liberalisation era has given West Bengal a chance to boost industrial growth, private investment and employment generation. The state government took up the initiative to usher in rapid industrialisation, announcing a new industrial policy in 1994. A self-sufficient state, West Bengal can meet all the key requirements for setting up an industry. It has rich coal resources, surplus power conditions, healthy monsoons and a high water table. With a large, trained and skilled workforce, the state looks forward to reclaiming its position among the frontrunners in industry and investment across the entire country.

The state government proposes to achieve the objectives of the recent investment and industrial policy in many ways:

- Creating quality infrastructure in the industrial clusters as well as the "state manufacturing zones" in line with the National Industrial Manufacturing Zones (NIMZ).
- Promoting industrial corridors to capitalise on locally available resources and strengths.
- Adopting a coordinated approach to the development of all sectors of the economy—creating and consolidating sufficient land banks by developing agencies to meet current and future requirements of entrepreneurs.
- Leveraging existing strengths in sectors such as food processing and agro, textiles, gems and jewellery, petrochemicals and downstream and leather by optimising available resources, e.g., agricultural and horticultural output, mineral deposits, marine, natural gas and coal, and, workforce.
- Encouraging private sector participation in infrastructure projects under the public–private partnership (PPP) model, especially in industrial infrastructure, power, communication, roads and bridges, ports, airports, tourism and hospitality, health and education sectors.
- Offering the convenience of single-window clearance for the industrial proposals.

The state has outlined opportunities of around USD 736.5 mn for PPP projects, especially in tourism. The Himalayan mountain range, the largest riverine delta, a mangrove forest, Sunderbans and the tea gardens in Darjeeling are some of the state's main tourist attractions. The establishment of the West Bengal Infrastructure Development Fund is aimed at meeting the financing needs of PPP projects. Three new medical colleges have been planned in Kolkata, Krishna Nagar in Nadia and Cooch Behar on a PPP model.

The proposed Eastern Dedicated Freight Corridor will have the starting node in Ludhiana and ending node in Dankuni (Hooghly district) which leads up to the proposed CEZ in West Bengal. The corridor will enable efficient evacuation of break-bulk cargo and potentially containers to the Haldia and Sagar port.

In addition to the DFC, the Union Govt. has also proposed the Amritsar Delhi Kolkata Industrial corridor between the cities of Amritsar, Delhi and Kolkata. The

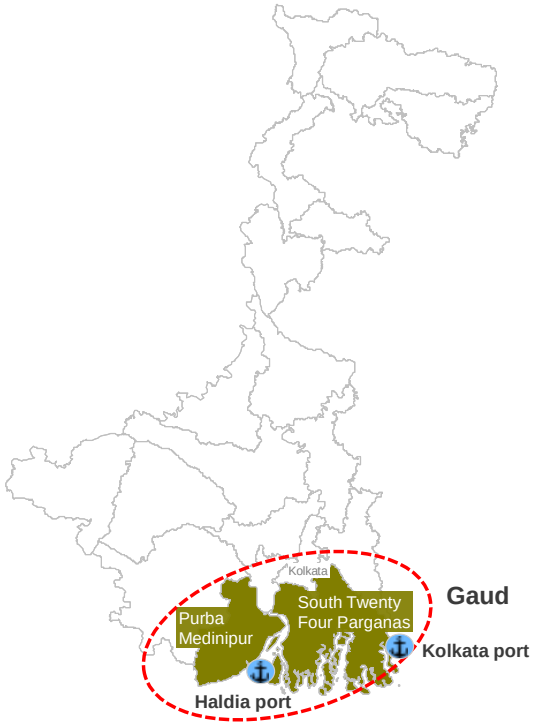
corridor will create a major push for industrialization and job-creation and the ADKIC will act as a catalyst for this growth. The project cost proposed is estimated to be ~ ₹5749 crore (US$850 million) for the first phase.

COASTAL ECONOMIC ZONE IN WEST BENGAL

The Gaud region in West Bengal has been identified as a coastal economic zone. The CEZ could cover two districts: South Twenty-Four Parganas and Purba Medinipur, which contribute around 10 per cent to state GDP and 15 per cent to state population.

EXHIBIT 74

Gaud coastal economic zone



Industrial complexes

The CEZ comprises of Haldia Industrial Park developed by the West Bengal Industrial Development Corporation which could act as a potential investments attraction centre due to already established eco-system.

The CEZ also has a planned Petroleum, Chemical and Petrochemical Investment Region. While the project was scrapped in 2012, the recent government the Union Govt. has approved the project as of now. The PCPIR will be spread over a contiguous area of more than 250 Sq. Km. – comprising of Haldia Mainland and Nayachar Island. It is a Brownfield site with large existing petroleum, chemical and petro-chemical units along with port and supporting infrastructure. The

additional processing area is being developed on the Nayachar Island. The PCPIR will consist of ~108 sq.km. (27,104 acres) of processing area and non-processing area is around 141 sq.km. (35,444 acres) of non-processing area. The targeted investment for PCPIR is Rs. 93,180 crore, of which Rs. 48,180 crore is committed. IOC has been identified as the Anchor Tenant along with CALS Refinery.

The CEZ also covers two of the state's dock complexes: Kolkata and Haldia. Sagar Port is also expected to come up in the region.

- Kolkata is a riverine port predominantly handling containers. The traffic at Kolkata Port is expected to grow from around 15 MTPA to around 25 MTPA in 2025.
- Haldia Port primarily handles containers, coking coal, iron ore and fertilisers in dry and break bulk cargo and POL in liquid bulk. Of these commodities, liquid bulk and coking coal constitute around 50 per cent of the cargo. The traffic at Haldia port is expected to go up to around 55 MTPA from 31 MTPA currently on account of growth in POL and coking coal traffic.

The primary hinterland for this cluster includes West Bengal, Bihar, Jharkhand, the Northeast and Odisha.

Since the existing industries near Haldia Dock are planning to expand capacity, Kolkata Port Trust has announced that it intends to upgrade Haldia Dock's cargo handling capacity by building riverine jetties. This is currently underway.

The entire stretch of the Ganges between Haldia and Allahabad (in Uttar Pradesh) extends over 1,620 km, and the Government of India has designated this as National Waterway 1 (NW1). The Haldia–Farakka segment of NW1 has been developed to be part of the multi-modal system for cargo travelling between Nepal, Bhutan, North Bengal and the Northeastern states of India.

Iron and steel has been the major industry in the region with multiple steel plants dotting the state. Other industries like leather, textiles, food processing, etc., have also done well in West Bengal.

Haldia port and key cargo commodities

HDC is a major port in West Bengal handling ~31 MTPA of cargo. It handles containers, coking coal, iron ore, fertilizers and POL. Out of these commodities, liquid bulk and coking coal constitute ~50% of the cargo. Haldia currently has West Bengal as its primary hinterland with other hinterlands including Bihar, Jharkhand, North East and Orissa. Going into the future we expect to see this traffic to go up to 54-65 MTPA by 2025.

Major commodities

POL

POL crude and product constitute 18% of traffic handled. The current traffic of 5.5 MTPA is split between crude, POL product-EXIM and coastal movement and LPG. IOCL Haldia is the key player for the crude oil imports. The current and the estimated traffic of POL in 2025 is shown below.

With no significant capacity expansion expected at Haldia and no new facility planned, POL crude traffic is increasing minimally. However, LPG imports are expected to increase with government's focus on distribution of LPG connections to rural households. It has also been proposed to setup LPG import terminal at Haldia.

Thermal Coal

Currently Haldia imports 3.5 MTPA of thermal coal to meet the blending requirement of the power plants in the hinterland (NTPC Farakka). In addition, it also exports 1.2 MTPA of thermal coal, which is coastally shipped to TNEB power plants. Going forward, with the output of ECL increasing, overseas coal imports is unlikely to increase. By 2025, thermal coal imports is likely to range around 3-4 MTPA while the coastal coal exports will be around 2 MTPA.

Coking Coal

Currently Haldia imports 6 MTPA of coking coal primarily to meet the energy requirement of the steel plants in the hinterland. Haldia is the nearest logical port for 4 major steel plants – Durgapur, IISCO, Bokaro and Rourkela. But due to low draft, only a part of these plants' requirement is met by Haldia, the remaining is catered by Dhamra and Paradip port which have a much higher draft, allowing for bigger vessels to call at the port. Going forward, coking coal import is expected to increase and touch 8 MTPA by 2020 and 11-12 MTPA by 2025

Containers

Haldia port currently handles 0.1 Mn TEUs of containers, catering primarily to West Bengal hinterland. Kolkata, Durgapur, Haldia are the key container generating hinterlands for HDC and KDS generating ~60% of the overall traffic and small volume move to/from Bihar, Jharkhand and other parts of West Bengal. Kolkata's GDP is expected to grow at 9-11% while most other hinterlands are expected to grow at 8-10% CAGR.

With the capacity at KDS getting saturated, spill over traffic is expected to come to Haldia port. Going forward, container volumes are expected to touch 0.15 Mn TEUs by 2020 and 0.2-0.3 Mn TEUs by 2025. In case of capacity constraints, part of this traffic will move to Dhamra and Sagar.

Other localized commodities

Other commodities include iron ore, manganese, vegetable oil, chemicals, limestone, etc. With the mining ban on iron ore, exports are expected to remain low, while chemicals and vegetable oil will grow at a healthy rate.

Kolkata port and major commodities

Kolkata handles containers, coking coal, iron ore and fertilizers in dry and break bulk cargo and POL in liquid bulk. Out of these commodities, Containers alone constitute ~53% of the cargo. Kolkata currently has West Bengal as its primary hinterland for containers with other hinterlands including Bihar, Jharkhand, North East and Orissa.

Major commodities

Assessment of traffic has been done based on analysis of past traffic at Kolkata, interviews with Port authorities, West Bengal Industrial Development Corporation (WBIDC) as well as several stakeholders in the shipping and user industries.

Hinterland for container traffic at Kolkata is expected to remain the same going forward. Tidal draft, limited plans for capacity expansion and no mainline vessel call for containers in India limit growth in hinterland for Kolkata.

Kolkata port currently handles ~0.5 Mn TEUs of containers, catering primarily to West Bengal hinterland. Kolkata, Durgapur, Haldia are the key container generating hinterlands for HDC and KDS generating ~60% of the overall traffic and small volume move to/from Bihar, Jharkhand and other parts of West Bengal. Kolkata's GDP is expected to grow at 9-11% while most other hinterlands are expected to grow at 8-10% CAGR.

Based on above, Kolkata is expected to handle 0.7-0.8 Mn TEUs by FY25 and further increase in traffic is limited by the port's planned capacity of 0.8 Mn TEUs.

Port led industrialization

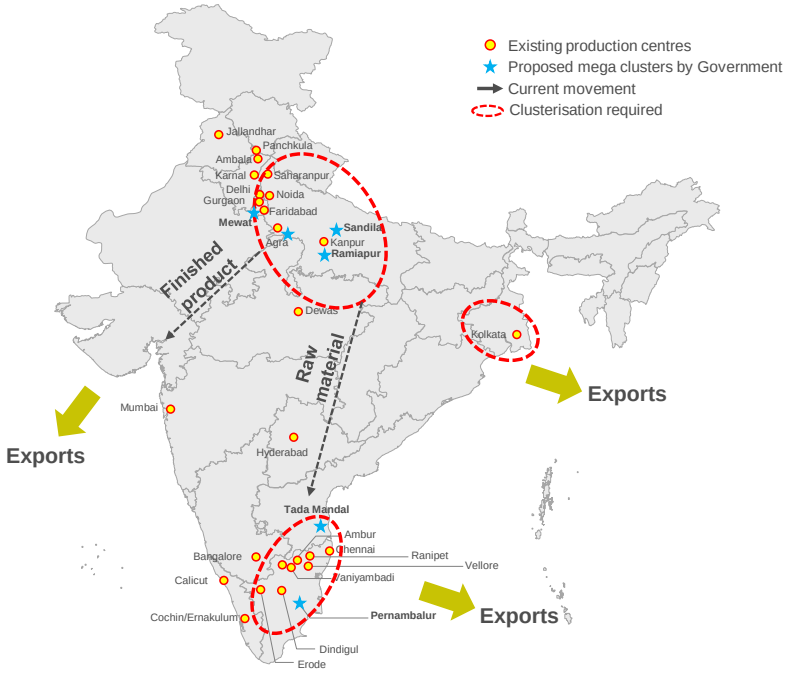
Based on the traditional stronghold of industries and focus of state government, a few high potential industries have been identified for the state.

- Leather processing

The leather industry is one of the major earners of foreign exchange in the country. India exported around USD 6 bn of leather and associated products in 2014. West Bengal, with many exporting units concentrated in the Bantala region, is a significant contributor to that figure.

EXHIBIT 75

Leather production centres in India



The port-based approach has played an important role in building the competitiveness of leather footwear and leather goods manufacturers in China. Wenzhou in China is a port-based footwear cluster and is known globally as the shoe capital of the world. Building a leather cluster near Indian ports can similarly increase the export competitiveness of Indian manufactured leather and leather products. This will reduce the transportation costs involved in exports. Situating a leather cluster near ports will also help to reduce the hinterland travel cost of the chemicals used in the leather industry, most of which are imported. As an additional advantage, the input water for desalination can be taken directly from the sea.

A leather processing park could therefore come up in the CEZ, and the export-ready products from it could be evacuated using Kolkata Port.

Port modernisation and connectivity projects

- LPG import terminal at eastern ports (Haldia, Paradip and Dhamra)
- Road connectivity between proposed Port at Sagar Island and Muriganga Bridge and between Muriganga Bridge and proposed rail yard at Kashinagar
- Rail connectivity between proposed port at Sagar Island and Kashinagar rail station

- Improvement of existing road connecting Kolkata Port Trust to NH6 and to nearby industrial clusters
- Expressway from Panagarh (Durgapur) to Haldia
- Mechanisation of Berth 3 at Haldia Dock Complex at Haldia
- Building barge jetties to support the anchorage operations at Haldia
- New exclusive berth outside dock for edible oil and chemicals at Haldia
- Development of multipurpose berth outside the dock basin at Haldia
- Setting up of second railway line from Durgachak take-off point to "A" cabin at Durgachak at HDC, Haldia
- Construction of RoB cum flyover at Ranichak level crossing at Kolkata Port
- New ICD development in North Bengal (Darjeeling)
- New port at Sagar
- Repair of EJC railway marshalling yard

In terms of setting up Coastal Economic units under CEZ's, the development coud be taken up in a phased process initiating with the districts have larger potential for attracting investments due to already existing industrial muscle and eco-system.

Phase 1 districts: Purba Medinipur, South twenty Parganas

Land parcel available

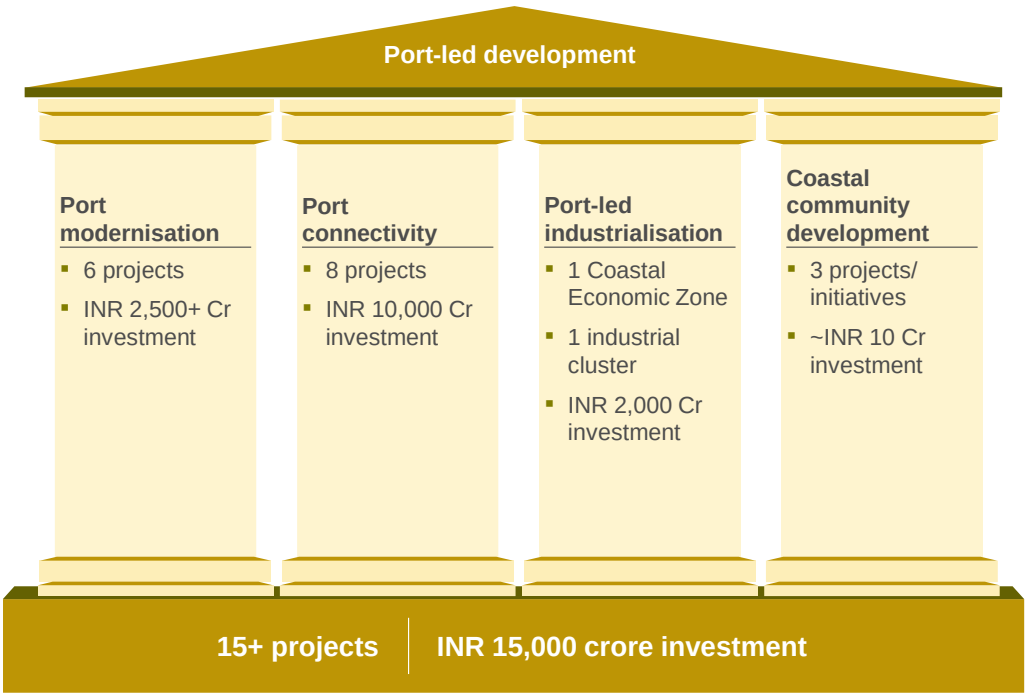
District	Land Bank Location [Estate]	Acres
Purba Medinipur	Haldia Industrial Park, Haldia	307

IMPACT

The Sagarmala National Perspective Plan has classified these 15-plus projects under the four pillars of port-led development. These projects will require investments worth ~INR 15,000 crore. The leather and footwear industrial clusters could also generate around 2 lakh jobs in the next 10 years.

EXHIBIT 76

Sagarmala: Port-led development



MAHARASHTRA & GOA: CEZ PERSPECTIVE PLAN

Maharashtra is an industrialised state with impetus on small-scale industries, and has the largest number of special export promotion zones. It has also emerged as a key hub for IT and ITeS, electronics and captive-business outsourcing industries.[9] Its capital, Mumbai is also the commercial capital of India and has evolved into a global financial hub. It is home to most of the major corporate and financial institutions as well as India's main stock exchanges and capital market and commodity exchanges.

Besides four international and seven domestic airports, Maharashtra has two major ports, Mumbai Port Trust (MbPT) and Jawaharlal Nehru Port Trust (JNPT). In addition, there are 53 minor ports. Around 1,254.62 lakh tonne traffic was handled at the two major ports in 2014–15.

Goa is one of the fastest growing states in the country, located right below Maharashtra. It has a coastline of about 104 km and inland waterways of around 250 km.

CURRENT ECONOMIC SCENARIO

Maharashtra's GDP for 2015–16 was estimated at INR 10,90,598 crore at 2004–05 constant prices, contributing around 13 per cent to national GDP. The state GDP has grown nearly 7 per cent in the last five years. The Maharashtra government has targeted a growth of 12.5 per cent in the 12th Five Year Plan, and nearly USD 50.6 bn has been allocated to accelerate economic growth by implementing specially designed growth-oriented policies.

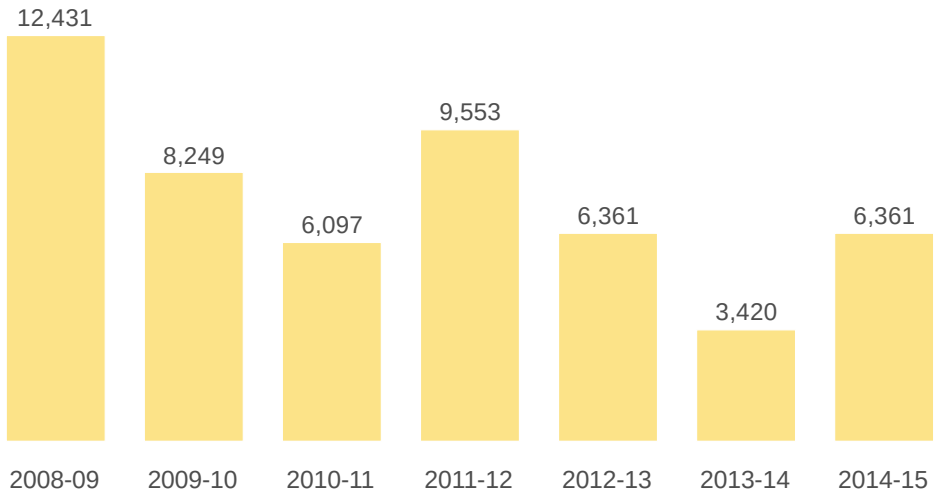
Maharashtra is regarded as one of the favoured destinations for industrial investment in the country, one of the most industrialised states and has successfully attracted a large share of domestic and foreign industrial investments in the post-liberalisation era. It adopted the Special Economic Zone (SEZ) Policy with effect from February 2006. The SEZs aim to promote rapid industrial development as well as employment generation, expecting that this will help in the inflow of large foreign and domestic investments in infrastructure for the SEZs and productive capacities, leading to additional economic activities and employment opportunities.

Total FDI in the state from April 2000 to September 2015 was approximately USD 76.5 bn, the highest among all states in the country.

[9] All the information given in the introduction until "Exports" has been sourced from *Maharashtra* and *Goa*, reports by the India Brand Equity Foundation, the *Economic Survey of Maharashtra 2014–15* and the *Industrial State Profile of Maharashtra 2013–14*, unless otherwise specified.

EXHIBIT 77

FDI equity inflows in Maharashtra[1]
USD million



1 Includes Maharashtra, Dadra & Nagar Haveli and Daman & Diu
SOURCE: Department of Industrial Policy and Promotion

MAJOR INDUSTRIES

Maharashtra

The Maharashtra Industrial Development Corporation (MIDC) is responsible for the growth of all industrial infrastructure. According to the MIDC, Mumbai also has 305 industrial units. The MIDC has also invested around USD 648 mn in various projects in Mumbai, providing employment to about 50,000 people. The Maharashtra Agro Industries Development Corporation, on the other hand, looks after the development of agro-based units.

The state government is also promoting the development of several SEZs for various sectors, such as IT/ITES, pharmaceuticals, biotechnology, textile, automotive and auto components, gems and jewellery and food processing.

- Gems and jewellery: The Indian gems and jewellery sector is primarily located in Maharashtra (and Gujarat) and employs around 1 mn people directly and indirectly. Mumbai and Surat are the most important diamond-cutting and diamond-polishing centres respectively. Mumbai is also an important export–import centre for gems and jewellery.
- IT/ITEs: The main IT/ITES clusters are in Greater Mumbai, Pune, Thane, and Nasik. Pune is the leader in Business Process Outsourcing (BPO) services. The state government is, focusing on providing IT-related infrastructure, fiscal

incentives to IT units and an institutional framework to this sector. Maharashtra's IT policy for 2015 offers an additional 100 to 200 per cent FSI and space utilisation to IT/ITES as well as animation, visual effects, gaming and comics (AVGC) parks, with a premium recovery of only 10 to 30 per cent, subject to conditions. Of the total 465 IT parks, 144 parks are already operational with an overall investment of USD 552.7 mn, while USD 1,485.5 mn has been proposed for the remaining projects in the processing phase.

- Textiles: Maharashtra contributes about 11.4 per cent to the country's textiles and apparels output, and is the largest cotton producer, accounting for 25 per cent of the country's total cotton production (65 mn kg). The textile industry is strategically quite important as it is the single largest employer, accounting for 10.2 per cent of the country's employment in the sector. It produces 12 per cent of India's total production of cotton yarn (nearly 272 mn kg). The textile industry contributes around 28 per cent to India's total exports.
- Mining: Up to 31 March 2013, nearly 258 mines were in operation in Maharashtra, accounting for the employment of roughly 48,091 people. During 2012–13, approximately INR 4,153 cr worth of minerals (total value) was extracted.
- Construction: The economic slowdown affected the construction industry in Maharashtra, with fewer developers queuing up for permission to build across major cities, including Mumbai and Pune. Only Solapur recorded growth. The number of upcoming projects in Mumbai dropped to 429 (with a total construction area of 19.32 lakh sq m) from 444 projects (17.44 lakh sq m) in the previous year.

Goa

Apart from having an established iron ore mining industry, Goa has emerged as a manufacturing base for several leading companies in various areas, such as fertilisers, tyres and tubes, cement, electrical machinery, fish-net making machines, automatic washing machines, printed circuit boards, pharmaceuticals and pharmaceutical machinery. Mining (iron ore and manganese), pharmaceuticals and iron and steel industries are located in North Goa, with the mining and shipbuilding industries in South Goa. Tourism is the largest segment in the services sector and the Goa Tourism Development Corporation (GTDC) is responsible for promoting tourism in the state.

- Fisheries: The fisheries sector contributes over 2 per cent of the total GDP, ranking third after West Bengal and Andhra Pradesh. It has a roughly 17 per cent share in the agricultural GDP of Goa. However, marine fisheries resources of Goa have been showing a fluctuating trend. Most of the resources are getting depleted and some of the highly commercial resources have already shown negative growth patterns. The monsoon trawl ban practiced along the Goa coast is an example of the temporal input control mechanism. The existing regulatory framework could be implemented to

sustain the fishing activity by traditional and motorised vessels in inshore waters and by mechanised units in offshore waters.

- Mining: Goa's mining belt covers an area of around 700 sq km, concentrated mostly in the four talukas of Bicholim, Salcete, Sanguem and Quepem. The average annual production of iron ore is about 15 to 16 mn tonne, out of which 40 to 50 mn tonne of mining waste is generated. The total annual royalty collection on major minerals is around INR 250 crore. The iron ore production in the state increased from around 22 mn tonnes in 2004–05 to 150 mn tonne in 2014–15.
- The handicrafts industry has been flourishing with the huge inflow of tourists. Seashell craft is a popular product. The state government is considering branding its handicrafts indigenously as part of an initiative to promote the cottage industry. It intends to construct a mall known as "Shilpagram" to facilitate the sale of handicrafts. The state-run Goa Handicrafts Rural Small Scale Industries Development Corporation (GHRSSIDC) also plans to set up an e-marketing platform. The government will also identify ethnic crafts and traditions that are fast disappearing and train the artisans through master craftsmen, which will help local artisans.
- Marketing strategies projecting Goa as an all-time leisure destination have boosted tourist inflow over the years. Tourism is one of the primary sources of revenue for Goa, which receives over 12 per cent of India's tourist arrivals. In 2014–15, the state attracted more than 3 mn tourists, a quarter of whom were foreign visitors. Tourist inflows increased by at least 30 per cent in 2014, compared to 2013. During 2014–15, the Ministry of Tourism of India sanctioned around USD 1 mn to promote tourism at heritage sites in the state. The state government has also extended e-Visa facilities to around 150 countries.

  The government has encouraged public–private partnerships for promoting tourism by instituting a corpus fund. In the 2015–16 budget, around USD 43 mn was allotted for tourism, nearly double the amount in 2014–15. A special purpose vehicle (SPV) worth more than USD 1mn is expected to commence and will help the international convention centre at Panaji to provide world-class facilities at one place.

MAJOR EXPORTS FROM MAHARASHTRA AND GOA

Maharashtra is known for the export of commodities, such as gems and jewellery, software, textiles, readymade garments, cotton yarn, metal and metal products, agro-based products, engineering items, drugs and pharmaceuticals, and plastic and plastic items. During 2014–15, exports from the state were around USD 73.9 bn. Exports from the state grew at a CAGR of 7.02 per cent between 2008–09 and 2014–15.

EXHIBIT 78

Exports from Maharashtra and India

INR crore

Year	Maharashtra	India
2007-08	1,72,846	6,40,172
2008-09	2,26,794	8,39,978
2009-10	2,28,184	8,45,125
2010-11	3,08,515	11,42,649
2011-12	3,94,005	14,59,280
2012-13[1]	1,74,011	6,44,486

1 Upto August

SOURCE: Directorate of Industries GOM, upto August

Export commodities from Maharashtra and Goa include:

- Sugar: Maharashtra is the largest producer of sugar in the country. In May 2015, the state government approved a subsidy of USD 16.7 per tonne (up to the extent of 800,000 tonne) for the export of raw sugar. In November 2015, Maharashtra sugar mills entered into a deal with the neighbouring markets of Sri Lanka and Bangladesh for exporting 2 lakh tonne of white sugar. In September 2015, the state government announced that the state is expected to export 4 mn tonne of sugar during 2015–16.
- Pomegranate exports rose by 33 per cent from 2013–14 to stand at 40,000 tonnes in 2014–15. During 2015–16, the state government expects export volumes to reach 60,000 tonnes, with production volume ranging between 1,200 to 1,300 thousand tonne.
- During 2014–15, Maharashtra accounted for around 30 per cent of the country's software exports with the help of 1,200 software units in the state.
- Iron ore exports from Goa contribute to over 60 per cent of India's total exports, amounting to nearly INR 1,000 crore per annum. On an average, about 3 tonnes of mining waste has to be excavated to produce a tone of iron ore. Goa mainly produces low grade iron ore (iron content between 55 and 58 per cent), which is mainly exported to China and Japan, among others.
- Fisheries export from Goa is more than 2 per cent of the total fisheries exported by India, contributing around INR 35 crore to the country's foreign

exchange. In 2011–12, the GSDP share of fisheries for the agriculture and allied sectors was a little over 1 per cent. During 2012, the marine fish production was around 86,628 tonne and inland fish production was around 3,887 tonne was achieved while nearly 40,000 tonne of fish was exported, earning a revenue of INR 36,844 lakh.

Maharashtra as an investment destination

The Government of Maharashtra has been trying to endorse the state as a lucrative investment destination through major initiatives. It has announced plans to invest around USD 1,658.2 mn to expand and advance railways infrastructure. It is promoting the development of several special economic zones (SEZs) across the state for various sectors, such as IT/ITES, pharmaceuticals, biotechnology, textile, automotive and auto components, gems and jewellery and food processing. As of 2014–15, the state had nine operational SEZs, the majority in the engineering and electronics sectors. The government is also focusing on providing IT-related infrastructure, fiscal incentives to IT units and an institutional framework to the IT sector. Besides this, as a part of the "Make in India" program, the state government is planning to create an electronics policy for companies interested in investing in this sector.

It is also setting up the Delhi–Mumbai Industrial Corridor (DMIC), a mega infrastructure project costing around USD 90 bn, with the help of the Government of Japan, which has agreed to lend more than USD 4 bn for this project. This is expected to boost India's manufacturing sector, and seven nodes are already under development for Phase–1 of the project.

To enhance the pharmaceutical sector in the state and improve research activities by investing in and developing skilled manpower, the government plans to establish the National Institute of Pharmacy Education and Research at Nagpur in 2015–16. It has also set up the state's first public–private international biotech park in Hinjewadi, near Pune.

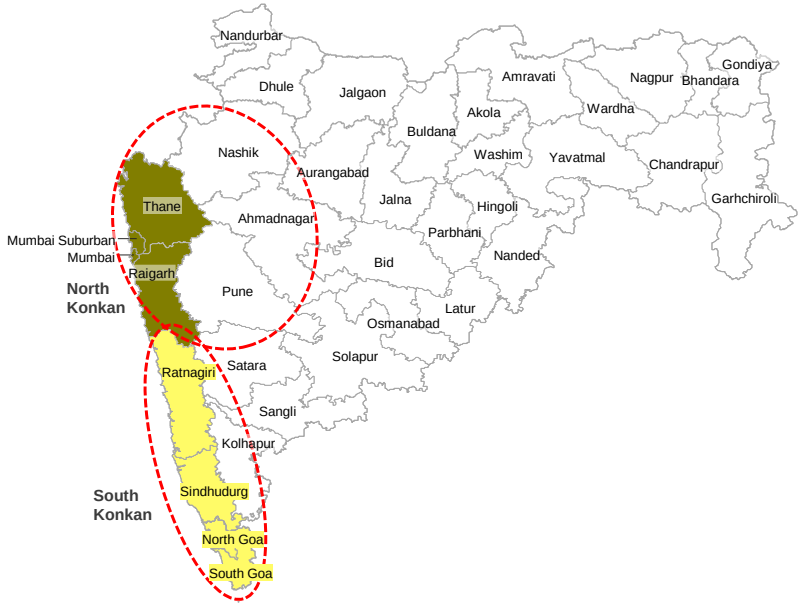
Textile parks, aimed to provide world-class infrastructural components for the textile sector and enhance productive capacity, are also being established across the state to maintain its leading position in textile exports and production.

COASTAL ECONOMIC ZONES IN MAHARASHTRA AND GOA

The states could be divided into two Coastal Economic Zones: North and South Konkan.

EXHIBIT 79

Maharashtra and Goa coastal economic zones



North Konkan Coastal Economic Zone (Maharashtra)

The North Konkan coastal economic zone could cover three districts: Mumbai, Thane, , Raigad. These districts account for around 60 per cent of state GDP. The Mumbai region alone (city and suburban) contributes around 40 per cent to state's GDP. This region is an automotive hub (Pune–Satara) contributing a large part of the total automotive production of the country.

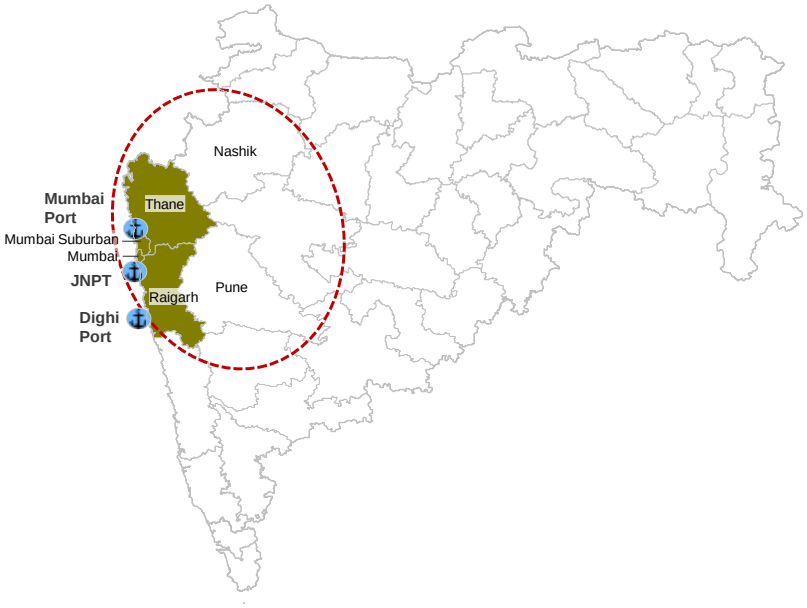
The CEZ also has two major ports: JNPT and Mumbai.

- JNPT handles containers, liquid cargo including POL, vegetable oil and chemicals and cement. The containers constitute 90 per cent of the total cargo. JNPT handled 4.2 mn TEUs in FY14 and this volume is expected to go up to around 9 mn TEUs by 2025.
- At Mumbai Port, 60 per cent of the total cargo is POL products and crude. The port handled around 62 MTPA of cargo in 2014–15, which is expected to go up to around 90 MTPA in 2025. Most of this incremental volume will come from the POL coastal shipping traffic. It should be noted that both the ports are running at over 90 per cent utilization and will require capacity

enhancements to support the expected incremental traffic in the next 10 years.

EXHIBIT 80

North Konkan coastal economic zone



The CEZ contains the end node of the Western dedicated freight corridor; which goes straight to the JNPT container port. It also contains the end node of the Delhi- Mumbai Industrial Corridor.

Delhi Mumbai Industrial Corridor is conceived to be developed as a Model Industrial Corridor of international standards with emphasis on expanding the manufacturing and services base and develop DMIC as the 'Global Manufacturing and Trading Hub'. Multiple investment regions (as shown in image below) have been planned as part of the project, to be executed under multiple phases.

EXHIBIT 81

Western Dedicated Freight Corridor

Major and minor industries in catchment areas

Location	▪ Covers a distance of 1483 km, JNPT to Dadri via Vadodara-Ahmedabad-Palanpur-Phulera-Rewari ▪ Passes through Haryana (192 kms), Rajasthan (553 kms), Gujarat (588 kms) and Maharashtra (150 kms)
Execution phases	▪ Phase I: Rewari- Vadodara (920 Kms): 2011-2017 (+3 yrs.) ▪ Phase II: Vadodara-JNPT (430Kms): 2012-2018 (+3 yrs.) ▪ Phase III: Rewari–Dadri (140 Kms): 2013-2018 (+3 yrs.)
Freight mix	▪ ISO containers from JNPT and Mumbai Port in Maharashtra and ports of Pipavav, Mundra and Kandla in Gujarat destined for Inland-Container depot's in northern India ▪ POL, Fertilizers, Food grains, Salt, Coal, Iron & Steel and Cement are the likely commodities moving on the route
Timelines & Status	▪ Was expected to be completed by 2019-2020 ▪ Running delayed, 900Km expected to be complete in the next 5 years ▪ 94% land acquired already
Funding & Contractor	▪ JICA (Japan International co-operation agency) has agreed to fully fund the project ▪ L&T- Sojitz has recently won the E&C contract

SOURCE: Capex CMIE database; Web and press search; Team analysis

EXHIBIT 82

DMIC

Aligment of Delhi Mumbai Industrial Corridor

SOURCE: DMIC Website

The CEZ also comprises of one operational special economic zone.

Name of the SEZ	Location	Type of SEZ
Arshiya International Limited	Village Sai, Taluka Panvel, District Raigad, Maharashtra	FTWZ

The Sagarmala National Perspective plan has identified high-potential industries and other port-related projects to leverage the potential of this coastal economic zone.

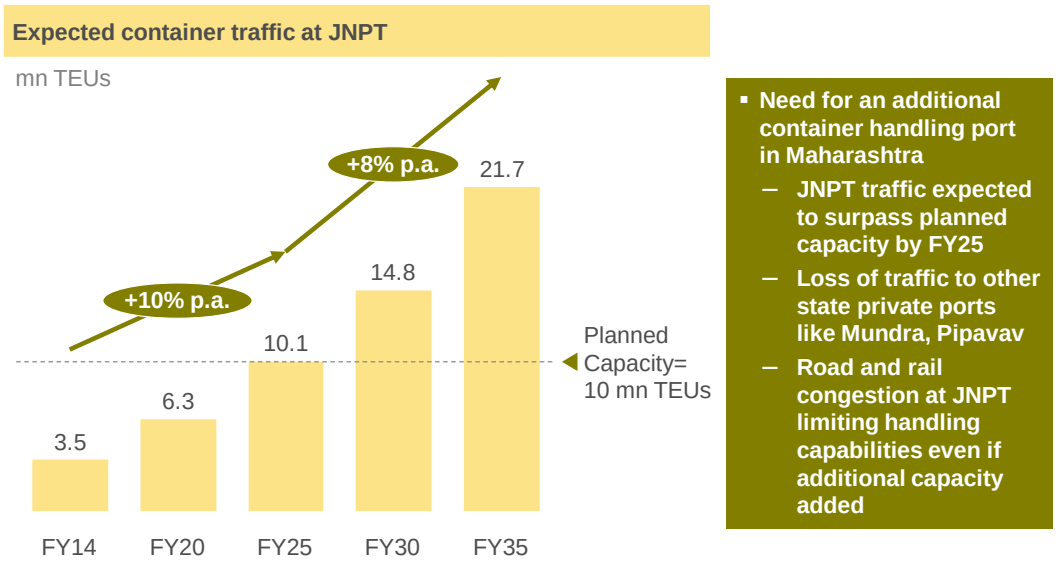
Northern Konkan CEZ

1. New port at Vadhavan

JNPT handles about 40 per cent of India's container traffic and is already running at close to 100 per cent utilization. The port handled 4.5 million TEUs of the 11.5 mn TEUs of container traffic in India in 2014–15. The capacity at JNPT after development of the fourth terminal is expected to reach 10 million TEUs, post which there will be limited space for further expansion. This will be just enough to cater to the projected traffic of around 10 mn TEUs at the port by 2024–25. Adding more capacity at JNPT is not feasible due to the binding constraints of evacuation capacity. Further, due to the presence of bed rock at or very close to the existing bed level, JNPT cannot be deepened further economically to handle the future generation of mega container ships that require a draft of more than 16 m.

EXHIBIT 83

Traffic projections for JNPT



SOURCE: Stakeholder interviews; McKinsey Global Institute; APMT

With limited potential for capacity expansion and deeper draft at JNPT, Vadhavan Port, around 190 km north of JNPT, could be developed as a satellite port. Vadhavan has deep draft of around 20 m close to shore which makes it feasible for the largest vessels to call at the port. Minimal need for maintenance dredging gives it a cost edge over other neighbouring ports, including JNPT, where the maximum draft can be 16 meters (with dredging) for the upcoming fourth terminal.

The proposed site for Vadhavan is 30 km from NH8, which connects Mumbai and Delhi. The closest railway station is Vangaon (around 12 km from the port site). Vadhavan is also on the proposed Western DFC from Dadri to JNPT. The nearest DFC station to north and south of Vadhavan will be Valsad in Gujarat and Vasai in Maharashtra, both around 100 km away.

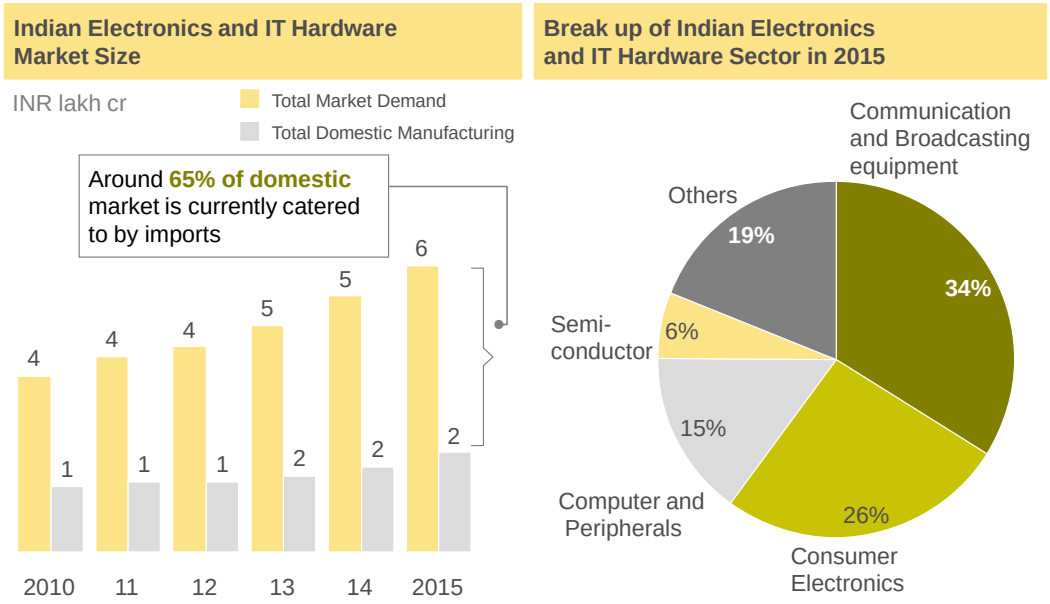
Port led industrialization

2. Science and Technology Park at JNPT/Dighi

The demand for electronics has grown at a consistent pace in India, reaching 6 lakh crore in 2015. Most the demand comes from communication and broadcasting equipment and consumer electronics. Production has been unable to keep pace with demand, remaining static at around 2 lakh crore. This has widened the gap between exports and imports, with around 65 per cent of the domestic demand being served from imports in 2015. The National Policy on Electronics (2012) lays out the vision of developing domestic electronics sector (ESDM) to achieve a turnover of about 400 USD billion, attract investment of about USD 100 billion and generate around 28 million jobs.

EXHIBIT 84

Indian electronics and IT hardware demand has grown at a steady pace of 10% CAGR in the last 5 years



SOURCE: NSDC report on Electronic and IT Hardware

Electronics manufacturing these days tends to have a global supply chain spanning countries and even continents. A port-proximate location will be a critical success factor for setting-up these fabrication units to link them with the global supply-chains:

- Import of raw materials: India will continue to import the raw materials needed for dicing/packaging operations (in short term) and for wafer production (in medium to long term). Many of these are classified as "photo-sensitives" and start losing yield after a period of 35 to 40 days.
- Linkage with export markets: The domestic demand for electronics chips in India will be insufficient to keep the fabrication unites fully loaded. The cost

of not loading a fab for one day could be USD 1 to 2 million. The most feasible business model for India would be for a global player to set up a fab in India to source their global requirement and serve local demand.

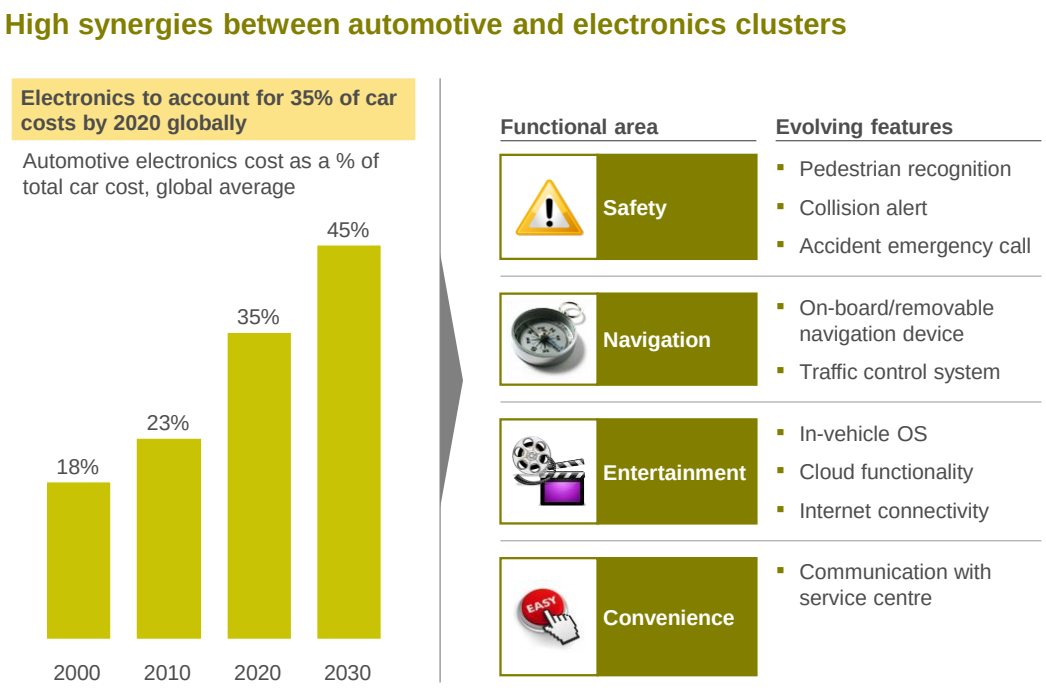
Successful port-based or port-proximate clusters create disproportionate value for the nation in terms of value added, exports, and jobs. For example, Hsinchu Science Park has grown to be a USD 35 bn revenue zone (equivalent to 7 per cent of Taiwan's GDP) starting from scratch in 1980. Chittagong Export Processing Zone generates USD 2 bn of exports, primarily apparel (equivalent to 2.5 per cent of Bangladesh's GDP). The value added at the Port of Antwerp is 6 per cent of Belgium's GDP.

Kick-starting upstream manufacturing will require an "ecosystem" approach. India should set up a "science and technology park" that creates this ecosystem instead of piecemeal electronics clusters.

The choice of location for setting up electronics manufacturing clusters will depend on two criteria:

- Availability of urban and social infrastructure: Science and technology parks will need to attract expats and Indians working abroad in high-tech industries. An existing developed social and urban infrastructure (e.g., proximity to research universities, international airport, metropolitans) will be a key success factor.
- Synergies with other sectors, e.g., automotive: We estimate that by 2020, almost 35 per cent of total car cost will be related to electronics components.

EXHIBIT 85



SOURCE: PTW-Hawk survey; strategy analytics

Proximity to talent and a port are other important enablers for setting up the cluster. Based on these considerations, there are two locations for setting up the first two potential science and technology parks in India: JNPT or Dighi SEZs.

JNPT has a declared 700-acre SEZ. Dighi port has a declared 500-acre SEZ and total land availability of 2,000 acres. Both seem like ideal choices for a science and technology park as they could have synergies with the Pune-/Satara-based automotive cluster. The Pune region has quite a few IT and electronic manufacturers. Many companies have announced that they are setting up assembly facilities for telecom and other electronic items in the state. JNPT is at hand for a potential park to source incoming components and to export the finished products. The electronics park could also draw synergies with the Pune-/Satara-based automotive cluster.

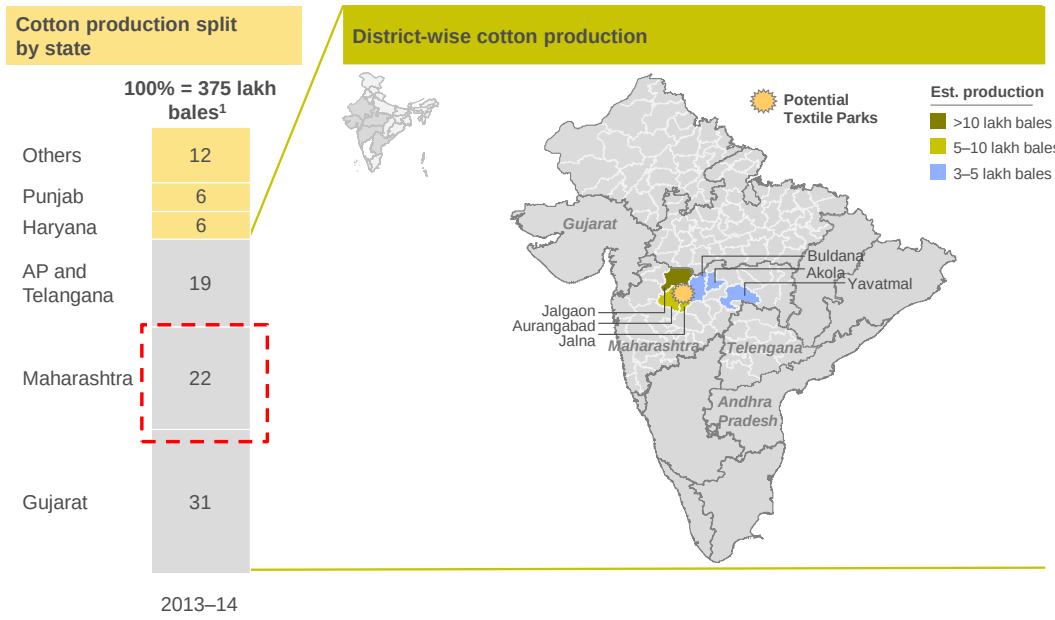
3. Apparel park in Vidarbha region (Aurangabad)

The region produces the second highest volume of cotton in the country after Gujarat. Some of the most productive districts are located in Maharashtra—Jalgaon, Aurangabad, Jalna, Buldana and Akola. On the basis of proximity to locations of cotton production, setting up a textile park near Dighi would lower

the overall cost of production. Being export-oriented, textiles can be a clear competitive advantage for the state if established in a textile park next to the port facility.

EXHIBIT 86

Proposed apparel park in Maharashtra



1 of 170kg
2 Based on "Cotton statistics at a glance" published by Directorate of Cotton Development & National Centre for Integrated Pest Management

4. Power complex at Vadhavan port

India's demand for coal in 2014–15 was around 850 MTPA, primarily from coal-fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent. Power demand in India is expected to reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then with "24/7 power to all", the peak demand could be as high as 280 GW. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal-based thermal power plants will continue to meet more than 70 per cent of the country's requirement. Maharashtra is an industrial state with high power demand and has the highest consumption in the country with around 138 bn units. The power demand in the state is expected to witness steady growth for the next 10 years. Maharashtra may require significant capacity addition, as power demand in the state is likely to reach around 400 bn units by 2025.

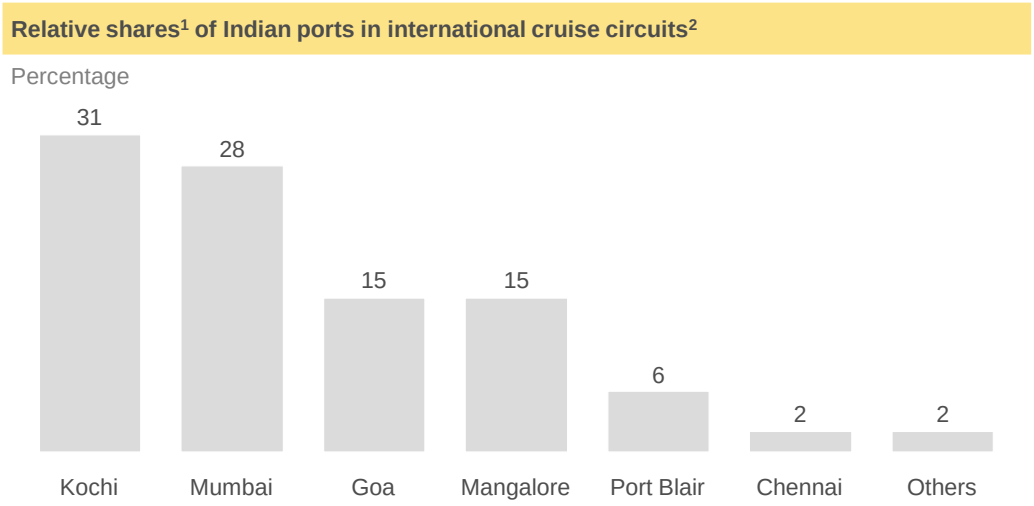
A coastal power complex can leverage the coastal shipping of thermal coal from MCL to coastal power clusters. This will significantly reduce the logistics costs, which can be as high as 30 per cent of the cost of power production. Logistics costs of transporting thermal coal via coastal shipping are around 40 per cent lower than transporting the coal by rail. Tamil Nadu is already a successful model, with plants at Tuticorin, Ennore, and Chennai leveraging coastal shipping. Southern Andhra Pradesh also leverages coastal shipping through its power complex in Krishnapatnam. To make coastal shipping viable, it is imperative to set up plants in and around the ports to ensure minimal last-mile connectivity to control logistics costs. Vadhavan in Maharashtra could be a potential location for building such a power complex to support the state's power demand.

5. Development of cruise terminal at Mumbai Port

Maharashtra has a significant competitive advantage in tourism because of its natural beauty. Mumbai, along with Kochi, Mangalore and Goa on the Malabar Coast, is already a port of call for cruises connecting South Asia and the Middle East and North Africa (MENA). The cruise circuits of major cruise liners—RCL, NCL and CCL—pass through Mumbai Port and other ports on the western coast. It was also found that Mumbai has the second highest relative share as "port of call" (28 per cent) among Indian ports. This reinforces Mumbai's popularity as a tourist destination amongst cruise liners.

EXHIBIT 87

Kochi and Mumbai ports are the most visited "ports of call" for international cruises



1 Share is defined as number of times a port appears in the cruise itinerary. There might be multiple trips to a port by a cruise line on the same itinerary over different time frames. However, for this analysis it has been counted only once
2 Cruise itineraries for future announced by the cruise lines as on Dec, 2015 have been taken for this analysis

SOURCE: Cruise itineraries of RCL, CCL, NCL and other cruise lines

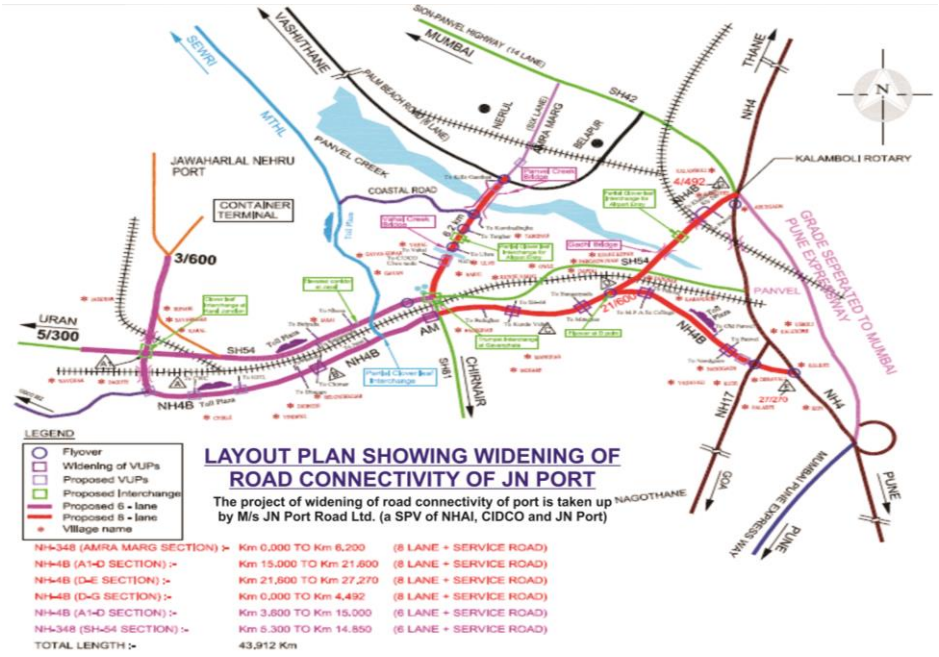
Although international cruise tourism is mainly a revenue earner through foreign exchange, it has positive spillovers for coastal communities. It creates demand for food items, especially seafood, fresh fruits and vegetables, handicrafts, etc., so that less skill-intensive industries like fishing, food processing, and cottage industries engage coastal communities and help them thrive. Alternatively, the huge earnings from the cruise business can be used to support local communities and offer alternative livelihood support systems through policy mechanisms.

PORT MODERNIZATION AND CONNECTIVITY PROJECTS

JNPT is suffering from high congestion on the entry gates and roads. Dighi Port's full potential is limited because it misses last-mile connectivity with NH17.

EXHIBIT 88

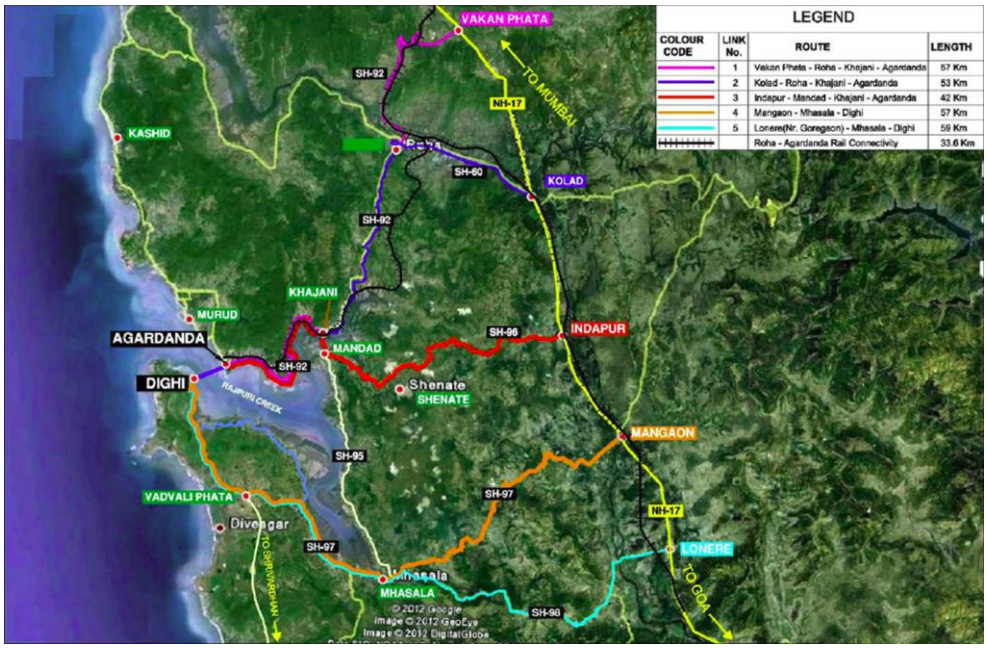
Layout plan showing congested portions of JNPT connectivity



SOURCE: JNPT

EXHIBIT 89

Layout plan showing congested portions of Dighi port connectivity



SOURCE: Dighi Port Ltd.

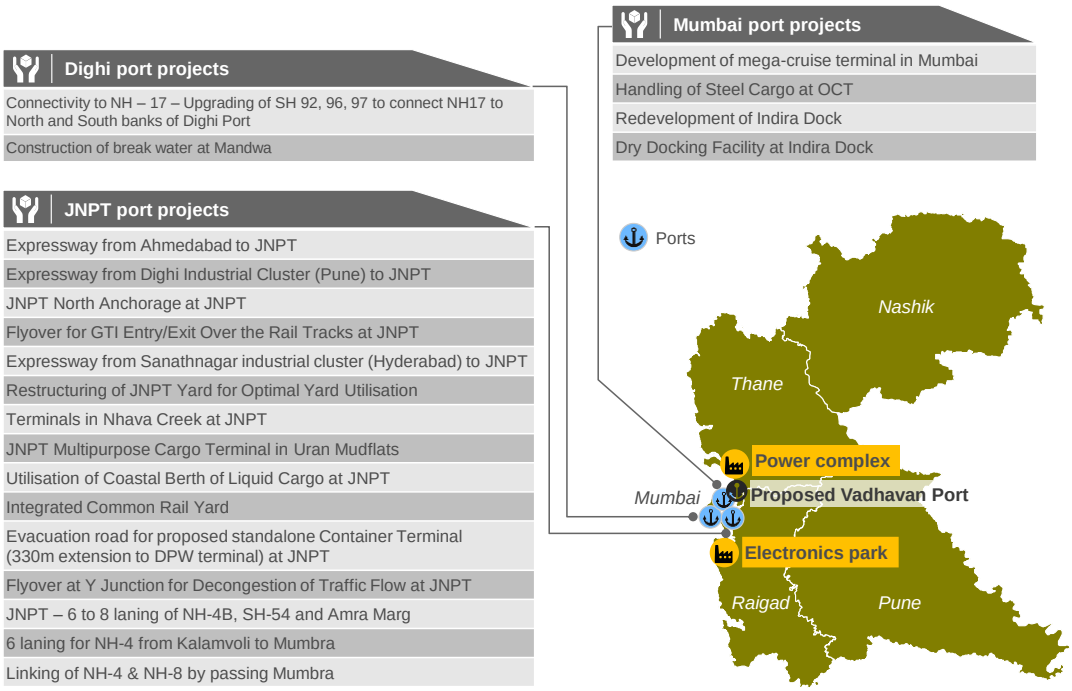
Multiple port connectivity and modernization projects have been proposed to enable these ports to cater to increased expected traffic in the next few years.

- Expressway from Ahmedabad to JNPT
- Expressway from Dighi Industrial Cluster (Pune) to JNPT
- JNPT north anchorage at JNPT
- Flyover for GTI entry/exit over the rail tracks at JNPT
- Expressway from Sanathnagar industrial cluster (Hyderabad) to JNPT
- Restructuring of JNPT Yard for optimal yard utilisation
- Terminals in Nhava Creek at JNPT
- JNPT 5th container terminal
- JNPT multipurpose cargo terminal in Uran Mudflats
- Utilisation of coastal berth of liquid cargo at JNPT
- Integrated common rail yard

- Evacuation road for proposed standalone container terminal (330 m extension to DPW terminal) at JNPT
- Flyover at Y Junction to decongest traffic flow at JNPT
- JNPT six to eight-laning of NH4B, SH54 and Amra Marg
- Six-laning for NH4 from Kalamvoli to Mumbra
- Linking of NH4 and NH8 by passing Mumbra
- Development of mega-cruise terminal in Mumbai
- Handling of Steel Cargo at OCT
  - Redevelopment of Indira Dock
  - Dry docking facility at Indira Dock
  - Connectivity to NH17: Upgrading of SH92, 96, 97 to connect NH17 to north and south banks of Dighi Port
  - Construction of breakwater at Mandwa

EXHIBIT 90

Proposed projects under the North Konkan coastal economic zone



Land parcel availability

District	Land Bank Location [Estate]	Acres
Thane	Ambernath	74.1
Thane	Add. Mahad	119.7

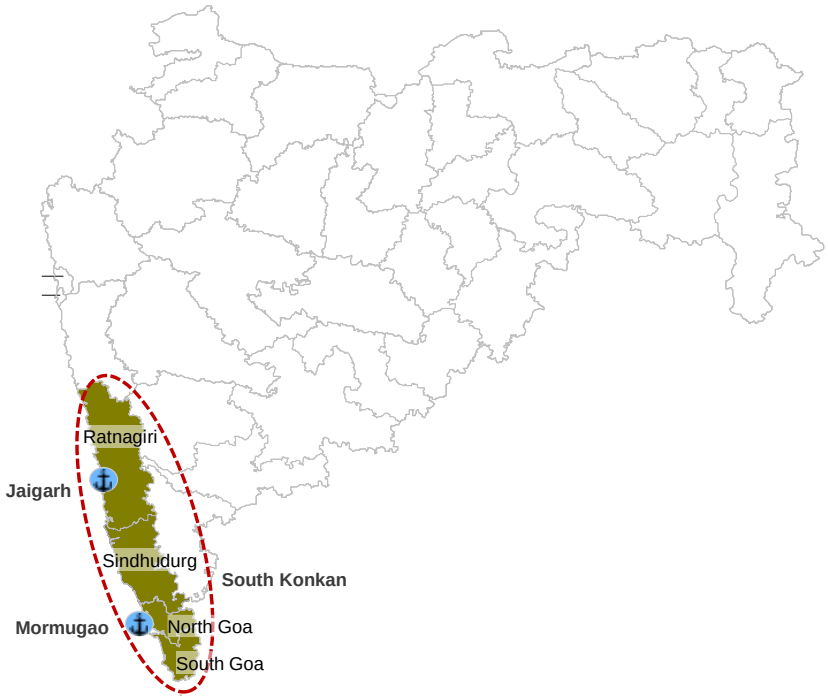
South Konkan Coastal Economic Zone

The South Konkan region covers two districts of Maharashtra (Ratnagiri and Sindhudurg) and two districts of Goa (North Goa and South Goa). The two districts of Maharashtra contribute only 2 per cent of state GDP and roughly have the same share in state population as well.

The region also covers one major port, Mormugao, and a minor port, Jaigarh. The Mormugao Port handled around 15 MTPA in 2015, registering a strong growth of 25 per cent—the highest on a year-to-year basis among all 12 major ports functioning in India. The port also exceeded the target of over 13 mn tonne determined by the Ministry of Shipping. The port primarily caters to the hinterland of South Maharashtra, Northern Karnataka and Goa. This cargo is expected to go up to around 30 MTPA in the next 10 years, primarily on the account of increase in the traffic of coking coal.

EXHIBIT 91

South Konkan coastal economic zone



Port led industrialization

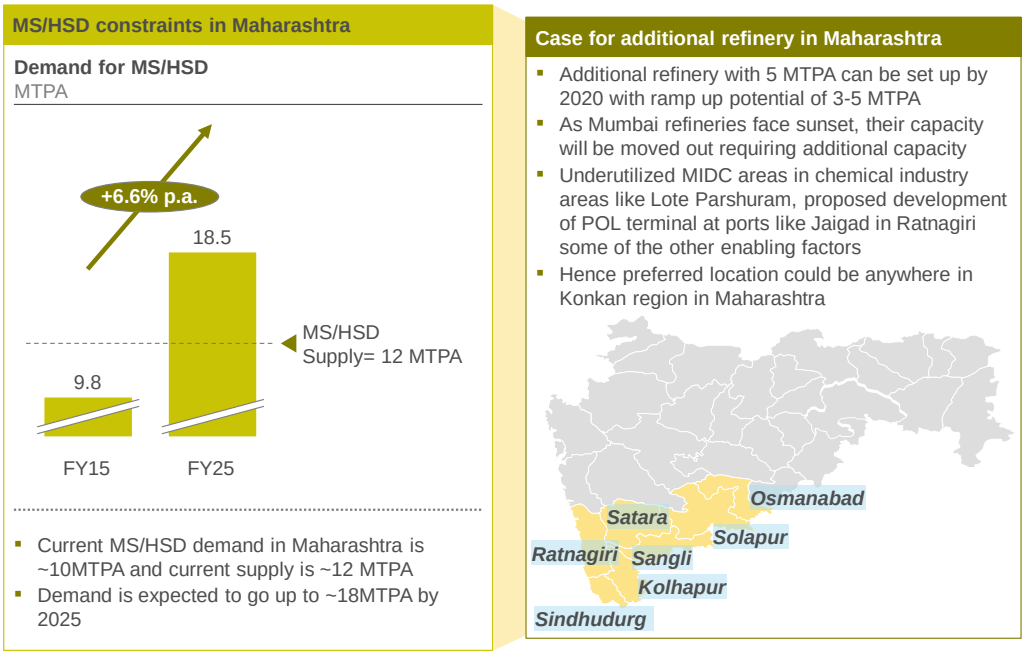
The South Konkan region has high potential for industrial activity and the following sectors could be considered as high potential given the location.

1. Refining and petrochemical cluster in Southern Maharashtra

The current demand for MS/HSD in Maharashtra of around 10 MMTPA is expected to increase to about 18 MMTPA by 2025. Current supply stands at around 12 MMTPA, with no scope for expansion in the existing refineries. Demand is thus expected to outpace supply from 2020, causing a deficit of about 6 MMTPA by 2025. There is therefore a strong rationale for setting up a 5 MMTPA refinery with the potential to ramp up by an additional 3 to 5 MMTPA. Since the bulk of POL imports takes place through the ports located in northern Maharashtra, that region is vulnerable to a security risk. Setting up a refinery in southern Maharashtra could diversify that risk. Other enabling factors include the use of underutilised areas in the Maharashtra Industrial Development Corporation (MIDC) and development of a POL terminal at Jaigarh port in Ratnagiri.

EXHIBIT 92

Proposed refinery in Maharashtra

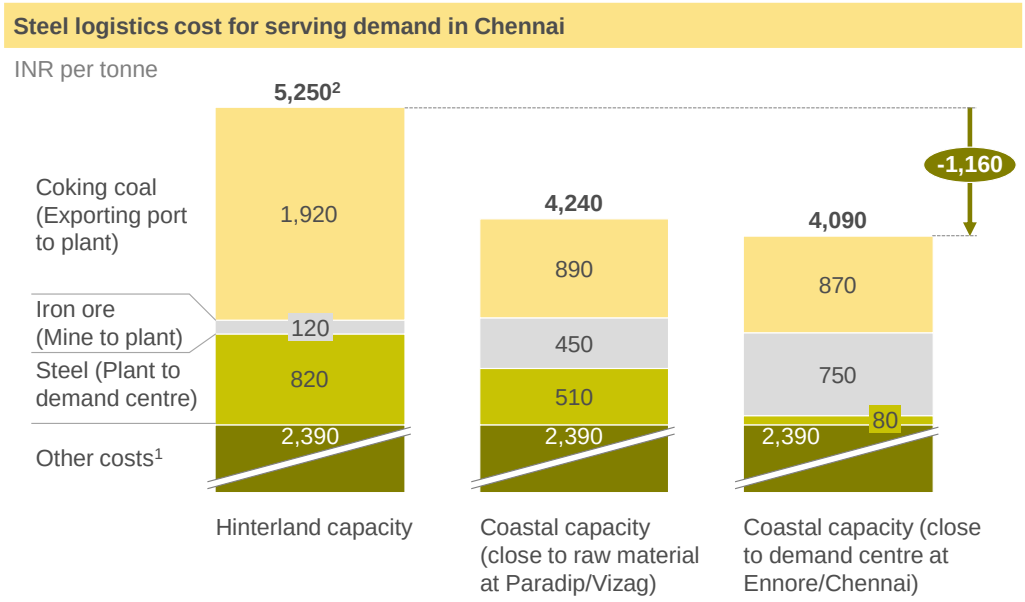


2. Steel cluster in Southern Maharashtra

Coastal steel plants located close to iron ore reserves and connected via a slurry pipeline could, on average, save INR 900 per tonne. Coastal capacities near demand centres could be even more cost effective.

EXHIBIT 93

Coastal steel plants provide logistics cost saving of ~INR 1,000 per tonne



1 Other cost includes internal logistics cost and logistics cost for other materials such as refractory, spares, etc.
2 Base case logistics cost is estimated as 15% of total steel production cost

SOURCE: DGCIS data – 2013-14

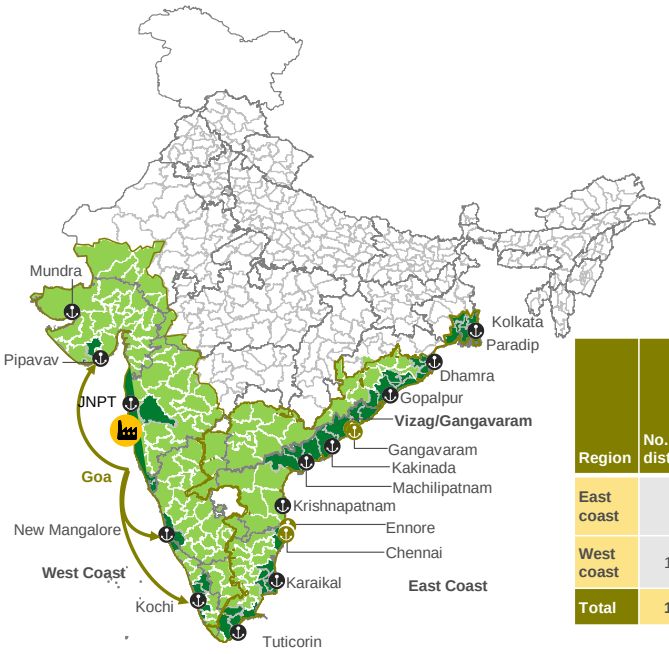
Based on demand projections till 2025, Greenfield 20 MTPA capacity steel clusters could be developed and existing coastal clusters could be further advanced to save more costs due to:

- Minimised inland logistics for coking coal: Saves INR 1.5 per tonne-km due to import of coking coal directly at steel plants
- Reduction in steel transportation through coastal shipping: Saves INR 1.30 per tonne-km in steel transportation due to coastal shipping
- Use of new technology (slurry pipelines): These offer a low-cost method of transporting iron ore fines from mine to coast, costing INR 0.70 per tonne-km compared to INR 1.50 per tonne-km for rail. In addition, pelletisation at the dispatch port location also leads to valuable iron ore fines being utilised for domestic production.

The Maharashtra belt, with its large auto hubs and other SEZs, is one of the biggest consumers of steel and iron. Even in the case of coastal shipping, Chennai emerges as one of the biggest importers of steel in the country. A coastal steel manufacturing plant could be considered

in southern Maharashtra, and could on average save roughly INR 700 to 1000 per tonne compared to conventional steel plants location close to iron ore reserves.

Proposed steel cluster in Maharashtra



Region	No. of districts	New steel demand over 2015–2025 (mn tonnes)	Average saving (INR/ tonnes)	Total saving (INR cr)	Saving from two 20 MTPA steel cluster (INR cr)
East coast	85	22–25	900	2,830	1,800
West coast	105	40–42	880	2,640	1760
Total	190	60–65	890	5,470	3,560

3. Food processing cluster in Southern Maharashtra

The Indian food processing industry was estimated to be USD 121 billion in FY 2014. It contributes around 9 per cent of the GDP in manufacturing and around 11 per cent of the GDP in agriculture.

While India is the second largest producer of food after China, it has only a minuscule share in the global trade of processed foods. The level of processing in India is much lower as compared to other countries. India scores poorly on logistics and storage infrastructure, which is one of the key enablers for making the food processing sector more export-competitive. Export cargo moving from the manufacturing clusters to the ports is subjected to high inland logistics costs as well as significant variability in transit time. Bottlenecks on road and rail routes prevent the smooth movement of cargo. Road cargo travels 250 to 300 km a day in India as compared to 600 to 800 km/day as per international standards resulting in long transit times. The railways also do not have a proper cold-chain facility, which is extremely important for food cargo. The perishable nature of food products make it important to have efficient logistics that minimise the transportation time of both raw materials and finished products.

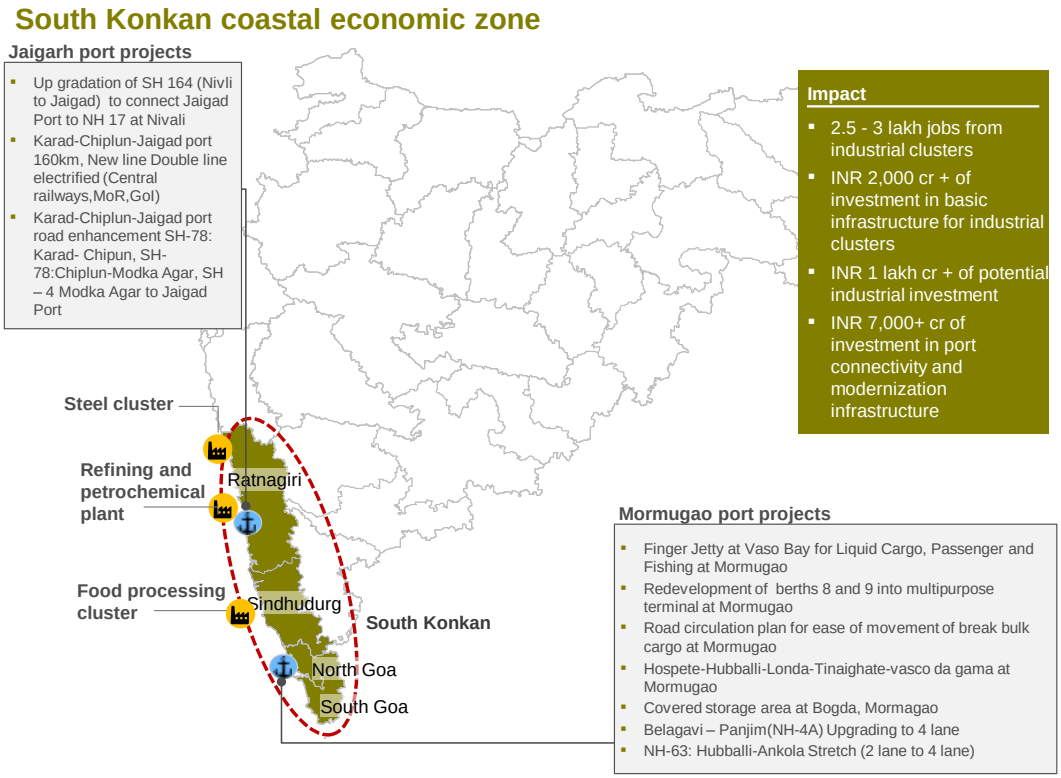
The impact of logistics on cost comes from two factors—direct freight cost and the cost of handling inventory for the duration of the transit. Freight cost contributes a significant portion to the ex-port price of the processed food cargo. As in the case of other export-oriented cargo, the inventory handling cost of a processed food consignment during the transit period and the buffer period is an additional cost.

Maharashtra is a leading producer of mango, cashews and fish. However, these foods are processed using traditional methods and primarily for domestic consumption. A mega food park specialising in the manufacturing and export of value-added products from mango, cashews and fish can come up in resource-rich districts of Ratnagiri and Sindhudurg, closely linked to Jaigarh and Vijaydurg ports.

Port modernization and connectivity projects

- Upgradation of SH164 (Nivli to Jaigarh) to connect Jaigarh Port to NH17 at Nivali
- Karad–Chiplun–Jaigarh Port 160 km new line double line electrified (Central Railways, MoR, GoI)
- Karad–Chiplun–Jaigarh Port road enhancement SH78: Karad–Chiplun, SH78: Chiplun–Modka Agar, SH4 Modka Agar to Jaigarh Port
- Finger jetty at Vaso Bay for liquid cargo, passenger and fishing at Mormugao
- Redevelopment of Berths 8 and 9 into multipurpose terminal at Mormugao
- Road circulation plan for ease of movement of break bulk cargo at Mormugao
- Hospete–Hubballi–Londa–Tinaighate–Vasco da Gama at Mormugao
- Conversion of Berth 3 into a multipurpose berth at Mormugao
- Covered storage area at Bogda, Mormagao
- Belagavi–Panjim (NH4A) upgrading to four-lane
- NH63: Hubballi-Ankola stretch (two lane to four lane)

EXHIBIT 94



Land parcel availability

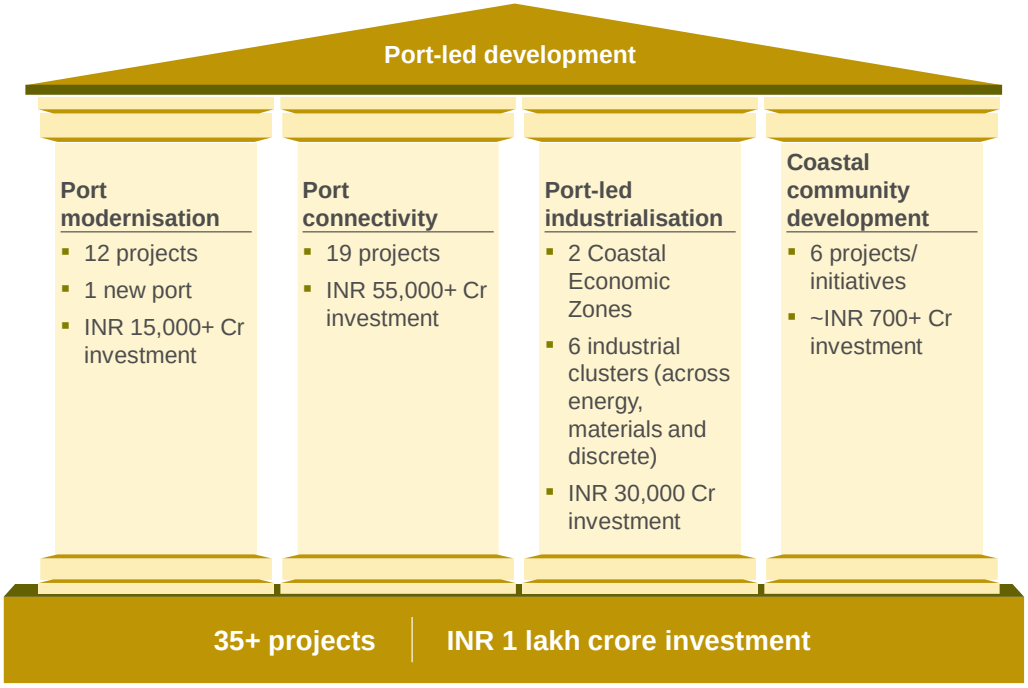
District	Land Bank Location [Estate]	Acres
Ratnagiri	Lote-Parshuram	127.8

Impact

The Sagarmala National Perspective Plan classifies these more than 35 projects under the four pillars of port-led development. These projects require investment of INR 1 lakh crore. The industrial clusters could generate 8 to 10 lakh jobs in the next 10 years.

EXHIBIT 95

Sagarmala: Port-led development



Annexure:

Detailed project notes for all relevant CEZ projects categorized by state attached at the end of the document

Annexure: Report on maritime clusters

Contents

Maritime clusters 4

Maritime clusters: A new concept for India 4

Market assessment 12

Location assessment 33

Gujarat maritime cluster 36

Tamil Nadu maritime cluster 47

Maritime clusters

MARITIME CLUSTERS: A NEW CONCEPT FOR INDIA

A maritime cluster is a group of co-located firms and businesses focused on the maritime sector generating positive synergies between their activities. Michael Porter described it as a "geographically proximate group of interconnected companies and associated institutions in a particular field, including product producers, service providers, suppliers, universities, and trade associations, from where linkages or externalities among industries result." The Indian government has recently introduced policies and initiatives to develop the shipbuilding sector and reduce the unfavourable cost differential of Indian shipyards. Maritime clusters could help to further this goal.

Phases/components of a maritime cluster

A maritime cluster could comprise- of the following:

- Shipyards: These form the centre of any maritime cluster and can focus on building specialty and coastal vessels less than 80 m long (offshore supply vessels, anchor handling tugs, etc.)
- Ancillary units for shipbuilding: Since shipbuilding (like other assembly industries) needs a strong ecosystem of suppliers and service providers, ancillaries can also be developed as part of the cluster in proximity to the shipyards. These will include supporting and related industries like fabrication, machining, engineering services, design services plus a number of specialised suppliers
- Service providers for the shipping industry: Another component of the cluster could be services focused on shipping and shipbuilding, like shipping agencies, ship owners, banks, law firms, classification and registers of ships, etc.
- Tourism: Cruise tourism, beach tourism, water amusement parks, aquariums
- Marine products: Fisheries and aquaculture

Advantage of a maritime cluster

Co-locating these various components could offer-the following advantage:

- Positive synergies between the participants by inducing mutual interaction and cooperation
- Reduced production costs, inventory costs and logistics costs
- Shorter lead time for critical supplies (if the suppliers are located in the cluster)
- Access to common infrastructure, reducing costs for development authorities

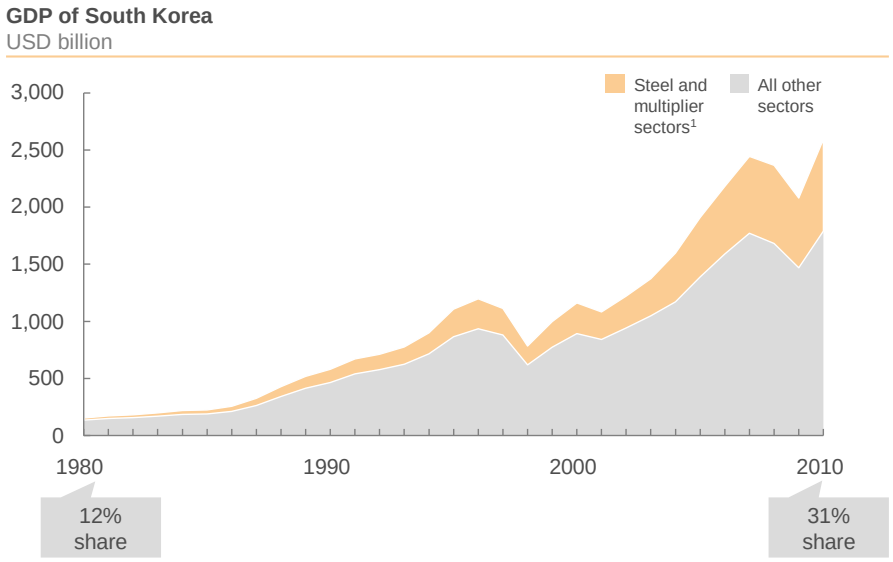
Some of the key clusters in the global maritime sector are found in Brazil, China, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Russia, Singapore and South Korea. The maritime cluster in Japan consists of fishing, shipbuilding and ship repair, shipping, maritime and port services. Japan has a market share of around 20 per cent in the world's shipbuilding market. South Korea, where the government has provided solid support through its policies and initiatives, has a market share of 34 per cent. South Korean maritime cluster has been discussed in detail in the case study.

Case study: South Korea

Steel and multiplier sectors played a pivotal role in the growth of the South Korean economy. Ports helped to boost steel and downstream "multiplier industries" such as automotive, and shipbuilding, through port-based steel, automotive and shipbuilding facilities (Exhibits 1 and 2).

Exhibit 1

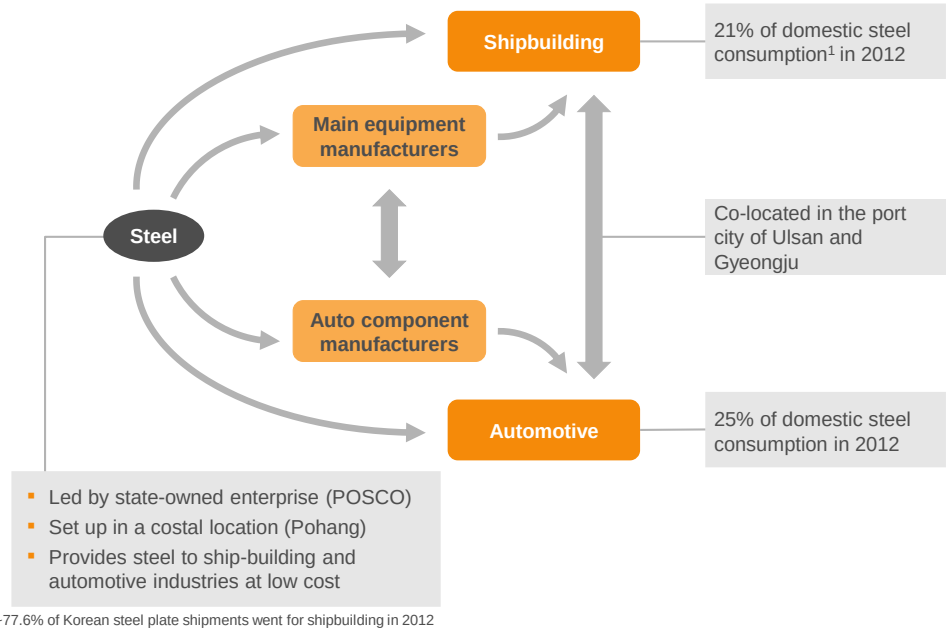
Steel and "multiplier sectors" played a pivotal role in the growth of the South Korean economy



1 Iron & Steel; Fabricated metal products; Machinery, equipment, appliances; Automotive; Shipbuilding; Electrical machinery, Communication equipment

EXHIBIT 2

South Korean maritime cluster: Steel–Shipbuilding–Automotive



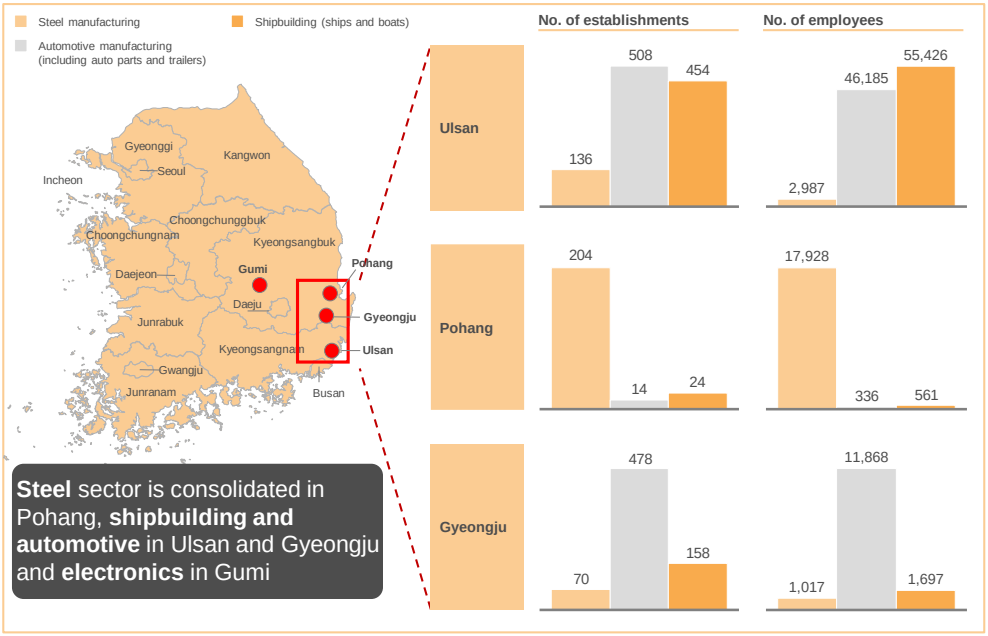
1 ~77.6% of Korean steel plate shipments went for shipbuilding in 2012

SOURCE: Working party on Shipbuilding: Peer review of the Korean shipbuilding industry and related government policies

A successful example of a maritime cluster is Pohang–Ulsan–Gyeongju in South Korea (Exhibit 3). The government set up a coastal steel cluster at Pohang to ensure low-cost access to imported iron ore, coking coal and to facilitate access to global markets. Between 1980 and 2010, one-third of South Korea's economic growth came from steel and related downstream sectors. Steel in Korea is consolidated in Pohang (204 establishments, employing around 20,000 people); shipbuilding and automotive in Ulsan and Gyeongju (around 1,000 automotive and around 600 shipbuilding units, together employing around 115,000 people); and electronics in Gumi. Logistics costs of input materials drop due to the close proximity of these three locations.

EXHIBIT 3

South Korean marine cluster: Pohang–Ulsan–Gyeongju



SOURCE: KOSIS

The government of South Korea selected Pohang as a location for building a national steel mill (POSCO) considering availability of land, port and other utilities. Ulsan developed as a major industrial cluster due to the government's plan to foster heavy and chemical industries. From 1962 to 1966, the government developed infrastructure (roads, civil works, harbours, etc.) in the region. It attracted Hyundai Motors to invest in Ulsan in 1968, Hyundai Heavy Industries (HHI) in 1972, Samsung in 1979 and Daewoo in 1981.

Multiple factors supported the growth of POSCO: the adoption of new technologies, capital and resource commitment to R&D, development of deep water ports, and JV investments in other countries. POSCO adopted new technologies and facilities from Japan and Europe, like larger scale blast furnace and continuous casting equipment. South Korea replicated the Japanese strategy of using large bulk carriers coupled with international investments to secure long-term access to iron-ore. The establishment of two of the world's leading research organisations—Pohang University of Science and Technology (POSTECH) and Research Institute of Industrial Science and Technology (RIST) also helped (Exhibit 4).

EXHIBIT 4

POSCO's strategies supported by Korean State

Strategies	Actions taken
Adoption of new technologies and facilities from others	▪ POSCO adopted new technologies and facilities from Japan and Europe, e.g., automation, larger scale blast furnace, continuous casting equipment, etc. ▪ Technology transfer from 2 Japanese steel producers- Nippon steel and Mitsubishi Heavy Industries ▪ Focus on superior quality steel and scale of production to lower costs
Capital and human resource commitment to R&D	▪ Establishment of two world's leading research organizations- Pohang University of Science and Technology (POSTECH) and Research Institute of Industrial Science and Technology (RIST)
Personnel policies	▪ Military style operation to foster strong motivation among workers ▪ Extensive training program that facilitates very low rates of turnover and absenteeism
Development of deep-water ports	▪ Development of deep-water ports in Young Il Bay and Kwangyang Bay ▪ Replicate Japanese strategy of using large bulk carriers coupled with international investments and bargaining skills to secure long-term access to iron-ore
JV investments in other countries	▪ Expansion of raw material strategy for securing stable sources of supply ▪ Two international JV investments in coal- Miller Pohang Company and POSCAN

SOURCE: The Steel and Shipbuilding Industries of South Korea: Rising East Asia and Globalization

The growth of the shipbuilding sector was also supported by a number of factors: focus on advanced technologies, efficient operations and use of external know-how. HHI obtained advanced shipbuilding technologies from European shipbuilders—dockyard designs from Scottish Naval architecture firm A&P Appledore, ship design and operating instructions from Scottish shipbuilding firm Scott Lithgow. Experienced European shipbuilders worked as employees of HHI for the first three years. HHI also obtained production know-how from Kawasaki, a shipbuilding company from Japan. During the period of overcapacity and price competition in the 1970s, HHI altered its product mix away from very large crude carriers (VLCCs) to smaller, high-value ships and branched into off-shore structures (Exhibit 5).

EXHIBIT 5

Ship-builder's strategies supported by Korean State

Strategies	Actions taken
Focus on advanced technologies	▪ HHI obtained advanced shipbuilding technologies from European shipbuilders: Dockyard designs from Scottish Naval architecture firm- A&P Appledore, Ship design and operating instructions from Scottish shipbuilding firm- Scottlithgrow
Focus on efficient operations	▪ Development of operations practices to reduce production time, eg. welding of small number of bigger blocks ▪ Use of Goliath cranes, barges and air-pressure driven skids
Use of external resources and know-how	▪ Experienced European shipbuilders worked as employees of HHI for first 3 years ▪ HHI obtained production know-how from Kawasaki shipbuilding company of Japan
Diversification	▪ During the period of overcapacity and price competition in the 1970s, HHI altered its product mix away from VLCCs to smaller high-value ships, branched into off-shore structures
Government support	▪ Grant of temporary monopoly over steel structure ▪ Issue of order that Korea's crude oil imports be carried by Hyundai group ▪ Extensive government subsidies for infrastructure and acquiring oversea credit for HHI

Due to the nature of the steel and shipbuilding industries as generative sectors that require massive capital investments and technological innovations, it requires frequent involvement of and subsidies by governments

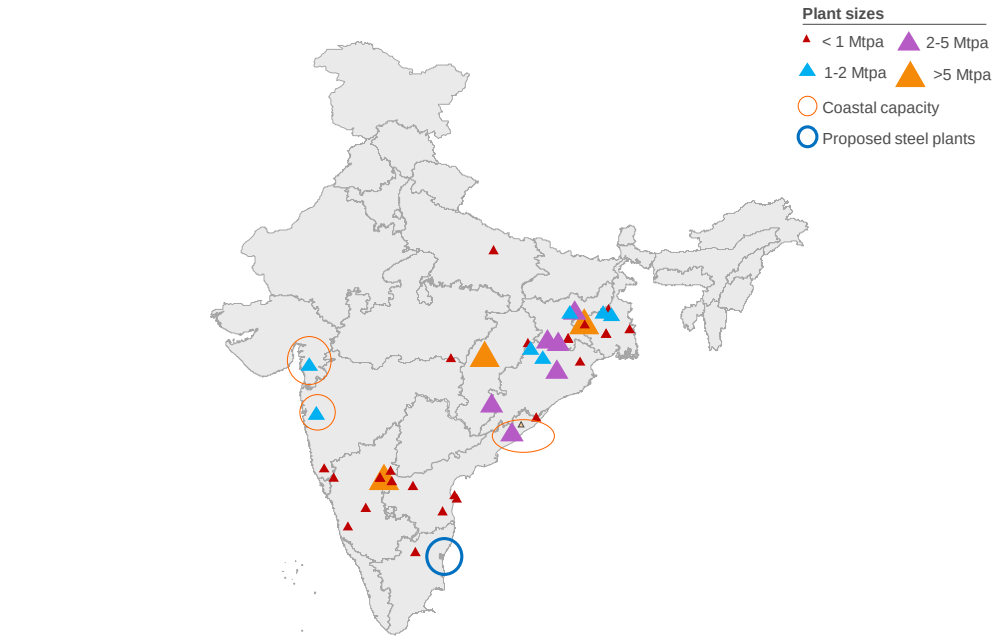
– Shin and Yoo, 2004

SOURCE: The Steel and Shipbuilding Industries of South Korea: Rising East Asia and Globalization

Potential cluster locations in India based on steel multiplier appear in Exhibit 6. Other parameters for identifying potential locations are discussed in detail later in this report.

EXHIBIT 6

Potential locations for maritime clusters in India based on steel multiplier



SOURCE: Ministry of Steel; VDEH plant facts

Tax recommendations for Maritime Cluster

Shipbuilding as a global industry is not restricted to a particular country or geography. As a result, investors have been inclined towards favourable tax regimes historically. Tax incentives can be an important lever to attract investments from global and Indian companies for the maritime sector and promote its development. The Indian government can leverage some of the learnings from the taxation strategy adopted for SEZs and export zones for building a favourable ecosystem for the maritime industry and shipbuilding. Some of the incentives that could be extended to businesses operating in the maritime cluster are:

1. Service tax exemption for all the firms in the cluster that can demonstrably conduct the same activity from another lower tax jurisdiction, concession on income tax, etc.
2. Companies involved in trade and carriage of goods could be exempted from corporate and service tax as an extension of tonnage tax
3. Corporate tax, minimum alternate tax, dividend distribution tax, service tax, etc.,

G2G partnership for shipbuilding

Demand for ships in India is expected to increase given the ageing fleet and increased push on coastal shipping for commodity flow and movement.

However, the shipbuilding industry in South Korea and Japan, which constitutes more than 50 per cent of the global capacity, is undergoing a crisis due to overcapacity and plunging demand. Given the importance of shipbuilding for these economies, the government is forced to support the shipbuilders. Therefore, one of the growth avenues for the shipyards in these countries could be to build their order-book based on the increase in ship demand from India.

Under the “Make in India” initiative of the Indian government, Indian shipyards are expected to perform the majority of shipbuilding activities on Indian soil. However, due to the lack of technical expertise, building large ships for global waters remains a challenge.

In these circumstances, it would be beneficial for the governments of both India and major shipbuilding countries to form a partnership. Recently, India has entered into partnership with South Korea for building LNG carriers wherein three LNG carriers out of a total nine will be built in India with technology transfer from Korean shipyards. Such partnerships can also be extended to other types of ships like Ro-Ro and defence.

MARKET ASSESSMENT

This segment discusses on the market potential and opportunities for various components of the maritime cluster.

Shipyards

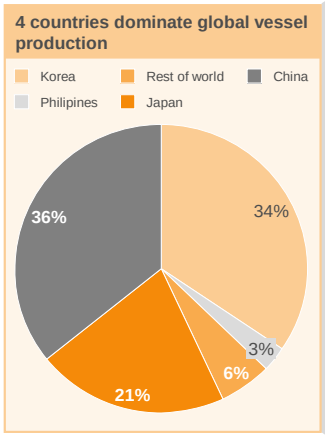
Demand and supply

China, Japan and South Korea account for around 90 per cent of the world's production (Exhibit 7).

EXHIBIT 7

MARKET TRENDS

China, Korea and Japan account for ~90% of the world's production; China and Japan specialise in bulk carriers, while Korea leads in container ships



Deliverables of new buildings, major vessel types and countries where built (2014, thousands of GT)

	China	Republic of Korea	Japan	Phili-ppines	Rest of world	World total
Oil tankers	2,896	4,781	891	-	466	9,034
Bulk carriers	13,304	1,588	10,791	869	167	26,719
General cargo	585	329	199	-	372	1,485
Container ships	4,986	9,135	188	995	735	16,039
Gas carriers	119	3,528	666	-	14	4,328
Chemical tankers	113	185	188	-	57	543
Offshore	714	1,485	51	-	956	3,206
Ferries and passenger ships	92	5	27	-	787	892
Other	42	835	391	-	147	1,415
Total	**22,851**	**21,872**	**13,392**	**1,865**	**3,682**	**63,662**

India commands only ~0.5% of the global shipbuilding market share

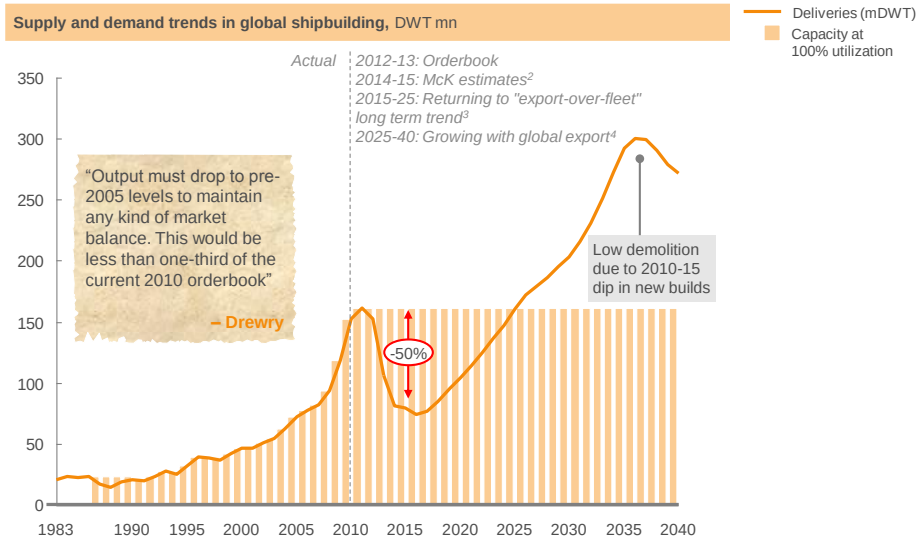
Note: Propelled seagoing merchant vessels of 100 GT and above. More detailed data on other countries where vessels were built is available under http://stats.unclad.org/shipbuilding.

SOURCE: UNCTAD secretariat, based on data provided by Clarkson's Research

Globally, shipyards can expect to have significant overcapacity in the next few years, but will see strong growth in the longer term. The existing capacity, which far outstrips deliveries (in mn DWT) could be sufficient to serve demand until around 2030 (Exhibit 8).

EXHIBIT 8

Significant overcapacity at shipyards expected in near future, but strong growth in the longer term



1 Capacity measured as maximum output last 5 years. Capacity at 2011 level in forecast period
2 Proprietary forecast model from McKinsey's shipbuilding experts
3 Oversupply eliminated and shipping market returning to supply-demand balance
4 Fleet growing with global export from 2015, demolition estimated using average 25 year lifetime and

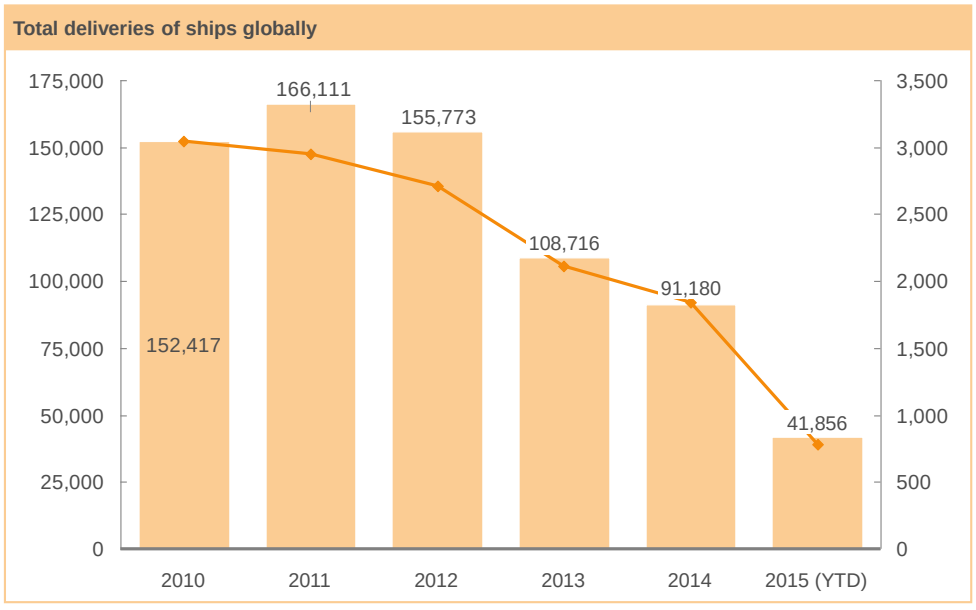
SOURCE: Clarkson; Global Insight; expert interviews; McKinsey analysis

While some rationalisation of capacity is expected, this overcapacity could persist for many years due to sunk cost investments. New deliveries of vessels globally have been sharply declining since 2010 (Exhibit 9).

EXHIBIT 9

MARKET TRENDS

New deliveries of vessels globally have been declining sharply since 2010

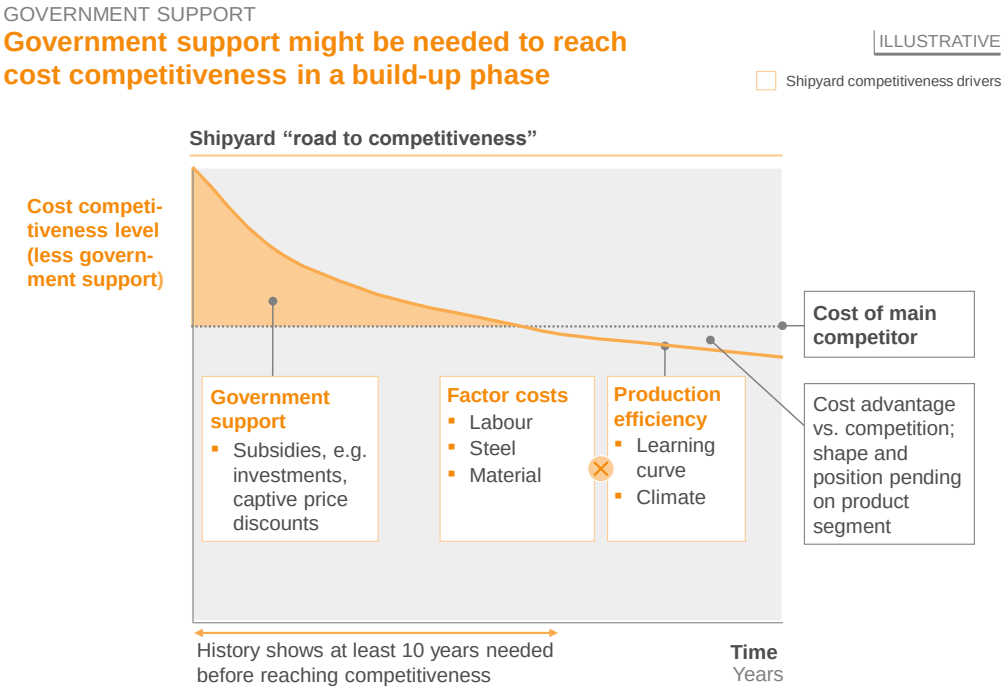


SOURCE: Clarkson

Key possibilities for the industry

Given that the factor costs in the industry are driven by labour and steel, government support on various fronts could be a crucial enabler for the shipbuilding industry (Exhibit 10).

EXHIBIT 10



SOURCE: McKinsey analysis

Globally, shipbuilding is a highly subsidised industry (Exhibit 11). Governments have used various measures to boost shipbuilding in their own countries. These include incentives and stimulus packages such as:

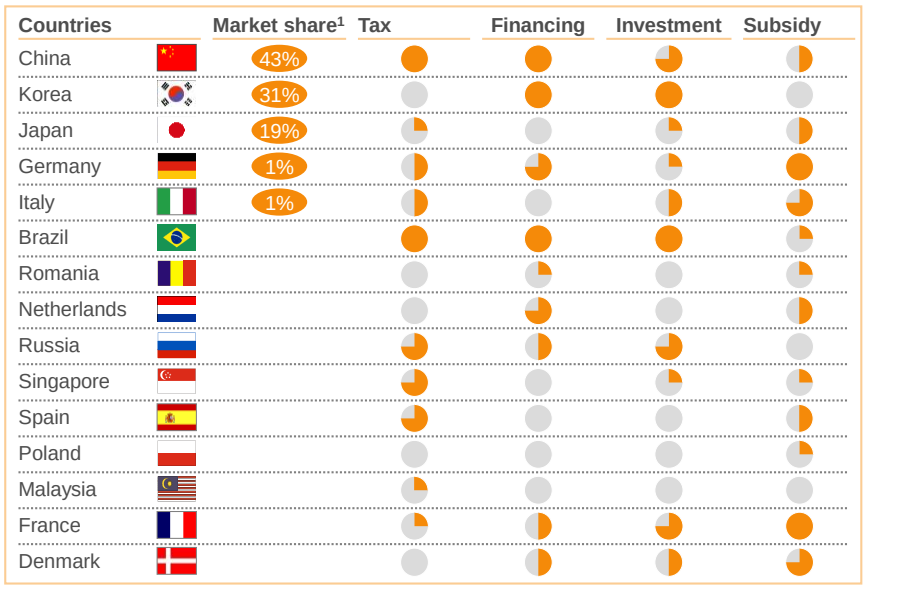
- Heavily subsidising the industry: All leading shipbuilding countries use one or more type/s (tax, financing, investment, subsidies) of incentives to support their shipbuilding industries. Nine of the 15 countries studied use three or more types of incentives.
- Financing operations and demand: Governments across the globe provide loans and loan guarantees on favourable terms (low interest rate, high leverage ratio) to shipyards to finance their ongoing operations, and to ship buyers to finance their orders.
- Supporting R&D and innovation: Research and development and innovation incentives are very popular among countries, with seven of the 15 countries providing these.
- Creating national champions: Countries with strong and growing economies (China, Russia and Brazil) are encouraging local shipyards to grow to be

global players through direct ship orders (from large state-owned companies) and selective distribution of subsidies (to large-scale shipyards).

- Overcoming the effects of the crisis: Most governments supported their shipbuilding industries to overcome the global economic crisis. Even China and Brazil—two countries least affected by the crisis—have provided significant financing and investment support for their countries.

EXHIBIT 11

Extent of government support for shipbuilding industry



1 Million CGT output in 2013

SOURCE: Clarksons and McKinsey

The government of China hplayed an important role in ensuring that China attains the world leadership spot by cushioning the industry in terms of tax, financing, investment and subsidies. Measures include VAT rebates, encouraging banks to offer low-interest loans, investing in R&D for high-technology vessels and speeding up the decommissioning and replacement of old ships through subsidies for new vessels built by domestic shipyards.

South Korea's government, too, has offered its shipbuilding industry a stimulus through financing, subsidies and investments. It offers tax concessions for restructuring and M&A, refund assurances to foreign buyers, support for the growth of domestic suppliers, and subsidises the cost of steel plates to cut shipbuilding costs by around 8 per cent.

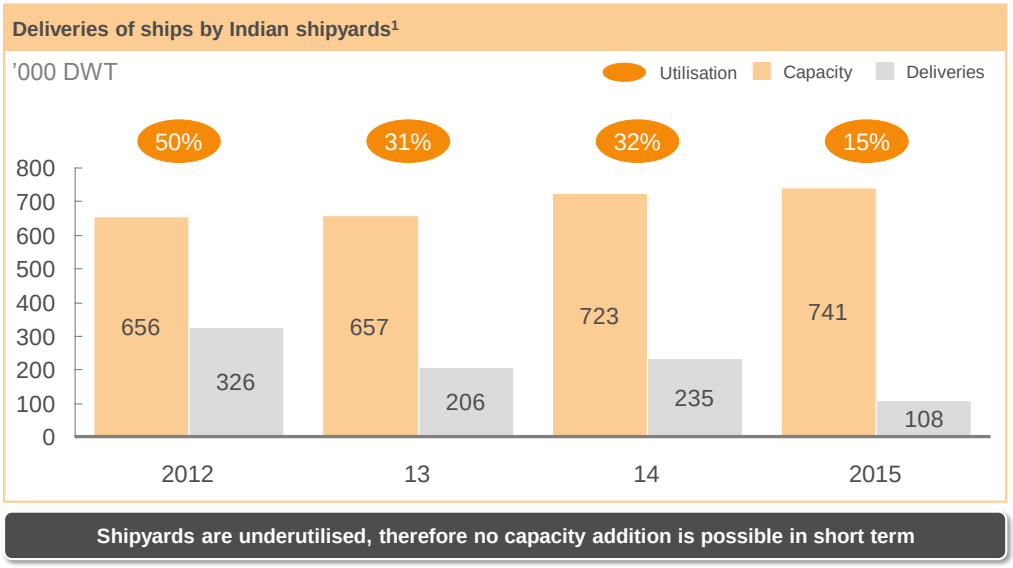
Shipbuilding in India

India has only 0.5 per cent of the global shipbuilding market share. The utilisation figures for Indian shipyards have dropped since 2011, from around 50 per cent to just 15 per cent utilisation[1]. Since current capacity is already underutilised, adding further capacity could be considered (Exhibit 12).

EXHIBIT 12

MARKET TRENDS

Utilisation of Indian shipyards has decreased since 2011



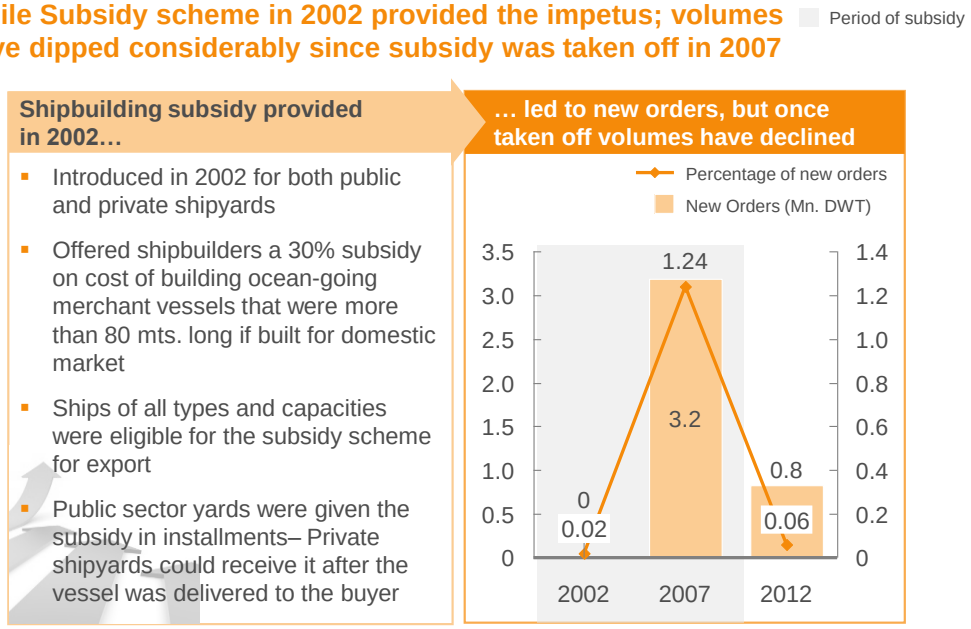
1 Defence Shipyards not considered

A subsidy scheme in 2002 gave shipbuilding some impetus, but once the subsidy was withdrawn in 2007, volumes declined again. The major cost differential between Indian shipyards and their competitors consists of the statutory taxes (Exhibits 13 and 14).

1 This does not include India's Defence shipyards

EXHIBIT 13

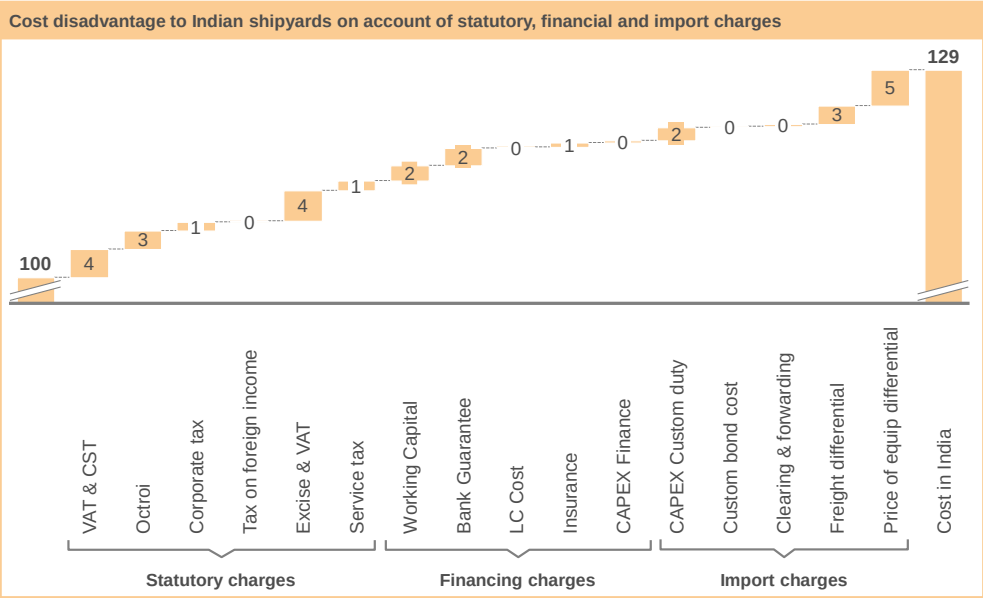
While Subsidy scheme in 2002 provided the impetus; volumes have dipped considerably since subsidy was taken off in 2007



SOURCE: Institute for Defense Studies and Analyses, Press Trust of India, Ministry of Shipping

EXHIBIT 14

Statutory taxes are a major component of the cost differential faced by Indian shipyards vis-à-vis competition



SOURCE: Report of Working Group for Shipbuilding & Shiprepair Industry for the 11th Five Year Plan

India has potential scope to add around 3 to 4 mn DWT of capacity by 2025. There could be demand for shipbuilding due to the replacement needs of the

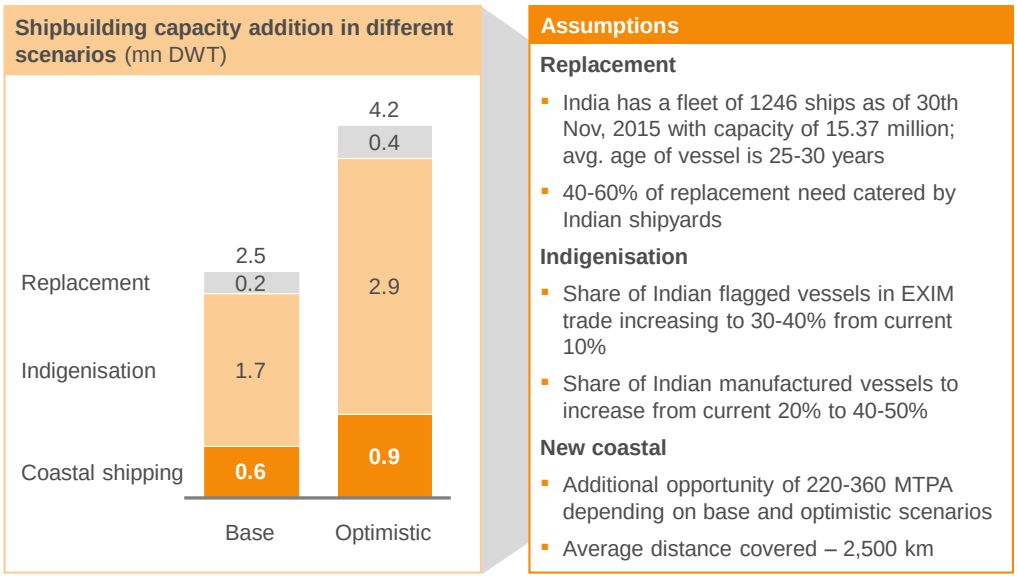
existing fleet, increased indigenisation of Indian flagged vessels for EXIM trade and increased domestic coastal shipping. An optimistic scenario calculates around 4.2 mn DWT of shipbuilding capacity addition. In case of replacements, the average age of India's fleet of ships as in 2015 was around 25 to 30 years. Indian shipyards could cater to around 40 to 60 per cent of replacement needs. In case of indigenisation, the share of Indian flagged vessels in the EXIM trade could increase from 10 per cent to 30 to 40 per cent. And the share of Indian manufactured vessels is expected to rise from the current 20 per cent to around 40 or 50 per cent. In case of coastal shipping, vessels may be required to cater to the additional opportunity of 220 to 360 MTPA depending on the base versus optimistic scenario (Exhibit 15).

EXHIBIT 15

INDIA OPPORTUNITY

Potential of 3-4 mn DWT annual capacity addition by 2025

2025



Key opportunities

India could target 3-4 mn DWT shipbuilding industry by 2025, through a combination of smart choices and government support. Indian shipyards are competent at building smaller size/specialty vessels. They could focus on building specialty and coastal vessels less than 80 m length (eg. Offshore supply vessels, anchor handling tugs, etc.)

The identified potential of 3-4 mn DWT for the Indian shipbuilding industry comprises of the following:

1) Replacement opportunity of existing ships and Indigenization of new Indian fleet:

As of 30th Nov, 2015, India has a fleet of 1246 ships with a capacity of 15.36 mn DWT. Considering an average age of vessel to be ~25-30 yrs, there is an annual potential of ~0.6 mn DWT for new ships. Empowered by the recently introduced policies and initiatives by the Govt of India, Indian shipyards can target capturing ~0.25-0.4 mn DWT of this potential.

India's current EXIM trade is expected to more than double by 2025. Correspondingly, the requirements of vessels is expected to increase especially the specialty vessels like LNG carriers, Ro-Ro, etc. Indian flagged vessels currently have a small share in the vessels used in EXIM trade. However, Indian shipyards can target ~1.5-3 mn DWT of annual demand through higher indigenization of the new vessel requirements.

The following table details the identified potential in terms of mn DWT and approximate number of vessels of different types for the next 5 yr and 10 yr period:

S. No.	Type of vessel	Mn DWT per annum- Till 2020		No. of vessels reqd till 2020		Mn DWT per annum- 2020-25		No. of vessels reqd till 2025	
		Base case	Optimistic case	Base case	Optimistic case	Base case	Optimistic case	Base case	Optimistic case
1	General cargo <30,000 DWT	0.04	0.06	80	120	0.07	0.11	234	350
2	Bunkering	0.01	0.02	20	30	0.03	0.04	58	88
3	PSV	0.01	0.02	20	30	0.03	0.04	58	88

4	Anti-Poll	0.01	0.02	20	30	0.02	0.03	58	88
5	Research	0.01	0.02	20	30	0.02	0.03	58	88
6	MPP	0.01	0.01	20	30	0.02	0.03	58	88
7	Supply	0.01	0.01	20	30	0.01	0.02	58	88
8	Dredger	0.01	0.01	40	60	0.01	0.02	117	175
9	Others (including ferries and passenger)	0.01	0.02	290	440	0.03	0.04	876	1314
10	LNG+LPG carriers	0.20	0.24	14	17	0.39	0.47	42	51
11	Ro-Ro	0.02	0.03	4	5	0.04	0.06	11	15
12	General cargo >30,000 DWT	0.64	1.17	45	80	1.28	2.34	137	250

3) New coastal opportunity:

India's coastal cargo traffic is expected to go up by ~220 MTPA in the base case and ~360 MTPA in the optimistic case. This significant rise in coastal traffic is expected to require new coastal cargo carriers of capacity ~30,000 DWT. Considering the increase in the coastal cargo traffic it has been estimated that India would require 200-300 such vessels till 2025 resulting in an additional potential of ~0.6-1 mn DWT that can be captured by the Indian shipyards.

S. No	Type of vessel	Mn DWT per annum- Till	No. of vessels reqd till 2020	Mn DWT per annum- 2020-	No. of vessels reqd till 2025

.		2020				25			
		Base case	Optimistic case	Base case	Optimistic case	Base case	Optimistic case	Base case	Optimistic case
1	General cargo ~30,000 DWT	0.3	0.5	50	83	0.6	1	150	250

3) Ro-Ro traffic potential

India produced 23.4 mn units of vehicles in the year 2014-15 serving a domestic demand of 19.8 mn units and exporting 3.6 mn units. This 3.6 mn units comprise of 2.46 mn units of 2-wheelers, 1.03 mn units of passenger vehicles (including 3-wheelers) and 0.09 mn units of commercial vehicles. The export oriented traffic of automobiles is originated in 5 specific clusters in India-

1) Northern cluster comprising of Gurgaon, Manesar, Haridwar, Pantnagar, etc.- This cluster primarily uses Mumbai, Pipavav and Mundra for exports

2) Sanand cluster: This cluster primarily uses Mundra and Pipavav port for exports.

3) Chennai/Hosur cluster: This cluster, dominated by passenger vehicle manufacturers uses Chennai and Ennore port for exports.

4) Pune/Chinchwad/Ranjangaon cluster: This cluster dominated by commercial vehicle manufacturers uses Mumbai and Gujarat ports for exports.

5) Jamshedpur/Surajpur cluster: This cluster, even though distance from the western ports uses Mumbai and ports in Gujarat for exports.

The table below summarizes the current and potential Ro-Ro traffic for the different port clusters:

Port cluster	**Manufacturing cluster**	**Vehicle types**	**Traffic in 2014-15 (No. of units, in 'ooos)**	**Potential traffic (2026)**	
				Base case	**Optimistic case**
Chennai, Ennore	Chennai/ Hosur cluster	3-wheelers	91	135	147
		Passenger	410	1,376	1,719

		Commercial	7	39	65
JNPT, Mumbai, Mundra, Pipavav	Northern cluster, Sanand cluster, Pune/Chinchwad/ Ranjangaon cluster, Jamshedpur/ Surajpur cluster	3-wheelers	312	464	503
		Passenger	186	624	780
		Commercial	47	261	435

4. Corporate tax, minimum alternate tax, dividend distribution tax, service tax, etc.,

4) LNG powered ships

There is a growing interest in using LNG as fuel—driven by increasingly strict regulations on vessel emissions and price competitiveness of LNG over oil.

Despite its relative efficiency, as compared to other methods of transportation, shipping has been identified by international governments as a large and growing source of greenhouse gas emissions leading to climate change. LNG usage could decrease SOX emisisons by 90 to 95 and Co_2 emissions by 20 to 25 per cent respectively, owing to lower carbon content of LNG compared to traditional ship fuels[2].

LNG is also more cost-effective than oil on the basis of heat value. In the short term, the competitiveness of LNG has reduced due to the slump in oil prices. However in the medium-to-long term, oil prices are expected to increase, making LNG a more viable alternative source given the abundance of supply and relatively stable prices[3]. Growth in LNG's distribution network could also reduce its cost, making it more competitive

However, LNG as a bunker fuel faces some challenges like investment required in ships propulsion, fuel-handling systems and bunkering facilities. LNG-powered ships can be around 10 to 25 per cent more expensive than similar vessels running on conventional fuel. It can take approximately five to eight years for owners to recover these costs[4]. Even though LNG powered ships are on the rise, bunkering stations continue to face the risk of not being in demand.

Given the challenges and risks associated with using LNG as an alternative fuel, tax incentives proposed for marine clusters can be given to the firms and businesses involved in the construction of LNG-fuelled ships and LNG bunkering stations. Such incentives are likely to promote LNG use and, in turn, the maritime industry.

[2] GL and MAN joint study on Costs and Benefits of LNG as ship fuel for container vessels

[3] Bloomberg: Why Shippers are turning to LNG powered vessels

[4] Bloomberg: Why Shippers are turning to LNG powered vessels

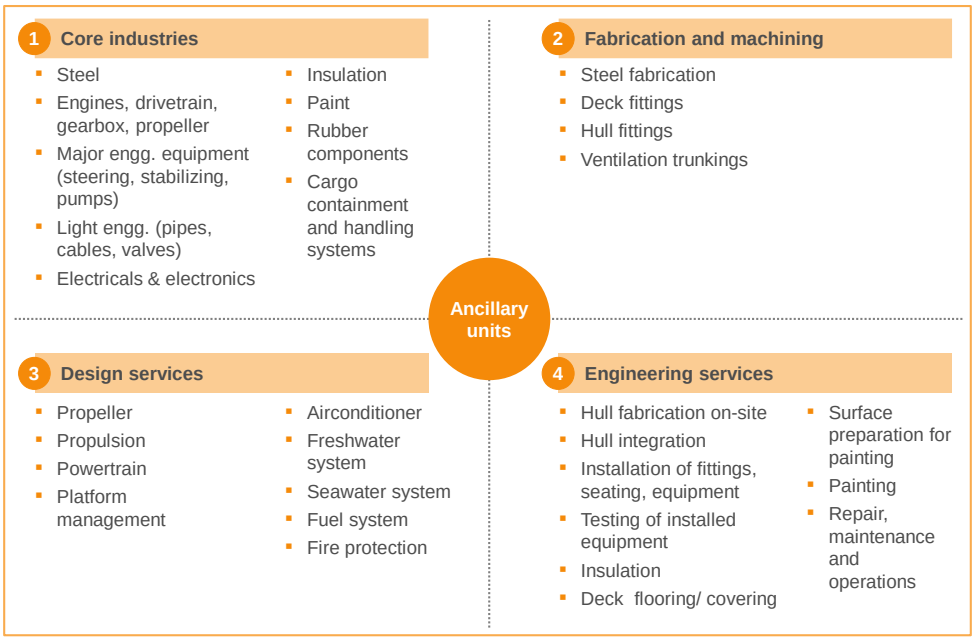
Ancillary

The shipbuilding supplies industry can be divided into four major categories (Exhibit 16):

- Core industries
- Fabrication and machining
- Design services
- Engineering services

EXHIBIT 16

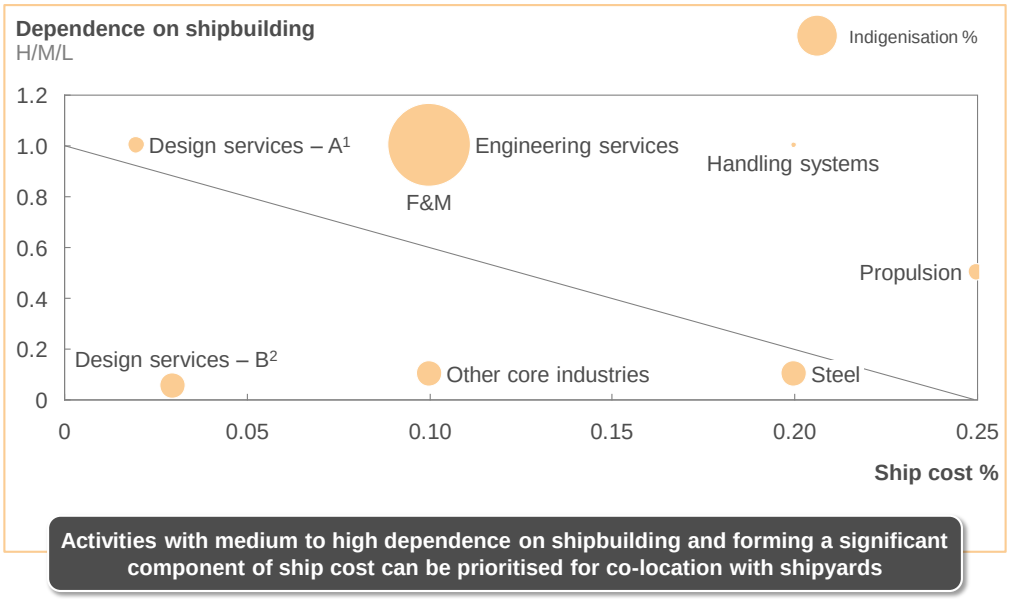
The supplies industry can be divided into four categories



Shipbuilding suppliers who can be co-located with shipyards as part of the maritime cluster are identified based on their dependence on shipbuilding and contribution to overall ship cost (Exhibit 17). High dependence on the shipbuilding industry implies that most of the output from ancillary industry is dedicated for shipbuilding activities. Activities with medium to high dependence on shipbuilding, that also form a significant portion of ship cost, can form part of the cluster on priority.

EXHIBIT 17

Framework for identifying potential ancillaries for maritime cluster



1 Propeller, propulsion, powertrain, platform management
2 Airconditioner, freshwater system, seawater system, fuel system, fire protection

Based on the framework, the ancillaries market is worth around INR 5,000 cr, with engineering services and fabrication and machining offering the greatest potential by 2025 (Exhibit 18). Moreover, the segment is fragmented and most services are offered by local players who can establish themselves near the shipyards for operational and financial benefits.

EXHIBIT 18

INR 5,000 cr addressable market size for ancillaries

ATTRACTIVENESS

Low Medium High

Ancillary	Base market size[1] (INR cr)	2025mMarke size[2] (INR cr)	Current indigenization	2025 indigenization	Addressable market (2025)
Engineering services	300	1,500	100%	100%	1,500
Fabrication and machining	300	1,500	100%	100%	1,500
Handling systems	600	3,000	0%	30%	900
Propulsion	750	3,750	5%	30%	1,125
Design services – A	60	300	5%	50%	150

1 Base Market Size: INR 3,000 cr
2 Total market size: INR 15,000 cr calculated assuming Revenues/DWT = INR 50,000/DWT and Deliveries = 3mn DWT

Engineering services, fabrication and machining have high attractiveness based on 2025 addressable market and colocation with shipyards.

Cargo handling systems and propulsion systems for ships have medium attractiveness when compared to engineering services, fabrication and machining. Most equipment is imported and Indian manufacturers are capable of serving only small ships. Given that indigenisation for these activities is negligible and shipbuilding demand is low, firms operating in this category can set up companies in the maritime cluster after a few years. Some of the big suppliers of propulsion system are Wartsila, Rolls Royce and Caterpillar. Cargo handling and containment systems vary depending upon the type of the vessel. Equipment required for a crude tanker includes a ballast system, cargo oil tanks, tank cleaning equipment, cargo heating and venting system. Companies providing such equipment include Aalborg Sunrod, Sewon, Kockumation, SAAB and Consilium.

Large foundries and a machinery setup, as required, could come up in conjunction with the propulsion and cargo handling industries in the maritime cluster.

Services

The prominent ports of the world (Singapore, Rotterdam, Hong Kong) are all supported by strong, cluster-based maritime services infrastructure. The cluster provides a positive, synergistic effect by attracting business for the maritime industry and improving the economics for the cluster participants.

In Singapore, the maritime industry contributes about 7 per cent to national GDP and employs over 170,000 workers. The major services operational in the Singapore cluster are ship broking, bunkering services, marine insurance services, shipping finance, maritime legal and arbitration services, and the Singapore registry of ships. The maritime services industry in Hong Kong, too, is highly evolved. Overall services contribute 93 per cent to the national economy, and the share of maritime services within that is around 0.45 per cent.

India could target to achieve a 0.2 per cent share of maritime services in overall GDP by 2025. Given an expected GDP of USD 6 trillion in India by 2025, and a services share of 50 per cent, the maritime services industry aspires to be around USD 6 billion by 2025.

The maritime industry in India is very fragmented, existing in small pockets[5]:

- Chennai/Ennore/Tuticorin: Maritime education, marine engineering, ship owners' base, liquid cargo
- Goa: Bulk port, shipbuilding, ship repairs, marine tourism, etc.
- Gujarat: Shipping lines, maritime consulting firms
- Kochi/Mangalore: Ship repair, shipbuilding, container cargo, LNG, etc.
- Mumbai/JNPT: Maritime education, ship repair, shipbuilding, ship finance, ship owners, etc.

The presence of international ship owners and service providers is also limited. An effective services cluster could be developed in four stages, as suggested in the pre-feasibility report conducted by GMB for the marine services cluster in Gujarat.

- Stage 1: Focus on attracting local industry and port operators in the state; select Indian charterers, brokers, law firms and banks can be potential tenants
- Stage 2: Attract players from India to the cluster along with some select overseas players. The cluster can move from Stage 1 to 2 only after successfully implementing tax reforms and changing the existing regulatory framework
- Stage 3: By this stage, cluster synergies will be apparent, creating many more business opportunities for the maritime sector firms in the cluster. Global ship operators and owners will also be interested in the cluster.
- Stage 4: Consolidate the gains and progress of previous stages and carry forward the momentum.

[5] Roadmap on the development of Maritime Clusters in Gujarat

Marine tourism

India's 7,500 km long coastline and an inland river transport network of over 14,500 km make the country an ideal destination for developing marine tourism. This can include a variety of water-based tourist activities that attract a wide range of people from around the world—aquariums, dolphinariums, waterparks, marine museums, cruise tourism and the opportunity to try water sports (Exhibits 19, 20, 21).

India is one of the most popular tourist destinations in Asia. A large number of its tourist destinations are in close proximity to either the coast or the inland water network. Coastal states such as Kerala registering a high growth rate of revenue from tourism, a CAGR of over 17.5 per cent during 2005–10, have already shown the way for optimising the returns from this industry[6]. Led by India's economic growth in the recent past, increasing per capita incomes have also been fuelling the domestic demand for leisure travel.

EXHIBIT 19

Cruise tourism: Royal Caribbean's Anthem of the Seas

ANTHEM OF THE SEAS
WOW. This changes everything.

Characteristics and features

Ship statistics

- Launching date: Spring 2015
- Maximum passenger capacity: 4,905
- Length: 348 m (1,142 ft)
- 16 decks
- Of 2,090 cabins, 1,570 will have balconies

New features

- Inside cabins feature real-time views of the ocean and destinations
- A 70 m poolside movie screen
- Bumper cars, roller skating, basketball court, circus school
- Indoor pool with retractable roof

Dynamic dining

- Eliminates set dining times and main dining rooms, replacing them with 18 restaurant options, flexible dining times and dining spaces

Impressions

SOURCE: Company website; Press articles; Cruise Market Watch

6 IBEF (2011). *Tourism and Hospitality.* India Brand Equity Foundation.

EXHIBIT 20

Aquarium type amusement park: Discovery Cove, Orlando, USA

Background

Discovery Cove is a theme park in Orlando, owned and operated by SeaWorld Parks & Entertainment

- **Activities/ attractions**
  - "Talk, touch, play and swim" with bottlenose dolphins
  - Coral reef where guests can swim and snorkel with thousands of tropical fish, sting rays, etc.
  - Over 250 tropical birds
  - Several beaches, waterfalls and a rainforest
  - Shark-filled lagoon
- **Facts**
  - Investment of **US$ 300 mn**
  - Size of 30 acres/ 130,000 mn sq m
  - Sister park of SeaWorld Orlando
- **Strategy**
  - Limit the number of guests (1,300 per day) in order to provide exclusivity and ensure personal experience with wildlife
  - In return, guests are willing to pay an admission price that far exceeds the industry average (~US$ 260)

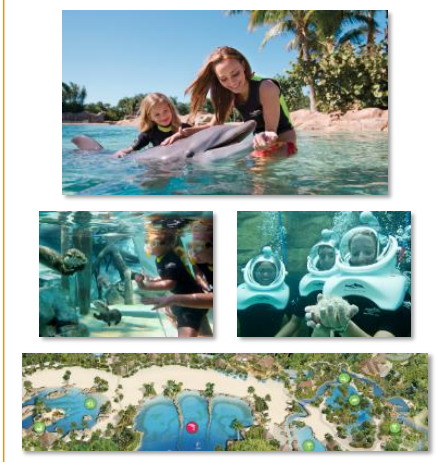


EXHIBIT 21

Water park: Port Aventura, Spain

Costa Caribe Aquatic Park

- The waterpark is part of the Port Aventura area, but guests can choose to only visit the waterpark
- The area **is themed like the Caribbean** (with over 5,000 species of tropical plants, beaches and Latino and Reggae music)
- The waterpark section is **~ 50,000 sq m** large (of which **8,500 sq m is water**)
- In 2013 alone, the waterpark grew 14,000 sqm
- 3 new water slides opened in 2013
- Most of the park is outdoors but one large pool with several mid-sized water slides is indoors
- Over **16 attractions** available for all age groups
- 5 restaurants are located within the waterpark area
- Features Europe's highest free fall waterslide

Park statistics

- 65% of all park visitors are domestic and 35 international guests
- 45% of all international guests are French
- About a quarter of all guests stay overnight
- 30% of the generated revenue comes from the hotel business on site
- 77% of all visitors are visiting with their families
- The park counts over 75 restaurants
- The four hotels have approximately 2,000 beds
- Room occupancy is at 72%
- 2013 EBITDA margin was 40%

SOURCE: Company website; Press search

Cruise tourism

The Asian cruise market is expected to grow at around 8 per cent per annum, and to double its passenger volume by 2020. According to the Asia Head of Carnival Cruise Lines, Pier Luigi Foschi, "The market potential for cruising in Asia is huge as the total potential number of cruise passengers could reach 3.7 million by 2017, and double to over seven million by 2020." With the recently proposed Sagarmala project, cruise tourism could get a much needed boost in India.

With just a few players (Carnival, Royal Caribbean and Norwegian) dominating around 90 per cent of the Asian market for cruise tourism, the sector could be described as oligopolistic. India does not r feature among the Asian cruise destinations, which choose a home port based on demand factors such as:

- Local market size
- Airport passenger throughput and flight connectivity
- Proximity to attractive destination ports
- Attractiveness of home port city to tourists
- Safety

Indian ports (Mumbai, Goa, Mangalore and Cochin, all on the western coast) only serve as ports of call for international cruises that connect Asia and the Middle East. There is great potential for India to change this. Mumbai, Goa and Kochi can all serve as home ports for international cruises—they are much in demand and cruise lines already call at these ports. India can also promote domestic cruises that combine inland tourism with a sea cruise with religious, cultural and heritage themes (Exhibit 22, 23, 24 and 25).

EXHIBIT 22

Marine Tourism – Potential for international and domestic cruises

EXHIBIT 23

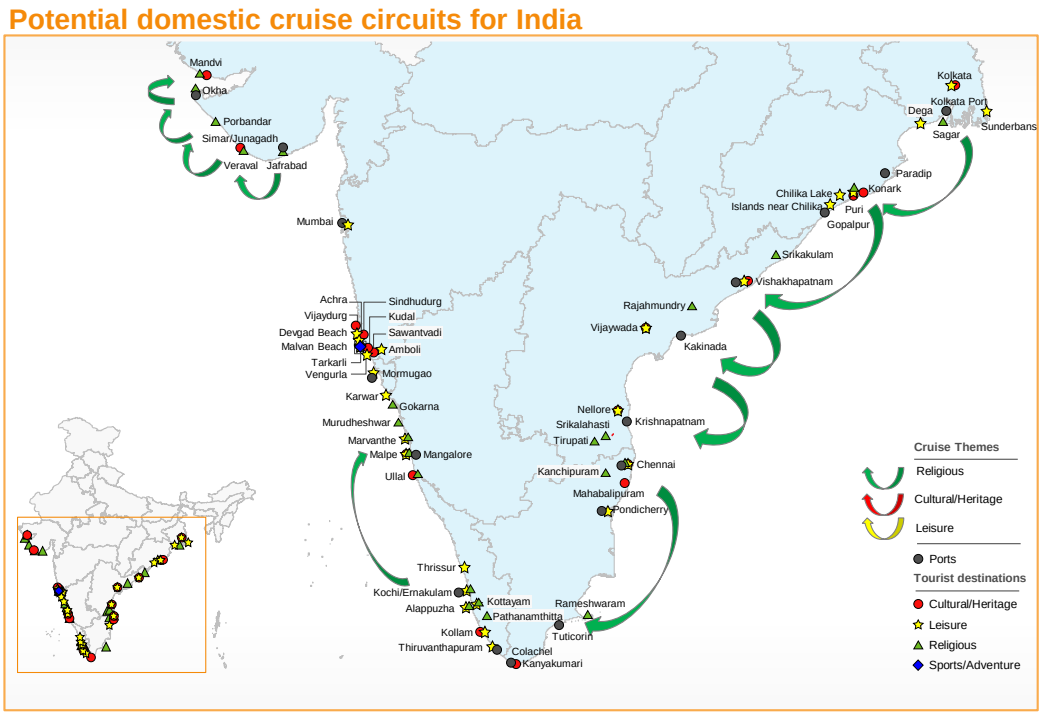


EXHIBIT 24

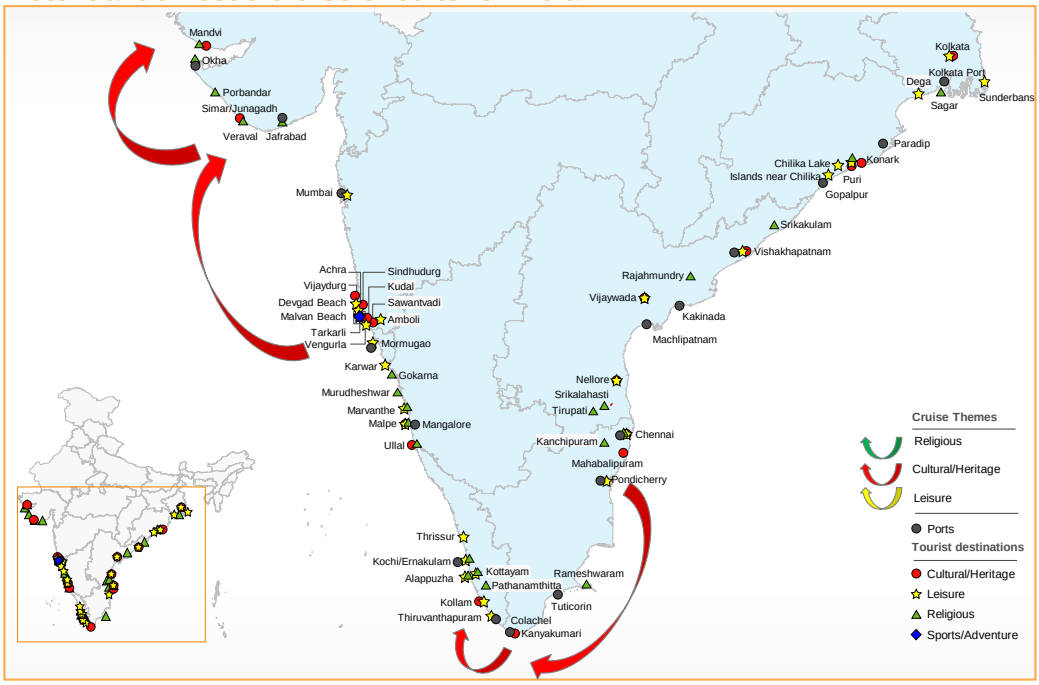
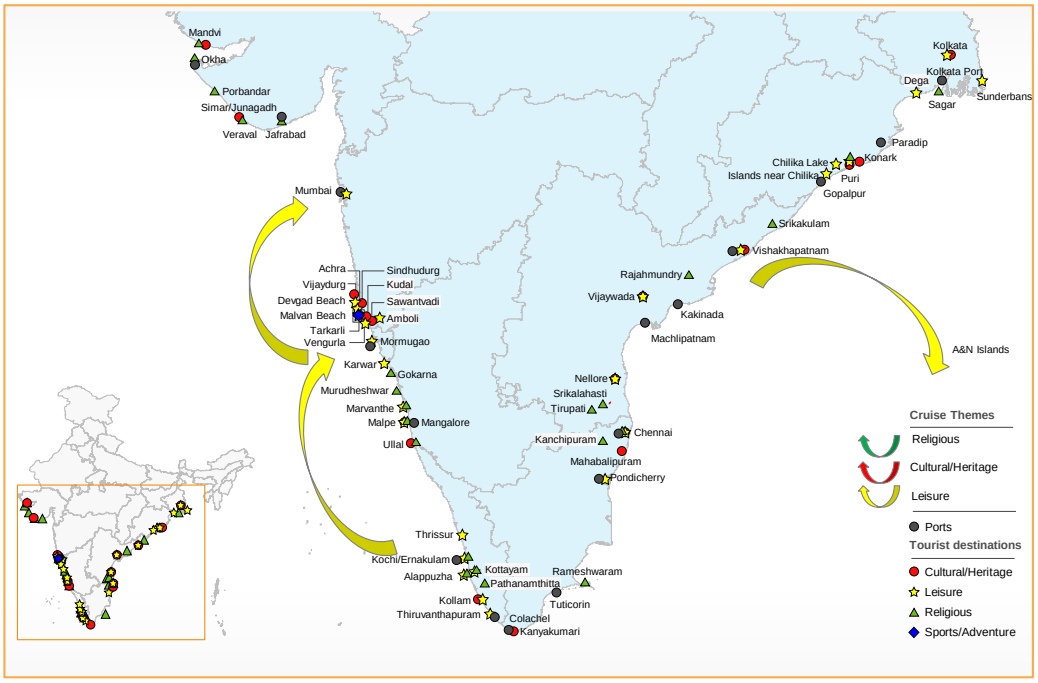


EXHIBIT 25

Potential domestic cruise circuits for India



While there is a spotential for marine tourism in India especially cruise tourism, the focus within the maritime clusters could be on retail and leisure developments.

Marine products

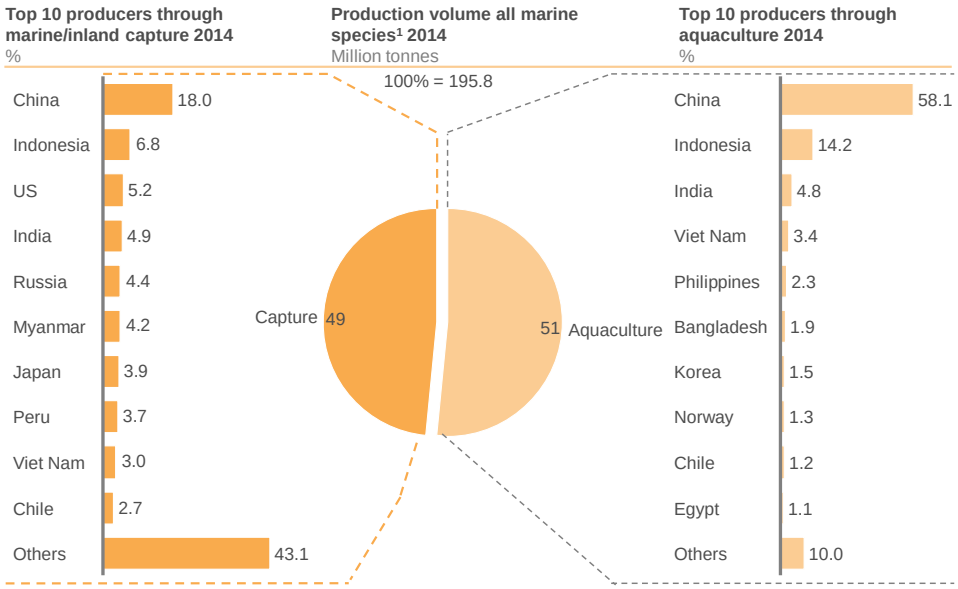
Globally, the fisheries sector contributes around USD 220 bn in value, as well as 55 mn direct jobs and 15 per cent of the world's animal protein. While constraints on fish supply sources might slow down volume growth in the future, the rise in production and prices has till date driven a steady industry growth of around 5 per cent.

As of 2014, aquaculture accounted for around 50 per cent of all fish consumption and all fish production in the world. Asia is the world's biggest fish producer, with China alone accounting for over half of all global production, mainly from aquaculture. In further good news for the industry, health concerns, economic growth, and increasing populations mean that overall fish consumption is expected to increase by around 50 per cent by 2030[7].

[7] FAO, press search

EXHIBIT 26

Asia is the biggest fish producer, with China alone accounting for more than half of global production, mainly from aquaculture



1 Differs from slide 7, which includes only fish. Includes over 20 million tons of non-fish marine species. Without seaweed, etc. the share of China is expected to be lower than shown here

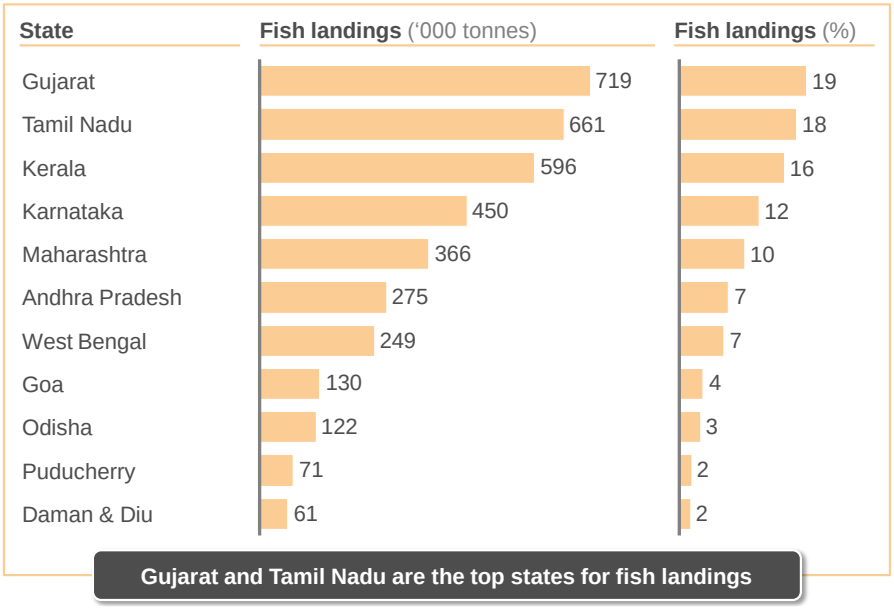
SOURCE: Fishstat plus

India is the fourth-largest fish producer through marine/inland capture and third-largest through aquaculture (Exhibit 26). The top two states for fish landings in India are Gujarat and Tamil Nadu, at 19 and 18 per cent respectively (Exhibit 27).

EXHIBIT 27

Indian fisheries industry

2013-14



Gujarat and Tamil Nadu therefore have been considered as potential locations for development of maritime cluster in India. Existing fish landing centres in these two states could form part of the suggested cluster. In addition to providing employment, fishing industry could contribute to the overall maritime economy of the state in turn benefiting the cluster.

LOCATION ASSESSMENT

Gujarat and Tamil Nadu emerged as the two possible locations for maritime clusters in India based on four important factors.

- Shipyard: Given that existing shipyards are underutilised, a greenfield shipyard is not required. However, a maritime cluster could be considered for development around an existing shipyard
- Manufacturing strength: Shipbuilding is an intensive assembly industry requiring inputs and materials from a variety of industries like steel, engineering equipment, wood, non-ferrous metals, etc. Synergies between cluster participants could be enhanced if the location has a strong manufacturing ecosystem
- Size of ports and shipping sector: High port traffic makes the location attractive for maritime service providers
- Synergies with other steel dependent industries such as automotive: A strong automotive industry can attract equipment suppliers for engines, gearbox and drivetrain, in turn helping the shipbuilding industry.

Gujarat

Gujarat has certain enabling conditions for a maritime cluster (Exhibits 28, 29):

- Port of Pipavav: Gateway port that can handle 1 million TEU traffic
- Essar Hazira plant with a capacity of around 10 MMTPA to supply steel to this cluster
- Sisoiya Alang Shipyard, one of the biggest ship-breaking yards in the world
- Gujarat International Finance Tec-City (GIFT), a new central business district between Ahmedabad and Gandhinagar that can host maritime service providers like lawyers and brokers.
- Sanand Auto Cluster, an emerging auto hub hosting Tata, Ford, Hitachi and Peugeot.

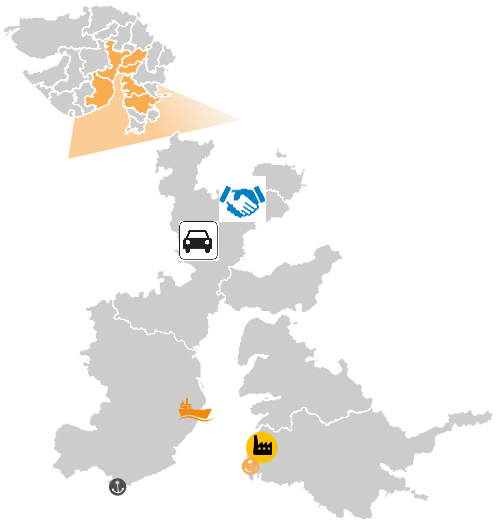
In addition, Gujarat has many operational shipyards:

- ABG Shipyard Ltd. in Surat, Dahej

- L&T in Hazira
- Shoft Shipyard Pvt. Ltd. in Kaladara village
- Pipavav Shipyard Ltd. in Pipavav
- Modest Infrastructure Ltd. in Bhavnagar
- Wadia Boat Builders in Billimora
- Alcock Ashdown Ltd. in Bhavnagar, Pipavav

EXHIBIT 28

Gujarat has enabling conditions required for maritime cluster (1/1)

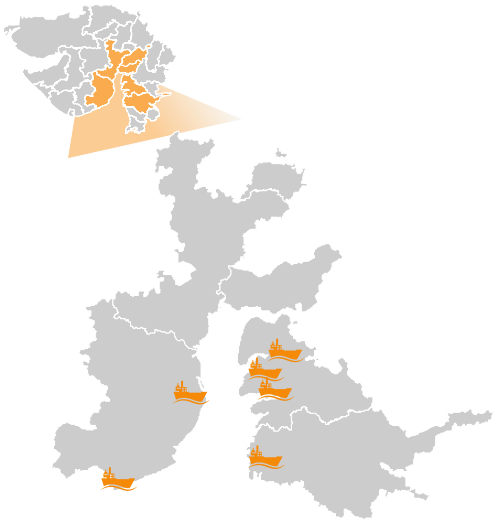


Key components of maritimee cluster

- Port of Pipavav: Gateway port that can handle 1 million TEU traffic
- Essar Hazira plant with a capacity of ~10 MMTPA to supply steel to this cluster
- Sisoiya Alang Shipyard, one of the biggest ship-breaking yards in the world
- Gujarat International Finance TecCity (GIFT), New central business district between Ahmedabad and Gandhinagar that can host marine services like lawyers, brokers etc
- Sanand Auto Cluster, an emerging Auto hub hosting Tata, Ford, Hitachi and Peugot

EXHIBIT 29

Gujarat has enabling conditions required for maritime cluster (2/2)



Operational shipyards

- ABG Shipyard Ltd.: Surat, Dahej
- L & T: Hazira
- Shoft Shipyard Pvt. Ltd.: Kaladara village
- Pipavav Shipyard Ltd.: Pipavav
- Modest Infrastructure Ltd.: Bhavnagar
- Wadia Boat Builders: Billimora
- Alcock Ashdown Ltd.: Bhavnagar, Pipavav

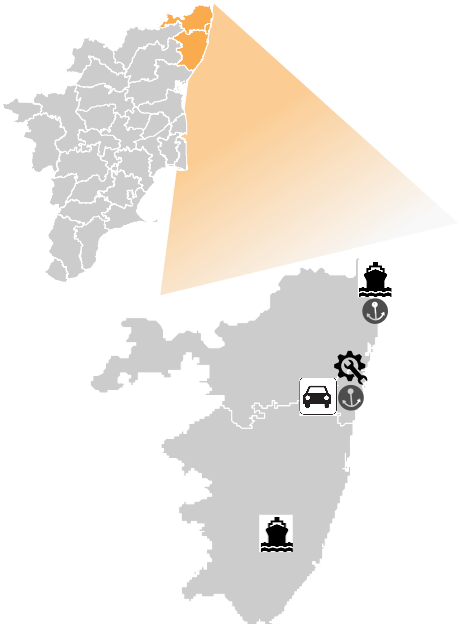
Tamil Nadu

Tamil Nadu, too, has certain enabling conditions for a maritime cluster (Exhibit 30):

- Ports of Ennore and Chennai
- A proposed steel cluster near Chennai
- Shipyards: L&T, Kattupalli; Tebma, Chengalpet
- The state ranks second in the "general purpose" and "special purpose" machinery categories, contributing 18 per cent and 11 per cent respectively to India's total output
- The Chennai automotive corridor accounts for 33 per cent of commercial vehicles, 21 per cent of all passenger cars, and 35 per cent of auto components manufactured in India.

EXHIBIT 30

Tamil Nadu has enabling conditions for maritime cluster



Key components of marine cluster

- Port of Ennore and Chennai
- Proposed steel cluster near Chennai
- Shipyards: L&T, Kattupalli; Tebma, Chengalpet
- Tamil Nadu ranks second in the "general purpose" and "special purpose" machinery categories, contributing 18 per cent and 11 per cent respectively to India's total output
- Chennai automotive corridor: Accounts for 33% of commercial vehicles, 21% of all passenger cars, and 35% of auto components manufactured in India

GUJARAT MARITIME CLUSTER

The maritime cluster in Gujarat could consist of:

- Existing shipyards
- An ancillary cluster at Bhavnagar with retail and leisure components
- A services cluster in Ahmedabad or GIFT city
- Existing fish landing centres

The Gujarat Maritime Board (GMB) is already working on some of the components of a maritime cluster. These plans could be integrated into the proposed maritime cluster for accelerated development and implementation. The GMB has proposed setting up a services-based cluster in Gujarat. A pre-feasibility study has been conducted to evaluate the potential of such a cluster. GMB is also undertaking the development of a Marine Shipbuilding Park or cluster based shipyards at Old Bhavnagar Port.

Services

As the state capital and an educational hub, Ahmedabad provides the right talent base for service-oriented jobs. GIFT city provides the right infrastructure environment for a services-based cluster. Pre-feasibility study by GMB evaluates the development of services cluster on a land parcel in Ahmedabad or construction of a tower in GIFT city.

Making the maritime cluster a reality requires around 600,000 sq ft of office space across the four stages of development (Exhibit 31, 32, 33 and 34).

EXHIBIT 31

SERVICES

600,000 sq ft of office space is required across four stages

Stages	Details	Details	Office space
Stage 1	▪ Local freight forwarders ▪ Shipping lines ▪ Port agents ▪ Bunker suppliers	▪ Stevedores/Misc. ▪ Banks ▪ Law firms ▪ Government offices	120,000 sq ft
Stage 2	▪ Indian ship owners ▪ Indian operators ▪ Charterers	▪ Indian brokers ▪ Technical consultants	200,000 sq ft
Stage 3	▪ Overseas operators & ship owners ▪ Overseas broker/Law firms	▪ Global technical services providers ▪ Global charterers/Trading house	130,000 sq ft

- **Stage 4 will consolidate the gains and progress of previous stages and would carry forward the momentum**
- **Space requirement for this stage will be 150,000 sq. ft.**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 32

SERVICES

Stage 1 details

Target market	Total estimated demand universe	No. of Units	Space per unit	Space requirement (sq ft)
Gujarat freight forwarders	More than 20 large freight forwarders	5	4,000	20,000
	More than 30 Medium size forwarders	5	2,000	10,000
	More than 100 small freight forwarders	10	1,000	10,000
Shipping lines	More than 20 major shipping lines in India	5	4,000	20,000
	More than 30 medium NVOCCs	3	2,000	6,000
Port agents	More than 20 port agents	5	4,000	20,000
Bunker suppliers	More than 10 bunker suppliers	5	1,000	5,000
Stevedores/ Misc.	More than 30	5	1,000	5,000
Banks	More than 15 financial institutes	5	2,000	10,000
Law firms	More than 10 law firms in India	2	1,000	2,000
Govt. offices	Various government offices to be targeted	6	1,000	6,000
Charterers	More than 50 firms	6	1,000	6,000
Total				**1,20,000**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 33

SERVICES

Stage 2 details

Target market	Total estimated demand universe	No. of Units	Space per unit (sq ft)	Space requirement (sq ft)
Indian ship owners	More than 7 large ship owners – INSA members	3	5,000	15,000
	More than 15 medium size ship owners – INSA members	5	3,000	15,000
	More than 30 small ship owners – (INSA members + barge owners)	10	2,000	20,000
Indian & overseas operators	7 Indian and 11 overseas operators in the category of large ship operators	5	3,000	15,000
	11 Indian and 11 overseas operators in the category of small ship operators	5	1,000	5,000
Charterers	More than 20 large charterers in India	10	3,000	30,000
	More than 25 small charterers in India	10	1,000	10,000
Indian brokers	More than 10 large Indian brokers	5	5,000	25,000
	More than 15 small brokers	5	2,000	10,000
International brokers	More than 10 brokers with business relations in India.	5	5,000	25,000
Technical consultants	More than 15 technical consultants getting business from India	6	3,000	18,000
Other key institutes	Other miscellaneous firms	6	2,000	12,000
Total				**2,00,000**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 34

SERVICES

Stage 3 details

Target market	Total estimated demand universe	No. of units	Space per unit	Space requirement (sq ft)
Overseas operators & ship owners focusing on India / regional markets	More than 15 large overseas operators	5	5,000	25,000
	More than 15 medium size ship owners	5	3,000	15,000
Overseas broker/Law firms	More than 15 large firms	5	5,000	25,000
	More than 15 small firms	5	3,000	15,000
Global technical services providers	More than 20 global service providers	5	5,000	25,000
Indian charterers/ Global charterers/ Trading house	More than 50 firms in India and several global charterers	5	5,000	25,000
Total				**1,30,000**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

Option 1: Land parcel in Ahmedabad

For evaluating the financial feasibility of developing the cluster on a land parcel in Ahmedabad, requirements are estimated based on infrastructural and development norms (Exhibit 35). An FSI of 2.25 is used for the calculations and the numbers of floors considered for office and government buildings are ten and six respectively.

EXHIBIT 35

Infrastructure norms and assumptions

Area allocation	Value	Unit
Site coverage/ Plot coverage	32%	% of total area
Open area as % of total area	68%	% of total area
Roads and pathways	20%	% of total area
Utilities	10%	% of total area
Open space	38%	% of total area

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

For built-up area distribution **given in** Exhibit 36, land requirements are calculated (Exhibit 37).

EXHIBIT 36

Built-up area distribution

Item	Stage 1	Stage 2	Stage 3	Stage 4	Total
Office space	120,000	200,000	130,000	150,000	600,000
Commercial area	6,000	10,000	6,500	7,500	30,000
Area for govt./trade offices	82,000	-	41,000	-	123,000
Common area	32,000	-	25,000	-	57,000
Total built-up area	240,000	210,000	202,500	157,500	810,000

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 37

Land requirements for services cluster

Particulars	Total	Stage 1	Stage 2	Stage 3	Stage 4
Office space	**1.4**	0.3	0.5	0.3	0.3
Commercial area	**0.7**	0.1	0.2	0.1	0.2
Area for govt./trade offices	**0.5**	0.3	-	0.2	-
Common area	**0.2**	0.1	-	0.1	-
Roads and pathways	**1.8**	0.6	0.4	0.5	0.3
Utilities area	**0.9**	0.3	0.2	0.2	0.2
Open space	**3.3**	1.1	0.8	0.9	0.6
Total land area	**8.8**	2.8	2.2	2.3	1.6

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

The financial feasibility of the cluster is assessed based on certain cost and revenue assumptions (Exhibit 38 and 39).

EXHIBIT 38

Cost assumptions

Particulars	Results
Office space development cost	Rs. 1800 per sq ft
Cost of construction of commercial space	Rs. 2000 per sq ft
Cost of construction of utilities	Rs. 1200 per sq ft
Engineering/ mechanical and other utilities	Rs. 350 per sq ft
Water & sanitary facility	Rs. 350 per sq ft
Garden & free space	Rs. 240 per sq ft
Land development cost	Rs. 3,00,000 per acre
Green cover development	Rs. 60,000 per acre
Road construction cost	Rs. 3 crore per km

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 39

Revenue assumptions

Rentals	Average rentals (Rs./sq ft/ month)
Office space	35
Commercial space	100
Common facilities	50

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

Based on these assumptions, the pre-tax IRR for Option 1 is estimated to be 11.1 per cent in the pre-feasibility study by GMB.

Option 2: GIFT city

Another option for development of services cluster could be to construct a building in GIFT city and this could be constructed in phase 1 over a period of 2 years

Office space requirement could be the same as Option 1, however the cost of the construction in GIFT city is high at INR 4250 per sqft of built-up area. Lease rentals for office spaces are around INR 35 per sqft per month. With these assumptions, the IRR in this option is estimated to be 6.7%

Ancillary

The ancillary segment of the maritime cluster could be developed in Bhavnagar. GMB is already working on developing the Marine Shipbuilding Park in the area. It owns a parcel of the land in Old Bhavnagar Port which can be used for shipbuilding and allied purposes (Exhibit 40 and 41). Ancillaries could grow based on demand from shipyards in and around Bhavnagar.

EXHIBIT 40

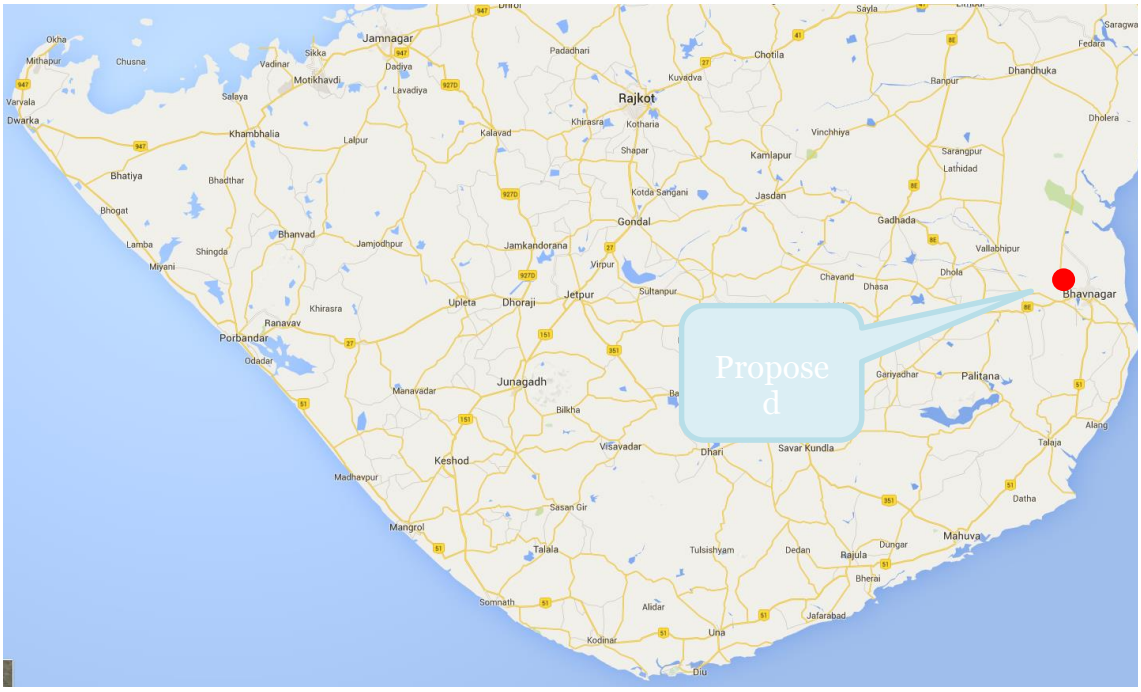
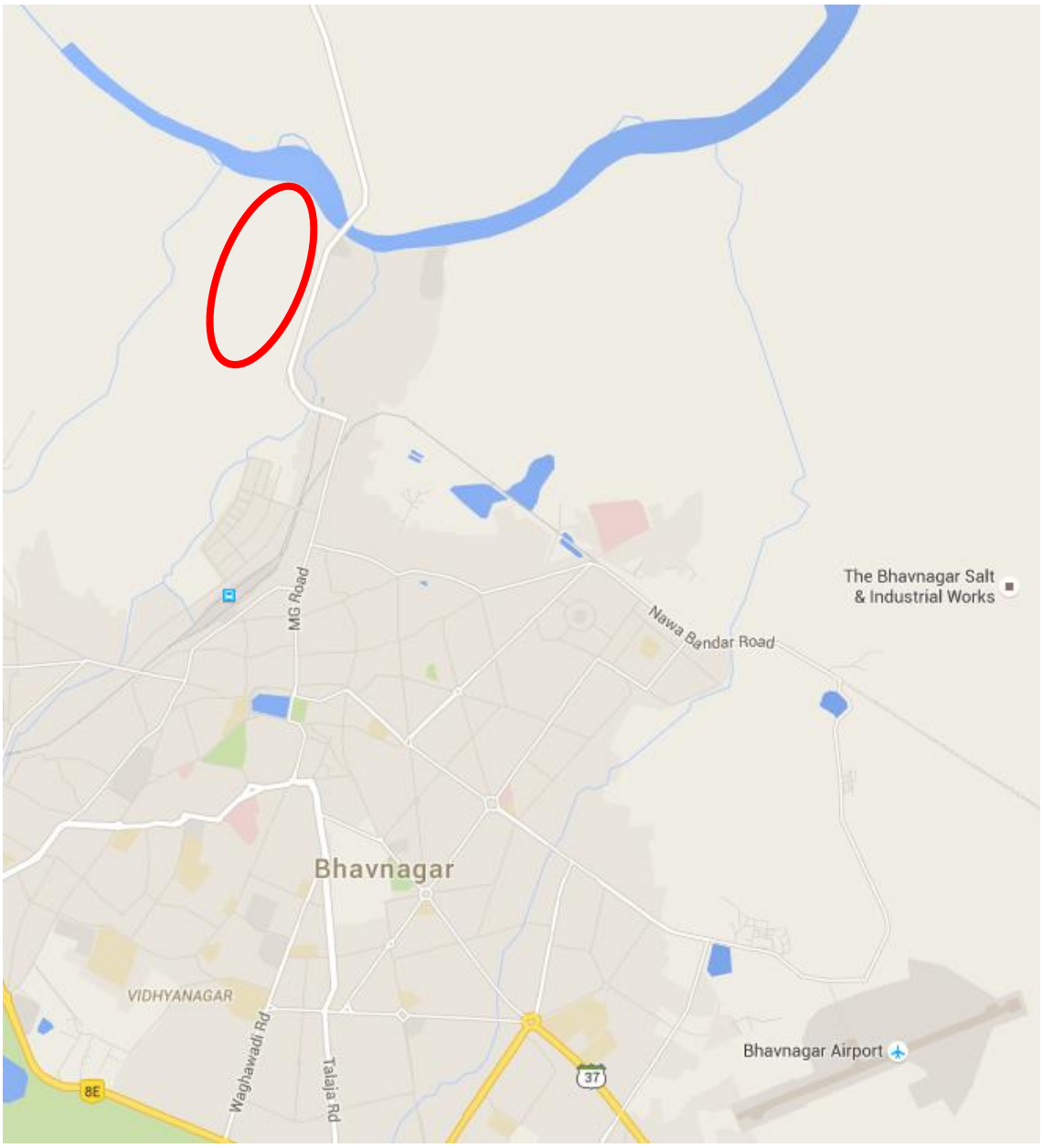


EXHIBIT 41



Units/suppliers that can be targeted as part of the ancillary cluster were identified in the Market Assessment section. Land requirements have been estimated for shipbuilding demand of up to 300,000 DWT. For example, to cater to the requirements of such a shipyard foundry, capacity of 25,000 T would be required. A foundry of this capacity will require about 40,000 to 45,000 sq m or 10 acres of land. Similarly, requirements for other units in the cluster have been estimated based on shipyard capacity (Exhibit 42).

EXHIBIT 42

Land required in the maritime cluster for ancillaries

Units	No. of units	Area per unit (acres)	Total area (acres)
Fabrication and machining	10	1	10
Engineering services	5	1	5
Handling systems	1	5	5
Propulsion	1	5	5
Foundry	1	10	10
Machining for large equipment	1	5	5
Design services (propulsion, propeller, powertrain, platform management)	2	0.5	1
Total			41

Eighty acres of land have been earmarked as “Reserved area for shipbuilding/allied purposes” by GMB. Land distribution has been estimated based on industrial and other commercial requirements (Exhibit 43).

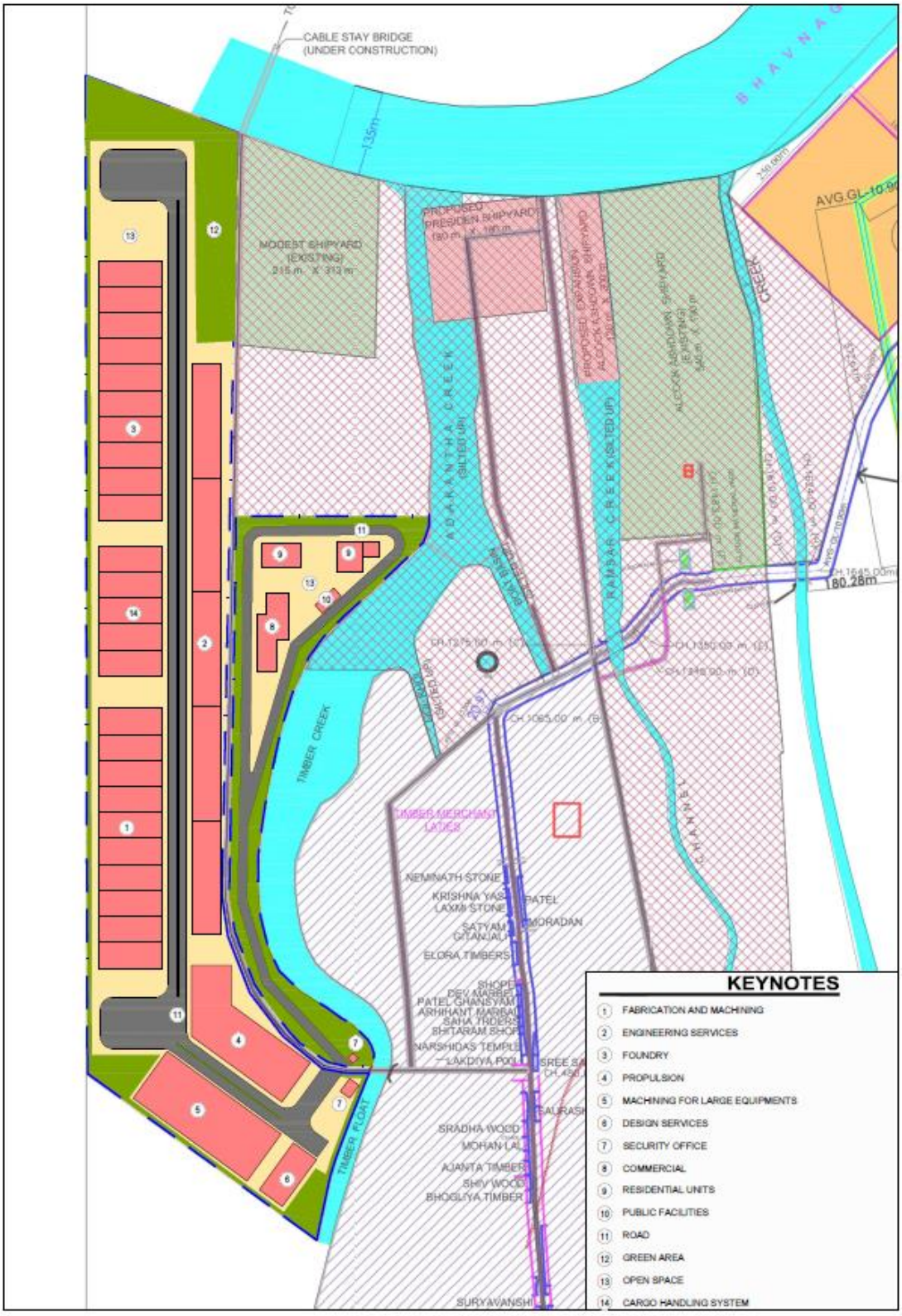
EXHIBIT 43

Land distribution

Category	% of total land	Land (acres)
Industrial	51%	41
Residential	5%	4
Commercial	5%	4
Roads	10%	8
Public facilities	5%	4
Open space	24%	23
Total		80

Drawings have been created to illustrate the land distribution and facility planning (Exhibit 44)

EXHIBIT 44



The financial analysis is done to assess the feasibility of the project. Certain land absorption assumptions are made for this purpose (Exhibit 45).

EXHIBIT 45

Absorption assumptions

Industrial Land

Year	Units	Land (acres)	Absorption %
1	5 F&M, 2 ES, 2 DS	8	20%
2	5 F&M, 3 ES	8	20%
3	Handling systems	5	12%
4	Foundry, machining	15	37%
5	Propulsion	5	12%
Total		41	

Commercial and residential land

Year	Absorption %	Land (acres)
1	10%	0.4
2	10%	0.4
3	10%	0.4
4	30%	1.2

It is assumed that the ancillaries will be established over a period of five years. Similarly, commercial land absorption assumptions are made over a five-year period. Infrastructure and development norms along with cost and revenue assumptions are considered for estimating the project cash flows (Exhibit 46).

EXHIBIT 46

Infrastructure and development norms, Cost assumptions

Category	FSI
Commercial	1.6
Residential	1.6
Industrial	1.0

Sale and lease assumptions

Category	Units	Rate
Industrial land lease	Rs/sq ft p.a.	70
Commercial lease	Rs/sq ft p.a.	360
Residential space	Rs/sq ft	2,000

Construction cost

Category	Rs/ sqft
Commercial	1,700
Residential	1,200

Equity of INR 80 cr could be invested at the beginning of the cluster development. Considering a project timeframe of 15 years and 5 per cent yearly inflation, project IRR is estimated to be 21.5 per cent.

TAMIL NADU MARITIME CLUSTER

The maritime cluster in Tamil Nadu could consist of:

- Existing shipyards
- Ancillary support and services in Ennore with retail and leisure components
- Existing fish landing centres

To be commercially viable, ancillary industries co-located with shipyards need a strong demand for ships. They gain from proximity to shipyards as it creates efficiencies in the supply chain and generates synergies. Marine services providers need access to infrastructure and a talent base for setting up their offices. The maritime cluster In Tamil Nadu can be developed near Chennai due to enabling conditions like existing shipyards, major ports, steel cluster, automotive and engineering industry, universities and colleges.

A 100-acre land parcel owned by Kamrajar Port Limited (erstwhile Ennore Port Ltd.) could beconsidered for cluster development ((Exhibit 47 and 48). The L&T shipyard at Kattupalli is around 5 km away. The following sections give details about the services and ancillary activities planned as part of the Tamil Nadu maritime cluster.

EXHIBIT 47

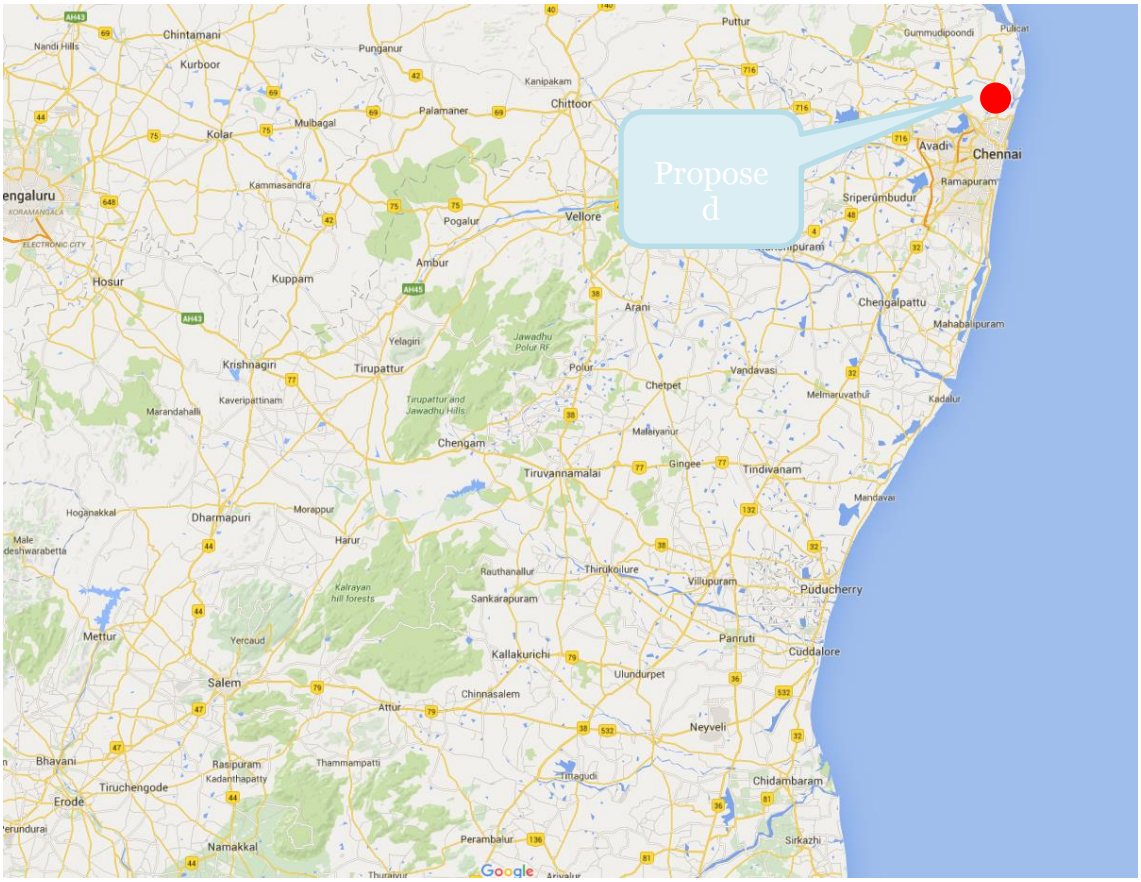

Propose
d
Chintamani
Kurboor
Punganur
Kanipakam
Chittoor
Puttur
Gummudipoondi
Kolar
Mulbagal
Palamaner
Avadi
Chennai
Ramapuram
Sriperumbudur
Kammasandra
Pogalur
Vellore
Ambur
Hosur
Kuppam
Arani
Chengalpattu
Mahabalipuram
Yelagiri
Krishnagiri
Tirupattur
Polur
Vandavasi
Chetpet
Melmaruvathur
Kadalur
Marandahalli
Kaveripattinam
Chengam
Malaiyanur
Tiruvannamalai
Gingee
Tindivanam
Mandavai
Hoganakkal
Dharmapuri
Morappur
Harur
Rauthanallur
Thirukoilure
Villupuram
Puducherry
Sankarapuram
Mettur
Yercaud
Panruti
Cuddalore
Kallakurichi
Ulundurpet
Salem
Chinnasalem
Attur
Neyveli
Bhavani
Rasipuram
Thammampatti
Tittagudi
Chidambaram
Tiruchengode
Erode
Namakkal
Perambalur
Sirkazhi
Google

EXHIBIT 48

Services and ancillary

Marine services will require office space of around 600,000 sq ft across four stages (Exhibit 49, 50, 51 and 52).

EXHIBIT 49

SERVICES

600,000 sq ft of office space is required across four stages

Stages	Details	Details	Office space
Stage 1	▪ Local freight forwarders ▪ Shipping lines ▪ Port agents ▪ Bunker suppliers	▪ Stevedores/Misc. ▪ Banks ▪ Law firms ▪ Government offices	120,000 sq ft
Stage 2	▪ Indian ship owners ▪ Indian operators ▪ Charterers	▪ Indian brokers ▪ Technical consultants	200,000 sq ft
Stage 3	▪ Overseas operators & ship owners ▪ Overseas broker/Law firms	▪ Global technical services providers ▪ Global charterers/Trading house	130,000 sq ft

- **Stage 4 will consolidate the gains and progress of previous stages and would carry forward the momentum**
- **Space requirement for this stage will be 150,000 sq. ft.**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 50

SERVICES

Stage 1 details

Target market	Total estimated demand universe	No. of Units	Space per unit	Space requirement (sq ft)
Gujarat freight forwarders	More than 20 large freight forwarders	5	4,000	20,000
	More than 30 Medium size forwarders	5	2,000	10,000
	More than 100 small freight forwarders	10	1,000	10,000
Shipping lines	More than 20 major shipping lines in India	5	4,000	20,000
	More than 30 medium NVOCCs	3	2,000	6,000
Port agents	More than 20 port agents	5	4,000	20,000
Bunker suppliers	More than 10 bunker suppliers	5	1,000	5,000
Stevedores/ Misc.	More than 30	5	1,000	5,000
Banks	More than 15 financial institutes	5	2,000	10,000
Law firms	More than 10 law firms in India	2	1,000	2,000
Govt. offices	Various government offices to be targeted	6	1,000	6,000
Charterers	More than 50 firms	6	1,000	6,000
Total				**1,20,000**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 51

SERVICES

Stage 2 details

Target market	Total estimated demand universe	No. of Units	Space per unit (sq ft)	Space requirement (sq ft)
Indian ship owners	More than 7 large ship owners – INSA members	3	5,000	15,000
	More than 15 medium size ship owners – INSA members	5	3,000	15,000
	More than 30 small ship owners – (INSA members + barge owners)	10	2,000	20,000
Indian & overseas operators	7 Indian and 11 overseas operators in the category of large ship operators	5	3,000	15,000
	11 Indian and 11 overseas operators in the category of small ship operators	5	1,000	5,000
Charterers	More than 20 large charterers in India	10	3,000	30,000
	More than 25 small charterers in India	10	1,000	10,000
Indian brokers	More than 10 large Indian brokers	5	5,000	25,000
	More than 15 small brokers	5	2,000	10,000
International brokers	More than 10 brokers with business relations in India.	5	5,000	25,000
Technical consultants	More than 15 technical consultants getting business from India	6	3,000	18,000
Other key institutes	Other miscellaneous firms	6	2,000	12,000
Total				**2,00,000**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

EXHIBIT 52

SERVICES

Stage 3 details

Target market	Total estimated demand universe	No. of units	Space per unit	Space requirement (sq ft)
Overseas operators & ship owners focusing on India / regional markets	More than 15 large overseas operators	5	5,000	25,000
	More than 15 medium size ship owners	5	3,000	15,000
Overseas broker/Law firms	More than 15 large firms	5	5,000	25,000
	More than 15 small firms	5	3,000	15,000
Global technical services providers	More than 20 global service providers	5	5,000	25,000
Indian charterers/ Global charterers/ Trading house	More than 50 firms in India and several global charterers	5	5,000	25,000
Total				**1,30,000**

SOURCE: GMB: Pre-feasibility report for establishment of marine clusters

Units/suppliers that can be targeted as part of the ancillary cluster were identified in the Market Assessment section. Land requirements for these have been estimated based on shipyard capacity (Exhibit 53).

EXHIBIT 53

Land required in the maritime cluster for ancillaries

Units	No. of units	Area per unit (acres)	Total area (acres)
Fabrication and machining	10	1	10
Engineering services	5	1	5
Handling systems	1	5	5
Propulsion	1	5	5
Foundry	1	10	10
Machining for large equipment	1	5	5
Design services (propulsion, propeller, powertrain, platform management)	2	0.5	1
Total			41

Land distribution has been estimated based on industrial and other commercial requirements (Exhibit 54).

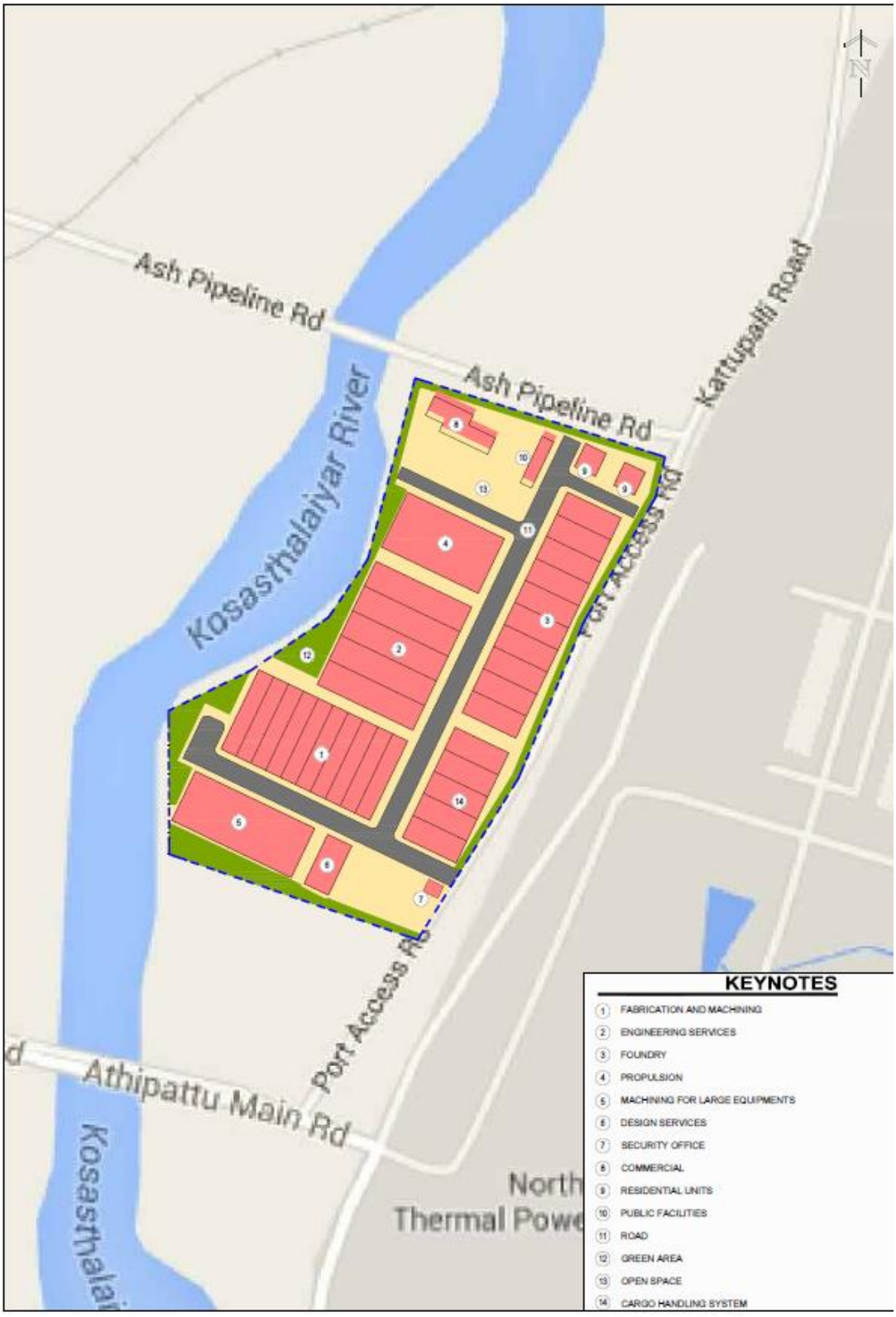
EXHIBIT 54

Land distribution

Category	Land (acres)
Industrial	41
Residential	10
Commercial	8
Roads	10
Public facilities	10
Open space	21
Total	100

Drawings have been created to illustrate this land distribution and facility planning (Exhibit 55).

EXHIBIT 55



A financial analysis assesses the feasibility of the project, based on certain land absorption assumptions (Exhibit 56).

EXHIBIT 56

Absorption assumptions

Industrial Land

Year	Units	Land (acres)	Absorption %
1	5 F&M, 2 ES, 2 DS	8	20%
2	5 F&M, 3 ES	8	20%
3	Handling systems	5	12%
4	Foundry, machining	15	37%
5	Propulsion	5	12%
Total		41	

Commercial land

Year	Absorption %	Land (acres)
1	10%	0.4
2	10%	0.4
3	10%	0.4
4	30%	1.2
5	40%	1.6
Total		4

It is assumed that the ancillaries will be established over a period of five years. Similarly, commercial land absorption assumptions are made over a five-year period. Infrastructure and development norms along with cost and revenue assumptions are considered for estimating the project cash flows (Exhibit 57).

EXHIBIT 57

Infrastructure and development norms, Cost assumptions

Category	FSI
Commercial	1.5
Residential	1.5
Industrial	1.0

Sale and lease assumptions

Category	Units	Rate
Industrial land lease	Rs/sq ft p.a.	100
Commercial lease	Rs/sq ft p.a.	420
Residential space	Rs/sq ft	2,500

Construction cost

Category	Rs/ sqft
Commercial	2,000
Residential	1,500

At the outset, the project could require equity of INR 70 cr. The project timeframe is assumed to be 15 years. Price inflation for revenue and cost figures is assumed to be 5 per cent. With these assumptions, the IRR of the project is estimated at 35.5 per cent.

Options for Consideration

Based on the returns of the maritime cluster in Tamil Nadu as well as the Ancillary Services cluster in Bhavnagar, it may be explored whether they can be implemented through the PPP mode. The Service cluster in Gujarat GIFT City appears to have only moderate viability and may need to be initially developed through public funds.

Accordingly the following options could be considered

- A suitable implementation structure and PPP model c developed for the 3 developments – i.e Tamil Nadu Maritime Cluster in Kattupalli-Ennore, Gujarat Services Cluster and the Gujarat Ancillary Services Cluster in Bhavnagar. The same needs to be discussed with GMB in case of Gujarat. In case of Ennore-Kattupalli, the Ministry of Shipping can decide the way forward since it owns the land. Nevertheless, consultation with the concerned bodies of the state government (Tamil Nadu Industrial Development Corporation and Tamil Nadu Maritime Board) are recommended
- Post this a detailed project report needs to be prepared for all the three developments through a suitable consultant. This should include detailed infrastructure norms and costing, schematics and detailed designs
- Environment clearances and other approvals would need to be obtained especially for the Ancillary Cluster in Bhavnagar and the Maritime Cluster in Kattupalli-Ennore.
- For projects to be developed on PPP mode, it is recommended that a transaction advisor be appointed to manage the PPP procurement process and select suitable developers for the projects
- For components to be developed by the government (e.g., the Service cluster in Gujarat) office space may need to be purchased or taken on long term lease. A PMC may be hired after completion of DPR and drawings in order to manage the process for procurement of works contracts. Closer to completion, a facilities manager may also need to be appointed for such projects
- In parallel the Ministry of Shipping, in coordination with respective state government agencies, should start discussions with potential anchor tenants for the 3 developments. This process can be taken over by the developed for PPP projects, once on-boarded
- An International Property Consultant may also be hired for leasing out the space for Service clusters in both Ennore and Ahmedabad

Annexure: Coastal Economic Zones perspective plan

ANNEXURE

ANDHRA PRADESH project details

- Port Modernization

Project Description	Details
Name of the project	LNG Import Terminal in Kakinada in Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial	AP region has a potential of 5MTPA gas demand coming primarily from

Project Description	Details
area etc. with empirical data, if available)	fertilizer and CGD. Additionally East West Gas pipeline is running below capacity due to low production of gas from KG basin. This pipeline can connect the terminal to demand centre across central india all the way to Maharashtra.

Project Description	Details
Name of the project	Additional coal stackyard for VGCB to increase the terminal capacity
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	An area of about 16 Ha is to be developed as a coal stackyard with 3 rows of stock piles and equipped with stackers and reclaimers to achieve a storage capacity of 0.52 MT. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	GCB has a capacity of 10 MTPA to handle capesize vessels, it is presently handling about 7 MTPA because of shortage of back up area. This additional stackyard will increase their capacity by about 4 MTPA.

Project Description	Details
Name of the project	Development of coastal food export berth for rice in Kakinada Anchorage Port
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Proponent- FCI, Implementing agency- State Ports Dept.
Project Brief with priority (High, Medium, Low)	The project proposes a dedicated coastal rice export berth in order to handle shipments from AP to Tamil Nadu, Kerala and South Karnataka and exports to Gulf and USA. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	AP is amongst the highest rice producing state in India producing ~8 Million tonnes in 2013-14. Coastal shipping of rice is much cheaper mode of transport as compared to the current rail movement. The only reason why this movement does not happen through sea routes currently is because of unavailability of adequate infrastructure facilities at port to reduce handling cost (priority berthing, dedicated handling, clearance, etc.)

Project Description	Details
Name of the project	Construction and Commissioning of additional Liquid Bulk Berth for handling POL at Vizag port
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Presently there is a gap of 180 m between FB & OR 2. This available space can be now bridged with a new berth. Also there is an extra space of ~50 m available towards east of OR-1, which can be utilized by extending OR-1 by 50 m towards east. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	With the refinary expansion to 15 MTPA, the product traffic is likely to increase to 7.5 MTPA from the present 4.3 MTPA. The existing facility wouldnot be able to cater to the augmentation.

- Port led industrialization

Project Description	Details
Name of the project	Petrochemical cluster at Kakinada
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Maritime financing & Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Ministry of Chemicals and Fertilisers
Project Brief with priority (High, Medium, Low)	High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The demand for petrochemicals in the country would be in the range of 60 – 75 MTPA by 2025. With the demand expected to rise to ~65 MTPA in the base case and production expected to go up to 40 MTPA, India will likely require significant capacity addition. We

Project Description	Details
	estimate that 25 MTPA of additional production capacity will be required to achieve zero trade balance in petrochemicals. As a LNG regasification terminal is coming up in Kakinada, we propose a petrochemical cluster based on gas usage to be set up in Kakinada.

Project Description	Details
Name of the project	Mega food processing cluster in Kakinada
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India has a very low level of food processing currently. In the category of cereals and processed derivatives, India exported $10 bn worth of raw cereals and only $ 0.8 bn of processed derivates (~8% of the value of raw exports) in 2014. In comparison to the same, Asia exported $ 19 bn worth of processed derivatives and $ 24 bn worth of raw cereals (~24% of the value of raw exports). Same is the case in other categories of meat, fish and marine products where India exported $ 11 bn of primary products and $ 0.3 bn of processed derivatives (~1.4% of the value of primary product export) in 2014. In comparison to the same, Asia exported $ 52 bn worth of primary products and $21 bn worth of processed derivatives (~41% of the value of primary product export). This suggests that India has a huge potential in the processed food segment. Industry's aspiration is to triple the food processing levels in India from around 7% in 2010 to 20% by 2020. This will also enable India to have a bigger share in the export market- US and Europe being the major consumers of processed food. India is favorable as a location for food processing due to availability of labour and cost and availability of raw materials. However, it scores poorly on most other parameters including technology, scale of domestic demand and logistics. Currently, the export

Project Description	Details
	cargo moving from hinterlands to ports is subjected to high inland costs as well as significant variability in transit time. Both road and rail have bottlenecks which does not allow smooth movement of cargo. Railways also does not have proper cold chain facility which is extremely important for food cargo. Due to the perishable nature of the food products it is important to have efficient logistics. Considering the relevance of logistics to the export competitiveness of food processing sector it is important to develop a port-led industrialization strategy for the sector. Andhra Pradesh is a leading producer of fruits and vegetables, rice and marine products. The existing industrial agglomeration of marine processing is in Kakinada and Chittoor, grain processing is in Kakinada, Krishna and Godavari and fruits and vegetables processing is in Chittoor and Krishna. Since Andhra Pradesh has the necessary factors of production including proximity to raw materials, port infrastructure and existing industrial agglomeration it is most suited for a port based mega food cluster with significant export orientation of value added food products of rice, fruits and vegetables. The proposed mega food cluster can also draw synergies from VCIC where food processing is a focus sector with Kakinada, Gannavaram and Yerpedu-Srikalahasti as the proposed nodes for development. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion mega food cluster in Kakinada can result in addition of 1 lac new jobs and INR 26k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Export based electronics cluster in Northern Tamil Nadu/Central A Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	The demand for electronics has grown at a consistent pace in the country, reaching 6 lakh crore in 2015. Majority of the demand comes from communication and broadcasting equipment and consumer electronics. While the demand has gone up, production sector has not been able to keep pace. The production of electronics has remained static at

Project Description	Details
	around 2lakh crore. This has led to increased gap between exports and imports with around 65 per cent of the domestic demand being served from imports in 2015. India imported nearly USD 40 billion worth of electronics items in 2014. At current growth rate, Electronics import could reach USD 85-100 billion by 2025.In addition, there is a huge and expanding export market that India can tap. Total exports of Electronics from Asia totaled USD 1.9 trillion in 2014 and have been growing at the rate of 5 per cent p.a. over last 7 years. India's share in exports from Asia is a miniscule 0.5 per cent. India can build onto three distinct sources of competitive advantages for electronics manufacturing: ■ Strong and growing domestic demand ■ Already established as an electronics design cluster: Nearly 2000 chips are designed per year in India with more than 20,000 engineers working in this field. ■ Emerging centre for downstream assembly operations: India has started undertaking the downstream activities of assembly operations. Electronics manufacturing these days tends to have a global supply-chain spanning across countries (even continents). Port-proximate location will be a critical success factor for setting-up these fabrication units to link them with the global supply-chains. Kick-starting upstream manufacturing will require an "eco-system" approach. India should set-up "Science and Technology cluster" creating this eco-system instead of piece-meal electronics clusters. These clusters need to be backed by strong technical

Project Description	Details
	research capabilities. Northern Tamil Nadu/Southern AP- Ennore Port, Yerpedu-Srikalahasti node developed under Vizag Chennai Industrial Cluster, Ponneri node developed under Chennai Bengaluru Industrial Corridor could be the potential candidates. These would have synergies with the Chennai/Ennore based automotive cluster. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $25 billion electronics cluster in southern AP/northern TN can result in addition of 3 lac new jobs and INR 1 lac Cr earnings of foreign exchange

Project Description	Details
Name of the project	Export based apparel cluster in Central Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP

Project Brief with priority (High, Medium, Low)	India has a raw material based competitive advantage in apparel manufacturing. India is third largest cotton producer in the world. India, however, exports nearly 25 per cent of cotton produced. The downstream activities of converting cotton to textile and then to apparel are highly labour intensive. India is thus losing out on job creation potential in the apparel sector. India's share in exports from Asia has remained stagnant at 5 per cent. Analysis of global trade-flows reveals that while China has consolidated its position, Bangladesh and Vietnam are emerging as the next "hot spots" for export oriented apparel manufacturing, taking away share from developed Asian nations like Hong Kong. McKinsey surveyed 29 Chief procurement Officers of leading apparel companies in late 2013 to identify future trends in apparel sourcing. 72 per cent of respondents planned to decrease sourcing from China over next 5 years. However, India ranked a3rd in list of sourcing market expected to grow in importance after Bangladesh and Vietnam. If India wants to establish a strong position in the global export market it should overcome the key challenges- high lead time and sub-scale operations. Setting-up port-based/proximate manufacturing clusters will help address above described two issues and significantly increase the competitiveness of apparel manufacturing. Central AP can be a potential location for export based apparel cluster. Guntur is a key cotton producing district in this region. Other than Guntur, this cluster can also tap demand cotton being produced in districts of Khammam, Warangal,

	Karimnagar, and Adilabad in Telangana. Priority:Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion apparel cluster at central AP can result in addition of 3 lac new jobs and INR 26k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Cement cluster in Central AP
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Maritime Financing & Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Cement demand in the "limestone deficient" coastal states is expected to reach 190 mn ton in 2025 from current 86 mn tons. Based on studies conducted, out of ~100 MTPA of additional capacity required for serving these districts, 40 MTPA can be served through setting-up coastal clinkerisation clusters in Southern Gujarat and Central Andhra Pradesh

Project Description	Details
	and grinding units at ports close to demand centres (Mumbai, Cochin, Chennai/Ennore, Kolkata and others). This configuration would save on average INR 600/tonne (10-15 per cent of total delivered cost of cement) compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by lower cost of fly-ash movement (due to better availability at ports), and lower cost of cement transport to demand centres. Central AP is one of the proposed location due to proximity to abundant limestone reserves and the potential for coastal shipping of cement to maritime states through the proposed central AP port- Vodarevu/ Machilipatnam.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $2 billion cement cluster in Central AP can result in addition of 0.1 lac new jobs and INR 1400 Cr earnings of foreign exchange

Project Description	Details
Name of the project	Power cluster in Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development	Opportunities in Maritime States

Project Description	Details
e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India's demand for coal in 2014-15 was around 850 MTPA primarily coming from coal fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent. Power demand in the country is expected to reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then in "24/7 power to all", the peak demand could be as high as 280 GW. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal based thermal power plants will continue to meet more than 70 per cent of the country's requirement. Power demand in Andhra Pradesh is likely to increase significantly in the next 10 years. This will require significant capacity expansion in the state.

Project Description	Details
	While pithead plants are more economical as it is cheaper to wire the power than transporting thermal coal from the mine head to the plants near the demand centres. But due to the resource limitations on the magnitude of pithead plants as well as the dual structure of power sector, capacity will be set up within the respective states. Power complexes can be set up in the coastal regions of the state. Coastal power complex can leverage the coastal shipping of thermal coal to coastal power clusters, to significantly reduce the logistics cost which could be as high as 30 per cent of cost of power production. Central Andhra Pradesh: Machilipatnam could be the location for a new 5 GW power complex, served by the proposed port in Central Andhra Pradesh Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Development of a $ 3 bn power complex in central AP can result in value addition of ~INR 5000 Cr to the economy. It will likely enable the state to meet its future energy demand

- Port connectivity

Project Description	Details
Name of the project	Development of Four lane green field road from Machilipatnam South Port to NH-9 in the State of Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Pre-feasibility Report prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	Development of 16.83 Km long, 4 lane road between NH-9 to Machilipatnam South Port in Krishna District including construction of Bridges, Flyovers,

Project Description	Details
	Vehicle Under Passes and culverts. Provides connectivity to the industrial area under acquisition by APIIC in Rudravaram, Gundupalli, Kona Bandar etc., villages. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important as it connects the proposed industrial cluster on the Southern side of Port. The project will also ensure the smooth evacuation of cargo to and from the port. Availability of this infrastructure will assist in speedy development of port.

Project Description	Details
Name of the project	Upgrading of existing R&B road From Chilakuru to Power plants near Krishnapatnam Port in SPSR Nellore District of Andhra Pradesh State.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Conceptual report prepared.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	Development of 26 Km long, existing road between NH-5 at Chillakuru to power plants near krishnapatnam Port in SPSR Nellore District including construction of Bridges, Vehicle Under Passes and culverts. It connects the Krishnapatnam Industrial Node proposed under CBIC, Power Plants and Private industrial units with NH-16 (old NH-5) Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important as it connects the industrial cluster of Southern AP from South Port of Krishnapatnam Port for evacuation of cargo to and fromthe Port and also it covers various villages enroute. It reduces the distance by 35 Km to Chennai and Chennai Bangalore Industrial Corridor. Hence the project classified under Coastal Economic Region and Port evacuation.

Project Description	Details
Name of the project	Upgrading of 24 Km road to four lane that connects Nellore City (NH-16) to Krishnapatnam Port in SPSR Nellore District of Andhra Pradesh State.

Project Description	Details
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Under ADB the DPR is advanced stage of preparation final DPR can be ready in 2 months.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by APIIC and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	Upgrading of 24 Km long existing road connectivity between Krishnapatnam Port to NH-16 via Muthukur in SPSR Nellore District including construction of Bridges and culverts. The length of the road is 24 Kms and the estimated cost is Rs.300.00 Crores.

Project Description	Details
	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important as it connects the Krishnapatnam Port to Nellore City for evacuation of cargo to and from the Port. It increases the Port efficiency and also reduces the traffic jams being caused along the road.

Project Description	Details
Name of the project	Development of Four Lane green field road from Machilipatnam North Port to NH-SH-46 in the State of Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Pre-feasibility report prepared.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	Development of 10.19 Km long, 4 lane road between SH-46 to Machilipatnam South Port in Krishna District including construction of Bridges, Flyovers, Vehicle Under Passes and culverts. Provides connectivity from SH-46 and NH-214A (216) to the Industrial area under acquisition by APIIC in Potepalli, Machavaram, Tavisipudi etc., villages. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important as it connects the proposed industrial cluster on the North side of Port. The project will also ensure the smooth evacuation of cargo to and from the port. Availability of this infrastructure will assist in speedy development of port.

Project Description	Details
Name of the project	Development of Four lane of Kakinada Anchorage Port Uppada beach road connection upto NH-16 in East Godavari District of Andhra Pradesh state
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	R&B Department
Project Brief with priority (High, Medium, Low)	Two lane road is part of Deep Water Port for the port connectivity to the National Highway at Rajanagaram. It provides connectivity from NH-16 to KSEZ and Vakalapudi Industrial area. Priority: High

Project Description	Details
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	At present there is a multi-fold increase of traffic enroute from Kakinada Port to National Highway 16. Number of accidents is increasing year by year on this road. Therefore, four laning of Kakinada Anchorage Port to Uppada beach road to connection upto NH-16 is an urgent need to link Kakinada and Vizag.

Project Description	Details
Name of the project	Development of 7.2Km green field road connecting NH 65 to Machilipatnam Port in the State of Andhra Pradesh.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	The green field road is connecting the NH65 to be proposed Machilipatnam Port. This road connects the NH65 near Sultan Nagaram. The estimate cost is Rs.175.00 Crores. Provides connectivity from NH-65 to the Industrial area under acquisition by APIIC in Potepalli, Machavaram, Tavisipudi etc., villages. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	This road is necessary for evacuation of Port cargo from the proposed Machilipatnam Port under PPP.

Project Description	Details
Name of the project	Four Lane green field road to Krishnapatnam Port from Naidupeta in the State of Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Conceptual report prepared. DPR is to be prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	Development of 37.12 Km long, 4 lane road between NH-5 at Naidupeta to Krishnapatnam Port in SPSR Nellore District including construction of Bridges, Flyovers, Vehicle Under Passes and culverts. Priority: High.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The link will provide connectivity to a new industrial node proposed under CBIC and it also helps in capturing the State cargo traffic moving towards Chennai Port. Efficiency of the Port will be increased due to easy

Project Description	Details
	evacuation of the Cargos from the Port to hinterland

Project Description	Details
Name of the project	Development of 5Km long Green field Road connecting South and North industrial cluster of Khandaleru creek Near Krishnapatnam Port in Nellore District of Andhra Pradesh State.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.

Project Description	Details
Project Brief with priority (High, Medium, Low)	Development of 5 Km long green field road between existing dedicated road connectivity to Krishnapatnam Port and South port connectivity at Varagali in SPSR Nellore District including construction of Bridges, Vehicle Under Passes and culverts. The project reduces the distance from the industrial cluster to the port. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important as it connects the industrial cluster of Southern AP from South Port and North Port of Krishnapatnam Port for evacuation of cargo to and from the Port.

Project Description	Details
Name of the project	Development of four lane bypass road for existing Gangavaram Port connectivity road in Visakhapatnam District in the State of Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR has been prepared. Project is under tendering
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	a) GoAP developed a 4-lane road connecting the Gangavaram Port to the NH5 near Gajuwaka. b) Since Gajuwaka area is densely populated area, a by-pass road needs to be developed from the "Y" Junction (of existing Gangavaram Port connecting road) to join at Vadlapudi towards south. c) The length of the road is 8km approx. d) There is an existing road from Y Junction to Vizag Steel Plant. This existing road needs to be converted to a 4 lane up to a distance of 4km (i.e. from "Y" Junction) and from that point the road has to be diverted through Steel Plant lands to connect the NH5 at Vadlapudi. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The proposed By-pass road project is very much needed keeping in view of expanded capacities of Gangavaram Port and Vizag Steel Plant so as to

Project Description	Details
	handle our operations at utmost efficiency.

Project Description	Details
Name of the project	Construction of two Nos. Of four lane ROB's at (i) Dummulapeta and (ii) Old Port area in Kakinada, East Godavari District of State of Andhra Pradesh.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.

Project Description	Details
Project Brief with priority (High, Medium, Low)	The level crossing gates at (i) Dummulapeta and (ii) old port area are situated on heavily congested port connecting roads. Due to frequent movement of trains this is affecting the road movements especially at the anchorage port area. This creates huge traffic jams due to frequent closure of LC gates. Both port traffic and the public traffic are affected. There are two four lane ROBs to be constructed. The length of the each four lane ROB is =1 Km with two lane approach road on either side of the ROB. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Affecting the port evacuation as well as the traffic in general and absence of a properly designed road traffic mechanism is also creating the risk of having accidents on the stretch. Due to delay in the Project, Through put of port is adversely impacted by atleast 2million tonnes/annum. This is also to improve the efficiency of the road movement and also the safety of the general public.

Project Description	Details
Name of the project	Formation of New By-pass parallel Road west of NFCL and CFL in Kakinada, East Godavari District of State of Andhra Pradesh.
Project category	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	The existing Municipal road connecting Dairyform junction to ADB road passing through the west side of fertiliser plants of NFCL & CFL. This road is not fully formed leaving this road corridor totally unutilised. If this road is developed this will

Project Description	Details
	decongest the various roads connecting to Deep water port as well as anchorage port. Once this road is developed the general public could avoid using highly congested port roads. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Improving the efficiency of the road movement and the safety of the general public.

Project Description	Details
Name of the project	Upgrading of Manginapudi Beach Road to a 4 lane road
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	The project proposes a road flyover to be built over the port road and rail connectivity near the port entrance to facilitate unhindered traffic on the Manginapudi Beach Road. To further facilitate traffic management, a road outlet from the port at a distance of

Project Description	Details
	2.5 km north of the port road and rail connectivity is to be built. The existing Manginapudi beach road in this 2.5 km stretch needs to be strengthened and widened to 4-lane. In addition to the Port, it also provides good access to the Industrial area under acquisition by APIIC in Rudravaram, Gundupalli, Kona, Bandar etc., villages. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Machilipatnam port is optimally located in central AP to handle a lot of cargo including coal, cement/clinker, containers, etc. Post development, it will also be the nearest port to capital cities of Hyderabad and Amaravati. Considering the importance of the port to facilitate cargo movement, it is critical to ensure connectivity to Vijayawada. The project will facilitate efficient movement of cargo to and from the port by avoiding interference with the existing traffic on Manginapudi Beach road.

Project Description	Details
Name of the project	Upgrading of the existing four lane road connecting to NH16 to Gangavaram Port in to six lane road in the State of Andhra Pradesh
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project is proposed by Port Department and will be implemented by R & B Dept., Government of Andhra Pradesh.
Project Brief with priority (High, Medium, Low)	The existing 4 lane road is not able to cater to the increased cargo handling volume at Gangavaram Port. Hence, it is proposed to upgrade the existing road into 6 lane road. The length of the road is 5 Kms. The proposed cost of the work is Rs.50.00 crores. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The proposed By-pass road caters traffic needs of both Gangavaram Port and Visakhapatnam Steel Plant. Development of the road will ease the traffic congestion situation at the existing infrastructure.

Project Description	Details
Name of the project	Upgradation of existing B.T. Roads and backup area in to C.C. Pavement in the Anchorage Port area of Kakinada Port in the State of Andhra Pradesh.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	A.P. Port Department
Project Brief with priority (High, Medium, Low)	Kakinada Anchorage Port roads are laid in between the period 1970 to 1980. At that time 10 tons lorrys used to ply in the Anchorage Port. At present 20 to 40 ton lorrys are plying

Project Description	Details
	on these roads. Due to increase of traffic volume in the Kakinada Anchorage Port, the crust of the road is badly damaged and hence, the roads are required to be redesigned with C.C. Pavement based on the present heavy truck traffic. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important as it could lead to the Port development, increase of the Port cargo handling efficiency etc., due to the facilitation of speedy evacuation of cargo in the Anchorage Port.

Project Description	Details
Name of the project	4- lane road connectivity from Outer harbour to Port Connectivity junction (B)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	In this scheme, present 2-lane Road is proposed to be developed as 4-lane Road starting from the Outer Harbour, via H8-H7 conveyor, reaching Port Connectivity Road at Convent Junction.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	It is a significant project to provide an access to the proposed extension of Container Terminal. Incidentally, this 26 m corridor will provide access to both Container Terminal and Outer Harbour, if it comes.

Project Description	Details
Name of the project	Freight friendly expressway from Sanathnagar industrial cluster (Hyderabad) to Vodarevu
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland connectivity and Multi-modal logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road

Project Description	Details
	only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost. Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. In absence of the port in central AP, Hyderbad cargo goes to JNPT and Chennai. The proposed central AP port, once developed, would be the most optimal port for cargo of Hyderabad. The route is as below: ■ City roads from Saanthnagar to LB Nagar ■ NH 9 from LB Nagar to Vijayawada ■ NH 5 from Vijayawada to Chilakuripeta ■ Local road from Chilakuripeta to Vodarevu Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between

Project Description	Details
	Hyderabad and Vodarevu. The existing status of the stretch is mentioned below: ■ 6 laning underway from Vijayawada to Chilakuripet on NH 5
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

Gujarat project details

- Port Modernization

Project Description	Details
Name of the project	LPG Import Terminal In Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The demand for LPG in the country in 2015 was ~ 15 MTPA and it is expected to remain strong in the next few years. In view of past trends, LPG demand has been growing at around 5 per cent per annum over the last ten years and is expected to grow at a similar pace over the next 10 years as well. According to estimates, the LPG demand could go up to 29-35 MTPA by 2025. Domestic supply of LPG is not expected to keep up with the demand for LPG and with LPG demand poised to outpace domestic production in the next decade, increase in LPG import capacity is required. In the present scenario, we have an import capacity of 7-8 MTPA of LPG. There are plans for adding another 3 MTPA of import capacity in the next few years taking the total projected import capacity for LPG to 10 MTPA by 2025. However, as seen earlier, consumption demand in 2025 is expected to reach ~33 MMTPA in the base case by 2025. Of this, 14 MTPA is expected to be produced domestically and with planned import capacity of ~10 MTPA leaves a supply gap of 8-9 MMTPA,

Project Description	Details
	for which capacity is needed to be built. The northern states have strong demand for LPG and are expected to experience LPG deficit to the extent of ~ 6MTPA over the next decade. Some part of this deficit (~ 2MTPA) will be met by excess LPG available in the Gujarat region. Hence it is proposed to build additional 4 MTPA of capacity on the Western ports to serve the North Indian hinterland demand. Kandla port could be one of the locations for building this importing capacity as it already has LPG importing infrastructure and land availability is also not an issue.

Project Description	Details
Name of the project	Development of deep draft Container terminal at Tuna Tekra for handling latest generation of containers ships , Kandla Port, Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KPT
Project Brief with priority (High, Medium, Low)	The Proposed terminal of 1.2 millionTEU capacity, shall be designed to cater to 18000 TEUs container ships on the western side of the existing coal terminal and is planned to use channel with Adani in Tuna Tekra. Minimal dredging need to be carried out at berth and manoeuvring area. An offshore breakwater of 900m length is proposed to provide tranquillity for round the year operations. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial	To be able to handle latest direct call container ships with draft of 16 m, which otherwise cannot be handled at

Project Description	Details
area etc. with empirical data, if available)	berths within creek, the container terminal would need to be developed at Tuna-Tekra

Project Description	Details
Name of the project	Development of Bulk terminal at Tuna Tekra for Bulk Imports using mechanised system, Kandla Port, Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port (KPT)
Project Brief with priority (High, Medium, Low)	The proposed Bulk terminal will have one berth with Twin berthing

Project Description	Details
	arrangement to allow for 2 ships at a time (Front Berth - Cape and rear berths for Panamax vessels). The coal berths will have capacity of 8.5 MPTA for coal and 2.1 MTPA for other dry bulk. Berth would be equipped with Gantry grab unloaders and conveyed through Belt conveyors to the stack yard with Stacker cum Reclaimer arrangement. The Yard Storage Area of approx. 45 ha, which is considered adequate to support the proposed Terminal Capacity. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The kandla port has been assessed to have inadequate capacity to handle the likely dry cargo traffic in future. While Tuna Tekra has potential for development of deep draft berths with Mechanized handling facilities.

Project Description	Details
Name of the project	Mechanisation of berth CJ6 for import of fertilizers, Kandla Port, Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept/Feasibility
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KPT
Project Brief with priority (High, Medium, Low)	A fertiliser terminal facilities is proposed at existing Berth 6 which would include mechanized unloading of finished fertilizers from ship to shore, conveyance to transit storage in bulk, transfer to bagging shed, subsequent transportation of bagged fertilizer to railway loading platforms and finally loading into closed railway wagons for despatch to hinterland. The port capacity for handling fertilizer after the proposed Mechanized Fertilizer Handling Facility at Berth 6 shall be 6.7 MTPA.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The traffic potential of Fertilizer imports both raw and finished through Kandla has already been assessed. Based on the traffic forecast, Kandla which is currently handling 4.5 MTPA has to develop mechanized facilities for handling about 6 to 8 MTPA.

Project Description	Details
Name of the project	Mechanisation of berth CJ2 for Export of Food grain

Project Description	Details
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept/ Feasibility
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KPT
Project Brief with priority (High, Medium, Low)	The Mechanised Food grain facility is proposed to be built at Berth 2 instead of berth 5 (as planned by the port). The facility would comprise of the following:- • System of grain loaders, • Conveyors, • Silos for bulk storage. • Existing shed to be used for debagging plant The capacity of mechanised food grain export facility will be about 3.26 MTPA. Priority: High

Project Description	Details
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The potential for coastal export of Food grains through Kandla port has been assessed as ~3 MTPA. This traffic is in addition to exports to foreign countries. Considering the above, it is a call for the mechanisation for food grain handling facilities at Kandla Port to ensure speedy and clean operation and to compete with Mundra.

Project Description	Details
Name of the project	Mechanisation of barge jetties in Bunder basin to support coal lighterage operations.Kandla Port, Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project would be implemented by KPT
Project Brief with priority (High, Medium, Low)	Under this project it is proposed to provide for a mechanised system for barge handling comprises with Barge unloaders with associated movable hopper, connected conveyor system to the stackyard where the material is stacked using elevated tripper, Transit storage area and taking off additional spur rail lines to the proposed stackyard. The updated capacity of the barge unloading Facility at Bunder Basin will be 2.2 MTPA. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The jetty at Bunder Basin is planned for unloading/loading of cargo from barges used to lighten/load the ships at Outer Tuna Buoy (OTB). It is proposed to further upgrade the Bunder Basin area for barge handling through mechanisation for quick turnaround of barges.

Project Description	Details
Name of the project	LNG Import Terminal In Mundra, Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Gujarat region has a potential of 20MTPA gas demand coming primarily from fertilizer, steel industry, ceramics and refineries. GSPL also has gas pipelines criss crossing the state. Hence additional LNG import terminals are required to cater to this demand

- Port led industrialization

Project Description	Details
Name of the project	Development of Maritime Clusters in Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics	Shipbuilding, Ship Repair and Ship Breaking

Project Description	Details
c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Pre-feasibility study conducted. Demand assessment and Location analysis also conducted as part of the study. Draft pre-feasibility report prepared and under review.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Gujarat Ports Infrastructure & Development Co. Ltd. (GPIDCL), a registered subsidary company of GMB
Project Brief with priority (High, Medium, Low)	A Maritime Cluster can be broadly defined as a group or agglomeration of firms, institutions, business and other industry players in the maritime sector that are geographically located close to each other and thereby enjoy positive synergy between their activities. The cluster approach concerns 'interconnected companies, specialized suppliers, service providers, and firms in related industries'. GPIDCL, a fully owned subsidiary of GMB intends to create “Complete Ecosystems of Port/Shipping services within state” to make its ports more attractive & competent. The intent is

Project Description	Details
	to develop soft maritime infrastructure and services in Gujarat like Shipping agents, Ship owners, Shipping agencies, Ship Manning and Chandlers, Shipping finance & insurance, classification and Registers of Ships etc. The objective of the cluster would be to provide world class infrastructure to members, along with assisting the members in professional conduct to market the cluster as a center for excellence. It is envisaged that the cluster would have globally competitive tax structure, opportunities for professional development through seminars and conferences with global shipping entities and world class office infrastructure. The cluster is also expected to provide a fillip for business opportunities to members, with presence of asset owners and service providers. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Despite the fact that Gujarat handles far more cargo throughput than any other State in India, there is no distinct town or city in Gujarat with a strong maritime identity. The first private ports were established in Gujarat. Gujarat is home to many more “firsts of its kind” landmark developments in the ports and infrastructure sector in the country. However, when the term maritime hub is referred to, the only city in India that strikes attention is possibly Mumbai. It is felt that since Gujarat is the leader in the Indian maritime sector, the state should create a strong maritime identity and at the same

Project Description	Details
	time, facilitate the futuristic developments in the sector. The proposed maritime cluster project would aim at addressing both the objectives simultaneously. The benefits from cluster dynamics are actively sought by some sectors in the maritime cluster, such as maritime services providers and marine equipment manufacturers, as well as related and supporting industries. In doing so, they seek to locate themselves close to the 'core cluster area'. This could imply that the presence of shipping and related companies in such clusters enhance local demand, interaction between the trade, thereby providing a basis for cluster dynamics. Thus, it is important to ensure that these core companies can operate on a level playing field with their international competitors, so that they are not driven to re-locate abroad due to cost and tax disadvantages in the cluster. The Maritime Cluster is proposed to be an integral part of the GMB vision/ strategic planning for the reasons as detailed below. 1) It will fuel and support maritime trade in Gujarat in long run. 2) Creation and incubation of platforms with requisite skills and capital to trade in global shipping markets and profit from same. 3) Creation of an ecosystem to support world class global shipping platforms which are mutually interdependent for success and business, with services like freight hedging, shipping finance, marine law firms and marine insurance. 4) Creation of wealth through inflow

Project Description	Details
	of global capital to invest in shipping platforms in the cluster. 5) It also provides GMB with cost effective and timely supply of Maritime Services to Gujarat Ports. 6) Greater Employment opportunities to local Youth. 7) As a center of maritime service, it would also complement the Proposed Maritime University project. 8) Greater awareness towards, Shipping Industry would be generated, which otherwise is known as a "Silent Sector" of the economy whose contribution to the economy is tremendous yet goes unnoticed.

Project Description	Details
Name of the project	Petrochemical cluster at Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Maritime financing & Cluster Development

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Ministry of Chemicals and Fertilisers
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The demand for petrochemicals in the country would be in the range of 60 – 75 MTPA by 2025. With the demand expected to rise to ~65 MTPA in the base case and production expected to go up to 40 MTPA, it can be seen that India will require significant capacity addition. We estimate that 25 MTPA of additional production capacity will be required to achieve zero trade balance in petrochemicals. As the LNG regasification terminals in Dahej and Hazira are being expanded by 10 MTPA and additional LNG terminal coming up at Mundra, we propose a petrochemical cluster based on gas usage to be set up in the vicinity.

Project Description	Details
Name of the project	Automotive cluster at Sanand
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation,	Maritime Financing & Cluster Development

Project Description	Details
Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India currently has 8% share in the global exports of 2-wheelers, 0.8% share in cars and 0.7% share in commercial vehicles. India currently scores well on the industry ecosystem-labour costs, state of development of auto component industry, etc. and the industry aspires to increase the total exports from India to 10 mn vehicles from the current 3 mn vehicles. However, there are a number of challenges to the industry amongst which quality of logistics infrastructure and logistics cost is the most important. A lot of automotive cargo currently travels from Northern hinterland to Mundra, Pipavav, Mumbai and JNPT travelling distance of ~1400 km. It was noted that the transit time of cargo, inclusive of processing time at the port, can vary between 7 to 17 days for a distance of 1400 km. This has implications on the time buffer that the automotive manufacturers have to keep for planning the logistics of export oriented cargo. Freight and insurance contributes around 1-2 per cent to the

Project Description	Details
	ex-port price of a passenger vehicle and considering the OEM margin of 6-7 per cent, makes significant impact. It is therefore evident that the ports and other logistics infrastructure have a significant role to play to improve the export competitiveness of the sector. Considering the relatively nascent stage of the Sanand cluster and potential for expansion, it is suggested to focus towards promoting export oriented automotive manufacturing in the cluster in the medium to long term with adequate linkages to the ports of Mundra and Pipavav
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $20 billion automotive cluster in Sanand can result in addition of 2 lac new jobs and INR 90k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Marble based furniture cluster in Kutch in Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House	Cluster Development

Project Description	Details
Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India currently has a mere 1% share in Asia's exports of furniture as compared to China which has ~80% share. Import markets are primarily developed economies. USA is the largest importer with 24 per cent share in global imports, followed by Germany (10 per cent), UK (5 per cent), France (5 per cent), Canada (4 per cent), Japan (4 per cent). However, the domestic market of furniture in India has shown impressive growth of 12% in the period 2007-2014. The incease in domestic scale can be leveraged to make a mark in the global furniture export market. India currently has few key export clusters- Gujarat, Rajasthan and Kerala and Mundra accounts for ~70% of the total export traffic of furniture from India. India is exporting maximum share of furniture to United States and United Kingdom accounting for 47 per cent of total export. For India to capture an increased share in the global market, it needs to overcome certain challenges- absence of scale and poor logistics infrastructure. Logistics currently contribute ~17% to the total cost of furniture. It hence becomes apparent

Project Description	Details
	that exports can be competitive in the internation market if they are close to the ports or inland waterways. There is a significant potential to expand the existing cluster in Gujarat and develop it as an integrated marble based furniture cluster. The raw material of marble is available close to the existing sites. A concerted effort in trying to make these clusters competitive in terms of exports can go a long way in boosting their export volumes and making this cluster the export cluster for marble based furniture. Seamless connectivity of the clusters to the DFC connecting to the key ports is also of utmost necessity in order to make them competitive. Priority" Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion furniture cluster in Gujarat can result in addition of 1 lac new jobs and INR 26k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Export based apparel cluster in Saurashtra in Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping	Cluster Development

Project Description	Details
f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India has a raw material based competitive advantage in apparel manufacturing. India is third largest cotton producer in the world. India, however, exports nearly 25 per cent of cotton produced. The downstream activities of converting cotton to textile and then to apparel are highly labour intensive. India is thus losing out on job creation potential in the apparel sector. India's share in exports from Asia has remained stagnant at 5 per cent. Analysis of global trade-flows reveals that while China has consolidated its position, Bangladesh and Vietnam are emerging as the next "hot spots" for export oriented apparel manufacturing, taking away share from developed Asian nations like Hong Kong. McKinsey surveyed 29 Chief procurement Officers of leading apparel companies in late 2013 to identify future trends in apparel sourcing. 72 per cent of respondents planned to decrease sourcing from China over next 5 years.

Project Description	Details
	However, India ranked a distant 3rd in list of sourcing market expected to grow in importance after Bangladesh and Vietnam. If India wants to establish a strong position in the global export market it should overcome the key challenges- high lead time and sub-scale operations. Setting-up port-based/proximate manufacturing clusters will help address above described two issues and significantly increase the competitiveness of apparel manufacturing. Saurashtra can be a potential location for export based apparel cluster as Amreli, Bhavnagar, Jamnagar, Rajkot, Surendranagar, and Ahmedabad are among the highest cotton producing districts in the region. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion apparel cluster at Saurashtra can result in addition of 3 lac new jobs and INR 26k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Cement cluster in Gujarat
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping	Maritime Financing & Cluster Development

Project Description	Details
f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Cement demand in the "limestone deficient" coastal states is expected to reach 190 mn ton in 2025 from current 86 mn tons. Based on studies conducted, out of ~100 MTPA of additional capacity required for serving these districts, 40 MTPA can be served through setting-up coastal clinkerisation clusters in Southern Gujarat and Central Andhra Pradesh and grinding units at ports close to demand centres (Mumbai, Cochin, Chennai/Ennore, Kolkata and others). This configuration would save on average INR 600/tonne (10-15 per cent of total delivered cost of cement) compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by lower cost of fly-ash movement (due to better availability at ports), and lower cost of cement transport to demand centres. Kutch in Gujarat is one of the proposed location due to proximity to abundant limestone reserves and the potential for coastal shipping of

Project Description	Details
	cement to maritime states through the ports.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $2 billion cement cluster in Gujarat can result in addition of 0.1 lac new jobs and INR 1400 Cr earnings of foreign exchange

Project Description	Details
Name of the project	Connection of western DFC to Hazira
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland connectivity and Multi-modal logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Rail transport for containers is generally preferred by importers and exporters especially over longer distances because it is safer and cheaper and provides a direct linkage to ports. However, higher haulage charges due to cross-subsidisation (of passenger lines) and uncertain schedules have made rail less economical and attractive for cargo handling in India. The recent increase in freight charges has further

	aggravated the issue. Share of railways in container movement in India reduced from 25 per cent in 2007 to 18 per cent in 2014. Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. Western DFC is already underway for improving the logistics of container cargo from northern and western hinterlands to JNPT. Howerv currently, the western DFC is planned to be connected only to JNPT. To avoid at least last mile connectivity charges, DFC stations need to be connected to nearest ports in Gujarat as well. It is recommended to connected DFC via spur line to Hazira.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers from northern hinterland by connecting DFC to Hazira. There will be additional savings to the trade due to reduced transportation cost.

- Port connectivity

Project Description	Details
Name of the project	Connection of western DFC to Mundra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland connectivity and Multi-modal logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Rail transport for containers is generally preferred by importers and exporters especially over longer distances because it is safer and cheaper and provides a direct linkage to ports. However, higher haulage charges due to cross-subsidisation (of passenger lines) and uncertain schedules have made rail less economical and attractive for cargo handling in India. The recent increase in freight charges has further

Project Description	Details
	aggravated the issue. Share of railways in container movement in India reduced from 25 per cent in 2007 to 18 per cent in 2014. Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. Western DFC is already underway for improving the logistics of container cargo from northern and western hinterlands to JNPT. Howevercurrently, the western DFC is planned to be connected only to JNPT. To avoid at least last mile connectivity charges, DFC stations need to be connected to nearest ports in Gujarat as well. It is recommended to connected DFC via spur line to Mundra.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers from northern hinterland by connecting DFC to Mundra. There will be additional savings to the trade due to reduced transportation cost.

Project Description	Details
Name of the project	Salaya Mathura crude pipeline expansion

Project Description	Details
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG/IOCL
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The IOCL refineries in Panipat and Mathura get their crude from Mundra and Vadinar ports in Gujarat via pipelines. These pipelines are currently operating at near capacity utilization levels. As the refineries expand, corresponding augmentation will be required in the crude pipelines as well. The current capacity of Salaya to Mathura pipeline that feeds crude to the refineries in Koyali, Mathura and Panipat is around 21 MTPA and IOCL has plans to augment its

Project Description	Details
	capacity to 25 MTPA. We propose further augmentation of the pipeline to around 40 MTPA to cater to the needs of the future expansions of Panipat, Mathura and Koyali refinery

Project Description	Details
Name of the project	RoB on Kandla Kutch Road
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland connectivity and Multi-modal logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	The ROB will be constructed by National Highway Authority as 'DEPOSIT WORK'. DPR of the project is being framed by NHAI through consultant viz K.& J Projects Pvt Ltd. Time Frame: • Feasibility Report – June-2016. • Board Approval– July-2016 • Payment of 'Deposit Amount' to NHAI- Nov.-2016

Project Description	Details
	• Start of further course of action by NHAI for awarding work to the Contractor and execution - Jan.-2017
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KANDLA PORT TRUST
Project Brief with priority (High, Medium, Low)	The Proposed Project can potentially eradicate the problem of the Traffic-Jam to a great extent and hence can boost the faster and smoother evacuation of Cargo 'To & From' the Port. –Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Speedier and smoother Evacuation of Cargo can further smoothen in the Cargo Handling and Storage Operations which may ultimately result into higher Quantitiy of Cargo Handling at the Port.

Project Description	Details
Name of the project	Providing alternative Road from Bhavnagar to Sosiya - Alang Ship Recycling Yard
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Gujarat Maritime Board
Project Brief with priority (High, Medium, Low)	The project proposed to be undertaken involves provision of alternate road from Bhavnagar to Sosiya-Alang ship recycling yard. This is aimed to be achieved by up-gradation and widening of existing old coastal highway from Bhavnagar to Sosiya/ Alang, via Gogha, Mithivirdi, Jaspara and Mandva. The existing 42 Km road has a variable width of 3.5-7m depending on the location, and the road surface is damaged at various stretches. The road is under possession of Roads and Buildings Department, Govt. of Gujarat. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	It will likely have effect on ship recycling activity and faster cargo evacuation of cargo generated at Alang. Alang-Sosiya ship recycling yard is a key component of India's maritime industry, also accounting for ~30% of global ship recycling industry. The ship recycling industry at Alang-Sosiya contributes to meeting ~1-2% of India's steel demand; and generates direct employment for 6000 people, with indirect beneficiaries in the range

Project Description	Details
	of 1-1.5 lakh. Looking at the trends of ship recycling at Alang Sosiya, higher traffic of trucks carrying recycled components is expected in the future. The following trend for ships recycled has been observed in last five years. 1) 2010-11: 357 ships 2) 2011-12: 415 ships 3) 2012-13: 394 ships 4) 2013-14: 298 ships 5) 2014-15: 275 ships 6) 2015-16 upto September 2015: 93 At present, all the traffic of Alang ship recycling yard passes through two lane state coastal highway 8E, i.e. Bhavnagar-Talaja road via Budhel, Bhandaria and Trapaj. The road caters to traffic of Alang, as well as coastal traffic for Mahuva, Pipavav, Jafrabad, Veraval etc., causing high traffic congestion, wastage of time, high fuel consumption, road accidents etc. The proposed alternate road from Bhavnagar to Alang/ Sosiya is 42 Km in length with variable width of 3.5-7m, and poor road quality. The distance from Bhavnagar to Alang via Trapaj road is 55 Km and upto Sosiya is 62 Km. The distance from Bhavnagar to Sosiya via this alternate road via Gogha/ Mithivirdi is 42 Km, and upto Alang is 49 Km. The shorter distance would obviously result in fuel savings; provide decongestion of existing road, and reduce chances of accidents and traffic jams. Gogha-Dahej Ro Ro Ferry service is expected to commence by 2017. Users of this service would also benefit from this alternate road.

Project Description	**Details**
	Lignite and Bentonite mining activities are undertaken along this alternate road. Lignite based power plant is also coming up in the vicinity which will increase road traffic movement. Famous Koliyak Nishkalank Mahadev Temple is also located on this route. Thousands of pilgrims visiting the temple would also benefit from the alternate road

Project Description	Details
Name of the project	Jamnagar to Mundra product pipeline
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Following the price de-regulation of diesel, it is expected that private refining players will re-enter the domestic retail market. Hence they will be able to cater to the MS/HSD demand coming from North Indian states. As Mundra and Kandla are connected to the north through product pipelines, connecting them with Jamnagar will enable efficient evacuation of the product from the private refineries in Jamanagar. It is estimated that North Indian states would face a deficit of around 10 MTPA of MS/HSD. While in the short run this product could be coastally shipped but as Mundra is connected to North through a pipeline, a pipeline could be constructed connecting Mundra/Kandla with Jamnagar to serve the hinterland demand in North India.

Project Description	**Details**
Name of the project	Freight friendly expressway from Sarkhej (Ahmedabad) to Mundra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development	Hinterland connectivity and Multi-modal logistics

Project Description	Details
d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network.

Project Description	Details
	Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. Ahmedabad currently moves 83,000 TEUs annually to Mundra and this traffic is estimated to increase to 3.2 lac TEUs by 2025. The route is mentioned below: ■ NH 947 from Sarkhej to Maliya ■ NH 8A from Maliya to Mundra Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Ahmedabad and Mundra. The existing status of the stretch is mentioned below: ■ 6 laning in projects from Samakhiyali to Mundra in 2 packages
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

Project Description	Details
Name of the project	Freight friendly expressway from Sarkhej (Ahmedabad) to Pipavav
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development	Hinterland connectivity and Multi-modal logistics

Project Description	Details
e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time

Project Description	Details
	from factory to port. Currently, Ahmedabad sends 95,000 TEUs to Pipavav which is expected to grow to 2.9 lac TEUs by 2025. Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Ahmedabad and Pipavav. Priority: ?
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

CCD

Project Description	Details
Name of the project	Development of Gujarat Maritime University
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources	Maritime Education, Training and Skill Development

Project Description	Details
j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility study conducted. Draft feasibility report prepared and under review.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Gujarat Ports Infrastructure & Development Co. Ltd. (GPIDCL), a registered subsidary company of GMB
Project Brief with priority (High, Medium, Low)	There is an acute shortage of skilled manpower to cater to the ever increasing specialized roles that the port sector in the country has to play. With the rise of India as a major economy of the world, the Indian maritime trade will rise significantly over the coming years and the need for skilled manpower with different maritime skills would be severe going forward. Gujarat plans to establish a premium maritime university with the state-of-art facilities for enabling training as well as maritime research & development. GMB envisages that the university will train and establish a new generation of leaders across various competitive positions in ports, shipping & chartering, ship building and various onshore based positions within the maritime sector globally. The university will serve as the regional centre of excellence catering to the needs of India as well as Far East, SAARC, African and Middle Eastern countries. The university will focus on both technical as well as commercial skilled manpower needs of the maritime industry. Priority: High

Project Description	Details
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Global demand for seafarers is expected to increase from 1.15 million in 2010 to 1.6 million by 2020. National Maritime Agenda 2020 has set a target of increasing contribution of India's seafarers to the global workforce from approx. 6% - 7% in 2010 to 9% by 2020. Under the twelfth five year plan the Government of India intends to generate additional employment for 2.5 million persons (0.5 million direct and 2.0 million indirect) by 2020 in the core shipbuilding, ancillary and supporting industry sector. Currently the split up of Jobs between Technical and Commercial is estimated to be ~~60:40 in Indian maritime industry. This is expected to reach global levels of 51:49 by 2025. Globally, the contribution of technical and commercial jobs is almost equal. However, Indian Maritime Education institutes are largely focused on technical programs which is in sharp contrast with Global Maritime Education Trends. Presently, more than 130 approved training institutes in India registered with DG Shipping offer pre-sea and post-sea training programmes. Unlike global maritime educational institutes which focus on both technical and commercial programs, Indian institutes largely focus on technical programs. Only 8% of programs offered by Indian Maritime educational institutes cater to commercial disciplines, which contribute almost 49% to the overall maritime sector jobs globally. Huge manpower demand supply gap in commercial sectors.

Project Description	Details
	It is estimated that an additional qualified manpower of ~0.31 to 0.48 million would be required in next 10 years in the Indian maritime sector. It is estimated that approx. 0.21 million would be the supply of manpower over next 10 years from Indian education institutes. Only ~17% of this i.e. around 36,000 would be the supply for commercial activities. It is estimated that there would be a shortage of approx. 0.11 to 0.28 million qualified manpower in the Indian maritime industry over next 10 years. Gujarat has a 1600 Km long coastline (longest among all Indian states); handles more than 40% of India's total maritime cargo; yet contributes to only 16% of total maritime jobs in India. Gujarat, which accounts for more than 40% of total national seaborne trade has only 3 out of 143 DG Shipping approved maritime education institutes with an intake of only ~286. In light of all these factors, Govt. of Gujarat intends to develop Gujarat Maritime University on high priority, as a world class university focusing on both technical as well as commercial aspects of maritime industry education.

Project Description	Details
Name of the project	Ro – Pax Ferry Services between Gogha and Dahej in Gulf of Cambay
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Port Modernisation
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Component wise present status of the project:- 1) Development of Ro-Pax Terminals at Gogha and Dahej Estimated cost: INR 223.53 Crore (tendered) Status: In progress; Physical progress: ~70% 2) Dredging in the channel and in the turning circle at Gogha and Dahej Estimated cost: INR 233.67 Crore (estimated) Status: Bidding Stage with afresh hydrographic survey chart 3) Integrated Operation of Ro-Pax Ferry cum Terminals at Gogha &

Project Description	Details
	Dahej Status: Contractor Finalized; LoI issued to the preferred bidder
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Gujarat Maritime Board
Project Brief with priority (High, Medium, Low)	Introduction: Roll-on, Roll-off (Ro-Ro) ferries are special vessels on to which vehicles can drive and be accommodated for the sea journey on vehicle decks of vessel. These ferries often have significant accommodation for passengers and can carry cars, trucks, buses or trailers to their destination together with the drivers and passengers. Goods and passengers are transported from one shore to another by ferry vessels in many parts of the world. Potential of Ro-Ro Ferry Service in Gujarat: The state of Gujarat is blessed with 1600 km long coastline facing Arabian Sea and includes two gulfs ie. Gulf of Khambhat and Gulf of Kutchh providing ample opportunities for the development of Ro-Ro Ferry Service connecting important centers across the Gulf. During the traffic study it was observed that about 5000 vehicles and 12500 passengers travel daily across the Gulf of Khambhat currently. In line with the Port policy announced by the state government in 1995, considering the advantages of ferry network in terms of saving in travel time, fuel cost, wear & tear of road surfaces, reduction in road congestion and thereby accident threats etc., the State Government has prepared feasibility report identifying the

Project Description	Details
	potential locations for the development of Ro-Ro Ferry Service in Gulf of Khambhat and identified 5 locations Viz. Gogha, Dahej, Suvali (Hazira), Jafrabad and Pipavav. Implementation of the Project: The project comprises of three main components viz. (A) Terminal Construction (B) Dredging and (C) Ferry cum Terminal operation. Due to the huge cost in terminal construction and dredging, to make the ferry service viable, Government has decided to undertake the work of providing infrastructure including terminal facilities for Ro-Ro Ferry service project at Dahej and Gogha through the Gujarat Maritime Board. It has been decided to assign integrated terminal cum ferry operation to private parties for a specific period. . By this arrangement of water transport, the circuitous road distance of 360 kms between Gogha and Dahej around the gulf will be reduced to 31 km. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project would connect Gogha and Dahej across the Gulf of Cambay, reducing the travel distance from ~350 Km by road to ~30 Km. This would help to significantly decrease travel times, reduce the congestion on roads, reduce the risk of road accidents and reduce the environmental impact of travel between the two places. The project also aims to promote coastal, intra state movement of goods and passengers, and hence is aligned to the Central Government's vision of Coastal Shipping promotion.

Karnataka project details

Port Modernization

Project Description	Details
Name of the project	Mechanised Fertilizer Handling Facility at Mangalore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Mechanised Fertilizer Handling Facility would comprise of Unloaders (or mobile Harbour cranes) at berth with connected hopper, conveyor belt to feed fertilizer into covered storage facilities and thereafter to the mechanized bagging plant having automatic bagging and stitching machines. One of the existing berths

Project Description	Details
	could be utilised for this purpose. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	NMPT could set up a mechanized berth for fertilizer handling, which is expected out of coastal movement.This would enable efficient handling of material with faster turnaround of ships and increased berth capacity.

Project Description	Details
Name of the project	Mechanised Food Grain Handling Facility, Mangalore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	In view of the significant throughput of food grains import expected at the port through coastal movement, it is suggested to provide a fully mechanised bulk grain handling facility comprising of unloader, conveyor system, storage silos, bagging machine etc. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The potential for coastal import of food grains through Kandla port has been assessed as ~4.5 MTPA. Considering the above, mechanisation for food grain handling facilities to ensure speedy and clean operation is ideal.

Port led industrialization

Project Description	**Details**
Name of the project	Petrochemical cluster at Mangalore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism	Maritime financing & Cluster Development

Project Description	Details
i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Ministry of Chemicals and Fertilisers
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The demand for petrochemicals in the country is estimated be in the range of 60 – 75 MTPA by 2025. With the demand expected to rise to ~65 MTPA in the base case and production expected to go up to 40 MTPA, it can be seen that India will require significant capacity addition. We estimate that 25 MTPA of additional production capacity will be required to achieve zero trade balance in petrochemicals. Additionally it is expected that gas will be made available in Mangalore either through an FSRU/Terminal or via pipeline from Kochi, we propose a petrochemical cluster based on gas usage to be set up in Mangalore.

Port Connectivity

Project Description	Details
Name of the project	4 Laning of Shiradi Ghat Road-Concretizing for smoothening of traffic road.
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Phase 1 is completed. Phase 2 contract has to be given.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NHAI
Project Brief with priority (High, Medium, Low)	NMPT will be well connected to the districts like Hassan, Tumkur,Bengaluru, Mysore with this project. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	It will allow the movement of container traffic, bulk cargo and break bulk cargos to the port from its southern karnataka which use to diverted to other port.

CCD

Project Description	Details
Name of the project	Development of Fisheries Harbour at Kulai, Mangalore, Dakshina Kannada District, Karnataka
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping	Island Development and Aquatic Resources

Project Description	Details
f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Brief	On commissioning of the New Mangalore Port Trust, the displaced Mechanised fishing vessels belonging to Kulai and near by villages started operating from old Mangalore fishing harbor. At present fishing vessels are taking shelter inside the New Mangalore Port during monsoon, causing inconvenience for the Port operation, creating security issues and hindrance for developing port infrastructure in the spending beach. Therefore, New Mangalore Port and Govt. of Karnataka have agreed to have an alternative of providing fishing harbor at Kulai. This will help in addressing difficulties of displaced fishermen and providing them with modern fishing harbor with allied facilities in hygiene conditions. This will also bring about improvement in socio-economic condition of fishermen in coastal region of Mangalore.
Project Proponent/implementing (e.g., NHAI, Port)	Govt. of Karnataka and New Mangalore Port Trust
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility/DPR and SPV formation
Priority of the project within the implementing Organisation (High, Medium, Low)	High

Project Description	Details
Name of the project	Proposal for Fisheries Growth Center for development of fisheries at Uppada in East Godavari District, AP and Majali in Uttara Kannada, Karnataka
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Island Development and Aquatic Resources
Project Brief	The present landing and berthing facilities can accommodate 23032 MFVs which is about 44% of operating fishing fleet in the country. To support fishery sector, it is necessary to provide infrastructure faciltiies for landing and berthing of all fishing vessels. The sector is a growing sector and it has been decided to develop projects - One on east and west coast of India. The aim is to enable safe and quality fish products to consumers with least wastage, create healthy domestic market, reduce post harvest loss, enable smooth cross border trade

Project Description	Details
	and enhance livelihood. Uppada has been the location chosen for the fishery harbour on the east coast of India
Project Proponent/implementing (e.g., NHAI, Port)	Govt of Karnataka and AP Govt.
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept note prepared by Department of Animal Husbandry
Priority of the project within the implementing Organisation (High, Medium, Low)	High

Kerala project details

Port Modernization

Project Description	Details
Name of the project	Mechanised Food Grain Handling Facility
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Cocept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Mechanised Food Grain Handling Facility will includes a mobile tyre mounted grain unloader, and conveying them through a closed pipe conveyor on to storage silos. The evacuation of stored grains from silos will be through an automatic grain evacuator, an automatic bagging machine and conveying to bags into the Lorries direct and loading automatically without any manual handling. There will be a separate facility for bulk loading of grains to special purpose Lorries for the use of flour mills. The facility planned will have a capacity of 3 Lakh tons per annum initially to be upgraded to 5 lakh tons. It is proposed that the back area behind Q6/Q7 berth may be used for putting grain terminal. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The potential for coastal import of Food grains through Kandla port has been assessed as ~4.5 MTPA. Considering the above, it is a cal l for the mechanisation for food grain handling facilities at NMPT Port to ensure speedy and clean operation.

Project Description	Details
Name of the project	Mechanised Fertilizer Handling Facility
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Mechanised Fertilizer Handling Facility will comprise of screw type Unloader at berth, a closed conveyor belt system on the rear side of the berth and silos for stacking. The silos envisaged will be storage bins of about 2000 Tons capacity. From the storage bins the fertilizer will be fed through an automatic electro-mechanical system into baggage bins and through them into automatic bagging and stitching plants and loading into Lorries. Since the projected volume is

Project Description	Details
	not significant only small scale facility to handle about 0.5 Million tons per annum. It is proposed that the berth Q7 may be used purpose with the backup area available to put up the Bin/silo storage and bagging facility. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Cochin could set up a mechanized berth for fertilizer handling, which is expected out of coastal movement. The traffic projections by 2025 indicate that Cochin port will have to handle increasing imports fertilizers. This would enable efficient handling of material with faster turnaround of ships and increased berth capacity

Project Description	Details
Name of the project	Setting of Edible Oil Terminal at Cochin
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	It is proposed to install 2 piplines from BTP berth (which is suitable for handling oil vessels) to the oil tankfarm to enable handling two vessels simultaneously Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Reviving the handling of palm oil which was banned will need to be considered as the port already has the required handling facilities

Port led industrialization

Project Description	Details
Name of the project	Wooden furniture cluster in Kerala
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India currently has a mere 1% share in Asia's exports of furniture as compared to China which has ~80% share. Import markets are primarily developed economies. USA is the largest importer with 24 per cent share in global imports, followed by Germany (10 per cent), UK (5 per cent), France (5 per cent), Canada (4 per cent), Japan (4 per cent). However, the domestic market of furniture in India has shown

Project Description	Details
	impressive growth of 12% in the period 2007-2014. The incease in domestic scale can be leveraged to make a mark in the global furniture export market. India currently has few key export clusters- Gujarat, Rajasthan and Kerala and Mundra accounts for ~70% of the total export traffic of furniture from India. India is exporting maximum share of furniture to United States and United Kingdom accounting for 47 per cent of total export. For India to capture an increased share in the global market, it needs to overcome certain challenges- absence of scale and poor logistics infrastructure. Logistics currently contribute ~17% to the total cost of furniture. It hence becomes apparent that exports can be competitive in the internation market if they are close to the ports or inland waterways.Kerala is one location which already has amongst the highest consumption of wood/bamboo per capita signallying scale of operations. It can be a possible location for export based wooden furniture cluster and can leverage ports for exports. Priority: Low
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion furniture cluster in Kerala can result in addition of 1 lac new jobs and INR 26k Cr earnings of foreign exchange

Port connectivity

Project Description	Details
Name of the project	Azhikkal Port - Proposed NH – Bypass and widening of 2 km - Development of riverside port road to Azhikkal

Project Description	Details
	along Valapattanam River and proposed rail line
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Govt of Kerala
Project Brief with priority (High, Medium, Low)	Development of 2 lane road connecting Port to NH Priority : Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	For continuous handling of Bulk & container cargo the road connectivity have to be improved.Total length of the road section is 13.5 km. So far 1 km road is constructed with State government funding.

Maharashtra and Goa project details

Port Modernization

Project Description	Details
Name of the project	Multipurpose Terminals in Uran Mudflats
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	The proposed terminal could cater to handling of car carriers and break bulk (Figure 1.9). A separate Road connectivity could be provided through Uran mud flats. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial	At present JNPT is saturated and new facility is required to cater to future

Project Description	Details
area etc. with empirical data, if available)	breaakbulk traffic at port apart from containers.

Project Description	Details
Name of the project	Re-arrangement of yard for improving the efficiency of Port's Container Terminal and allow for inter terminal movement
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Restructuring of JNPT yard is suggested to provide for more than 9000 ground slots.

Project Description	**Details**
	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	It is required that JNPCT's yard has to have continuous stacks for operational efficiency and better RTG utilisation. The restructuring of the yard would allow optimum utilization of space and equipment and also free up space to develop roads of adequate width for proper circulation of traffic of all terminals to common rail yard

Project Description	Details
Name of the project	Integrated Common Rail Yard
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	All the container terminals (except 4th container terminal) would use this common rail yard of 1600 m length and 250 m width. Stacking areas proposed, adjacent to rail sidings with Nested RMGCs and RTGs. The storage area in this yard shall be utilized for aggregation and separation of ICD traffic Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	For improving the efficiency of optimum utilisation of Port's Container terminal and to handle the DFCC racks with common rail yard.

Project Description	**Details**
Name of the project	Terminals in Nhava Creek
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	The proposed terminal could cater to handling of Chemicals/Edible Oil & Coastal Cargo . About 16 ha of storage area could be created through reclamation for handling multipurpose cargo thorugh coastal shipping. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	As present JNPT is saturated and new facility is required to cater to future traffic at port.

Project Description	Details
Name of the project	Part closure of Indira dock and revamping of the Hughes Dry dock
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Project would be implemented by Mumbai Port Trust
Project Brief with priority (High, Medium, Low)	In view of the deep draft available at the Indira dock berths as compared to the berths outside dock it is suggested that at least berths 10, 15, 16 and 17 shall be available for handling of general cargo. The remaining dock arms could be closed and the area could be utilised for other port usages such as storage of cargo etc. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Traffic aggregation to freeup land.

Project Description	Details
Name of the project	All steel traffic to be shifted to OCT to improve cargo handling operations
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Mumbai Port Trust
Project Brief with priority (High, Medium, Low)	The Offshore Container Terminal berth is built to have two berths in phase 1. The OCT was planned to handle container volumes, however, after careful evaluation of the prospects for OCT, not much container traffic can be expected at the terminal. Therefore, MbPT should consider handling steel products and cars at OCT. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	In view of the limited traffic for containers (0.1 mTEU) , OCT may be used for steel handling. Shifting of cargo to OCT will ensure better performance in hanlding of cargo and will be more suited to meet the future demands, specially the possibly growth in traffic of steel products.

Project Description	Details
Name of the project	Mandwa Breakwater Project
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - for construction of Breakwater at Mandwa
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Tendering underway
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MMB
Project Brief with priority (High, Medium, Low)	The travel via sea route between Alibag and Mandwa couldsave cost and time of approximately 10 lakh passengers who use this service. The breakwater will allow the operations to continue even during monsoon and rough weather. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	With the construction of breakwater travel between Alibag anf Mumbai saves about 3 hour of road journey to Alibag from Mumbai. The nautical

Project Description	Details
	distance between Mumbai and Alibag is only 9 miles while the road distance is approx. 100 km. Thereby,using this facility could be very convenient to save time and money.

Project Description	Details
Name of the project	Development of JNPT North Anchorage
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Anchorage arrangement is proposed at the north of the turning circle towards Elephanta Island. Mooring Buoys shall be provided so that

Project Description	Details
	lighterage operations could be performed. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The proposed arrangement would provide ship anchorage during rough weather conditions and also be used as waiting berths for ships and thus enable better berth utilisation

Project Description	Details
Name of the project	Dry Docking Facility at Indira Dock
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Mumbai Port Trust

Project Description	Details
Project Brief with priority (High, Medium, Low)	Refurbish the existing Hughes Dry Dock shall be undertaken. To support each dry docking facility there is a requirement of at least one wet berth for afloat repairs. There will be many instances where the ships might only need afloat repairs. Therefore adequate number of wet berth needs to be provided to complement the dry docking facility. The inner berths 1, 2 and 3 could be allocated for this purpose along with the backup space of boundary. The building currently being used for CISF could also be made part of the integrated dry docking facility for use as an office area and worker amenities. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	In the present scenario of ship repair industry in India, it has been found that there is large demand-supply gap of infrastructure, especially in Mumbai. This has led to more than 200 ships permanently stationed in Mumbai and more than 5000 ships visiting the region for trading activity.

Project Description	Details
Name of the project	Utilisation of Coastal Berth of Liquid Cargo at JNPT
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Coastal Cargo berth is being planned adjacent to Terminal-4. This project involve providing the facilities to handle some of the Chemicals & Edible Oil cargo coming in small parcels by providing pipelines connecting to the existing piplines Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	This would free up the capacity from the existing liquid berth. Overall liquid handling capacity would be enhanced to 8.25 MTPA

Project Description	Details
Name of the project	5th Container Terminal
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	The 5th Container Terminal is proposed at the north of Nhava Island in Panvel Creek (Figure 1.6). The terminal shall have a 1000m long Container berth, with yard and other facilities on reclaimed land, connected to main land using approach trestle. 85 ha area for Container Yard and backup area, 40 ha area for approach corridor is proposed. This would enable estimated capacity addition of 2.4 million TEUs. Priority: High

Project Description	Details
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	As present JNPT is saturated and new facility is required to cater to furure traffic at port.

Port led industrialization

Project Description	Details
Name of the project	Mega food processing cluster in Southern Maharashtra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India has a very low level of food processing currently. In the category of cereals and processed derivatives,

Project Description	Details
	India exported $10 bn worth of raw cereals and only $ 0.8 bn of processed derivates (~8% of the value of raw exports) in 2014. In comparison to the same, Asia exported $ 19 bn worth of processed derivatives and $ 24 bn worth of raw cereals (~24% of the value of raw exports). Same is the case in other categories of fruits, vegetables and nuts where India exported $ 3 bn of primary products and ~$ 1 bn of processed derivatives (~19% of the value of primary product export) in 2014. In comparison to the same, Asia exported $ 44 bn worth of primary products and $16 bn worth of processed derivatives (~37% of the value of primary product export). This suggests that India has a huge potential in the processed food segment. Industry's aspiration is to triple the food processing levels in India from around 7% in 2010 to 20% by 2020. This will also enable India to have a bigger share in the export market- US and Europe being the major consumers of processed food. India is favorable as a location for food processing due to availability of labour and cost and availability of raw materials. However, it scores poorly on most other parameters including technology, scale of domestic demand and logistics. Currently, the export cargo moving from hinterlands to ports is subjected to high inland costs as well as significant variability in transit time. Both road and rail have bottlenecks which does not allow smooth movement of cargo. Railways also does not have proper cold chain facility which is extremely important for food cargo. Due to the perishable nature of the food products it is important to have efficient logistics.

Project Description	Details
	Considering the relevance of logistics to the export competitiveness of food processing sector it is important to develop a port-led industrialization strategy for the sector. Maharashtra is a leading producer of mango, cashews and fish. However the food processing is currently done using traditional methods and oriented primarily towards domestic consumption. A mega food cluster specialising in the manufacturing and export of value added products from mango, cashews and fish can come up in resource rich districts of Ratnagiri and Sindhudurg closely linked to Jaigad and Vijaydurg ports. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion mega food cluster in Southern Maharashtra can result in addition of 1 lac new jobs and INR 26k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Greenfield refinery at Maharashtra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation,	Opportunities in Maritime States

Project Description	Details
Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	MS/HSD demand in Maharashtra is expected to go up to 18 MMTPA in 2025 while the supply would be around 12MMTPA. Demand will likely outpace supply by 2019 hence a 5 MMTPA refinery needs to be set up by that time with a ramp up potential of 3-5MMTPA

Project Description	Details
Name of the project	Export based electronics cluster in Northern Maharashtra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development	Cluster Development

Project Description	Details
d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	The demand for electronics has grown at a consistent pace in the country, reaching 6 lakh crore in 2015. Majority of the demand comes from communication and broadcasting equipment and consumer electronics. While the demand has gone up, production sector has not been able to keep pace. The production of electronics has remained static at around 2lakh crore. This has led to increased gap between exports and imports with around 65 per cent of the domestic demand being served from imports in 2015. India imported nearly USD 40 billion worth of electronics items in 2014. At current growth rate, Electronics import could reach USD 85-100 billion by 2025.In addition, there is a huge and expanding export market that India can tap. Total exports of Electronics from Asia totaled USD 1.9 trillion in 2014 and have been growing at the

Project Description	Details
	rate of 5 per cent p.a. over last 7 years. India's share in exports from Asia is a miniscule 0.5 per cent. India can build onto three distinct sources of competitive advantages for electronics manufacturing: ■ Strong and growing domestic demand: ■ Already established as an electronics design cluster: Nearly 2000 chips are designed per year in India with more than 20,000 engineers working in this field. ■ Emerging centre for downstream assembly operations: India has started undertaking the downstream activities of assembly operations. Electronics manufacturing these days tends to have a global supply-chain spanning across countries (even continents). Port-proximate location will be a critical success factor for setting-up these fabrication units to link them with the global supply-chains.Kick-starting upstream manufacturing will require an "eco-system" approach. India should set-up "Science and Technology cluster" creating this eco-system instead of piece-meal electronics clusters. These clusters need to be backed by strong technical research capabilities. Northern Maharashtra- JNPT SEZ (700 acres) or Dighi SEZ could be potential candidates. These would have synergies with the Pune/Satara based automotive cluster. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial	A $25 billion electronics cluster in northern Maharashtra can result in

Project Description	Details
area etc. with empirical data, if available)	addition of 3 lac new jobs and INR 1 lac Cr earnings of foreign exchange

Project Description	Details
Name of the project	Export based apparel cluster in Vidarbha in Maharashtra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India has a raw material based competitive advantage in apparel manufacturing. India is third largest cotton producer in the world. India, however, exports nearly 25 per cent of cotton produced. The downstream

Project Description	Details
	activities of converting cotton to textile and then to apparel are highly labour intensive. India is thus losing out on job creation potential in the apparel sector. India's share in exports from Asia has remained stagnant at 5 per cent. Analysis of global trade-flows reveals that while China has consolidated its position, Bangladesh and Vietnam are emerging as the next "hot spots" for export oriented apparel manufacturing, taking away share from developed Asian nations like Hong Kong. McKinsey surveyed 29 Chief procurement Officers of leading apparel companies in late 2013 to identify future trends in apparel sourcing. 72 per cent of respondents planned to decrease sourcing from China over next 5 years. However, India ranked a distant 3rd in list of sourcing market expected to grow in importance after Bangladesh and Vietnam. If India wants to establish a strong position in the global export market it should overcome the key challenges- high lead time and sub-scale operations. Setting-up port-based/proximate manufacturing clusters will help address above described two issues and significantly increase the competitiveness of apparel manufacturing. Vidarbha can be a potential location for export based apparel cluster. Jalgaon, Aurangabad, Jalna, Buldana, and Akola are they key cotton producing districts in this region Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial	A $5 billion apparel cluster at Vidarbha can result in addition of 3

Project Description	Details
area etc. with empirical data, if available)	lac new jobs and INR 26k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Steel cluster in Southern Maharashtra/ Goa
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Maritime Financing & Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Considering the expected demand of steel in India by 2025, there is a potential for setting up coastal capacities of ~40 MTPA close to the demand centres. Setting up coastal steel cluster is the most economical

Project Description	Details
	mode of expansion and would result in average savings of ~INR 1000 per tonne of steel produced. This is primarily due to reduction in transportation of coking coal, transportation of iron-ore through slurry pipeline and reduction in transporation cost of steel due to potential of coastal shipping. Due to proximity to the demand centre- automobile cluster around Pune, Southern Maharashtra/ Goa is one of the possible locations for setting up steel cluster of capacity 20 MTPA. Priority: Low
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $13 billion steel cluster in Southern Maharashtra/ Goa can result in addition of 1 lac new jobs and INR 16k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Power cluster in Maharashtra
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism	Opportunities in Maritime States

Project Description	Details
i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India's demand for coal in 2014-15 was around 850 MTPA primarily coming from coal fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent. Power demand in the country is expected to reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then in "24/7 power to all", the peak demand could be as high as 280 GW. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal based thermal power plants will continue to meet more than 70 per cent of the country's requirement. Maharashtra is an industrial states with high power demand. Current consumption in Maharashtra is 138 bn units, the highest in the country. Maharashtra will continue to dominate the urban and industrial landscape of the country, the power demand is expected to witness a steady growth for the next 10 years. Power demand in Maharashtra is likely to touch around 400 bn units by 2025. This will require significant capacity expansion in the state.

Project Description	Details
	While pithead plants are more economical as it is cheaper to wire the power than transporting thermal coal from the mine head to the plants near the demand centres. But due to the resource limitations on the magnitude of pithead plants as well as the dual structure of power sector, capacity will be set up within the respective states. Since SECL and MCL are expected to account for bulk of the coal production, Maharashtra is likely to be served by MCL. Power complexes can be set up in the coastal regions of the state. Coastal power complex can leverage the coastal shipping of thermal coal from MCL to coastal power clusters, to significantly reduce the logistics cost which could be as high as 30 per cent of cost of power production. Northern Maharashtra- Vadhwan can be the potential location for setting up a 5 GW power cluster. The proposed port at Vadhwan can serve the coal requirement of the complex. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Development of a $ 3 bn power complex in Maharashtra could result in value addition of ~INR 5000 Cr to the economy. It will enable the state to meet its future energy demand

Port connectivity

Project Description	Details
Name of the project	Freight friendly expressway from Dighi Industrial Cluster (Pune) to JNPT
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led	Hinterland connectivity and Multi-modal logistics

Project Description	Details
Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost. Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides

Project Description	Details
	delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. Pune currently moves 3 lac TEUs annually to JNPT and this traffic is estimated to increase to 9.3 lac TEUs by 2025. The route is mentioned below: ■ SH 50 from Dighi ICD to Mumbai Pune Epxressway ■ NH 4 from Talegaon to Panvel ■ NH 4B from Panvel to JNPT Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Pune and JNPT. The existing status of the stretch is mentioned below: ■ Mumbai Pune expressway is an access controlled 6 lane expressway ■ 4 laning of NH 4B connecting JNPT to Mumbai Pune Expressway under way Priority: ?
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

Project Description	Details
Name of the project	Up gradation of SH 164 (Nivli to Jaigad) to connect Jaigad Port to NH 17 at Nivli

Project Description	Details
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR for strengthening and widening of SH-164 within available Right of Way approved by PWD. The work is in progress.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	JSW Jaigarh Port Ltd. (proponent), NHAI (implementing agency)
Project Brief with priority (High, Medium, Low)	Priority : High The existing Nivli-Jaigad Road (SH-164) having a length of 43 kms. connects JSW Jaigarh Port to NH-17 (Mumbai-Goa NH). Besides,this road also connects 50 other villages of the region to the district of Ratnagiri. SH-164 is mainly an intermediate lane road except certain stretches where carriage way is widened to 7 m. There is an urgent need for 4-laning of this road to facilitate faster and safe evacuation of port cargo.

Project Description	Details
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	JSW Jaigarh port has a present capacity of 15 MTPA. However the port is currently handling about 7 MTPA out of which about 1.5 MTPA cargo is transported by SH-164. Remaining cargo is of coal imported for power plant of JSW situated at Jaigad. Presently, raw sugar, Bauxite and Limestone are being transported using the local road network. The total traffic intended for transportation through road work out to about 4.2 MTPA. Jaigad port is the nearest port for the sugar industries located in the Western Maharashtra and industries located in Karnataka. The Jaigad port is also a gateway for export of local agri-products. Current unlocking of bottlenecks by 4 laning the state highways could lead to release in capacity of 5MMTPA immediately. In addition, the projections in 2025 are forecasted at 30-35MMTPA. (condition being that the 4 laning is done.)

Project Description	Details
Name of the project	Flyovers at Y junction, approaches to existing terminals to improve flow of containers movement
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	JNPT to decide
Project Brief with priority (High, Medium, Low)	Two flyovers are proposed at JNPT. First flyover is proposed to segregates the IN & OUT traffic of JNPCT, NSICT, NSIGT and also allows adequate queuing space for IN traffic of JNPCT and NSICT, while other one is proposed at Y-Junction, to allow GTI exit traffic to merge with the exit traffic of all other terminals. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The new flyovers are proposed to avoid criss crossing at Y-junction and to segregate the in IN-OUT trafiic of JNPCT, GTICT, NSIGT and NSICT and for the better traffic circulation.

Project Description	Details
Name of the project	Connectivity to NH – 17 – Upgrading of SH 92, 96, 97 to connect NH17 to North and South banks of Dighi Port
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR for 4 laning completed by developer. DPR to be approved by PWD after which it is proposed to be taken up by Ministry of Shipping under Sagarmala scheme.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Dighi Port Limited (proponent), NHAI (implementing agency)
Project Brief with priority (High, Medium, Low)	Road Stretch I from dighi to mangaon (on NH17) via south port side (54.75 Km) Road Stretch II from Agardanda to Nagotne (on NH17) via North Port side (40.73 Km) Both strethces to be implemented simultaneously Priority : High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Dighi port is currently servicing approx. 1.5MMTPA of bulk (mainly imported coal) travelling to MLCP power plant in Nasik and Posco steel plant in Khopoli. Current unlocking of bottlenecks by 4 laning the state highways could lead to

Project Description	Details
	release in capacity of ~4MMTPA immediately. In addition, the projections in 2020 are forecasted at 30MMTPA. (condition being that the 4 laning is done.) Existing MIDC industrial cluster at Vilebhagad, Taluka, Mangaon and Chemical industries at Mahad and Roha. In addition DMIC is coming up with an Indiustrial cluster at Tala taluka.

Project Description	Details
Name of the project	Evacuation road standalone Container Terminal (330m extension to DPW terminal) upto Karal (NH4B)
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	This Terminal is scheduled to be commissioned from 2.7.2016 Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	High.

Project Description	Details
Name of the project	Flyover for GTI Entry/Exit over the Rail Tracks fro seamless traffic movement
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	JNPT to decide
Project Brief with priority (High, Medium, Low)	To avoid crossing at grade level with the rail lines to the common rail yard a flyover has been proposed for entry-exit to GTI yard. The flyover will start from the GTI entry gate till GTI yard. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	This is required to avoid traffic congestion and will improve operational aspects of the Port.

Project Description	Details
Name of the project	Freight friendly expressway from Sanathnagar industrial cluster (Hyderabad) to JNPT
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship	Hinterland connectivity and Multi-modal logistics

Project Description	Details
Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. Hyderabad currently moves 60,000 TEUs annually to JNPT and this

Project Description	Details
	traffic is estimated to increase to 1.5 lac TEUs by 2025. The route is mentioned below: ■ NH 8 from Sanathnagar to Solapur ■ Mumbai Pune Expressway to Panvel ■ NH 4B from Panvel to JNPT Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Hyderabad and JNPT. The existing status of the stretch is mentioned below: ■ City roads from Sanathnagar to SAngareddy ■ 4 laning underway from Sangareddy to Maharashtra Karnataka Border ■ 4 laning underway from Maharashtra Karnataka border to Solapur ■ 4 laning underway from Solapur to Pune ■ 6 laned from Pune upto Panvel - Mumbai Pune Expressway ■ 4 laning underway rom Mumbai Pune Expressway to JNPT
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~2-3 days can be reduced in the transit time of containers by developing freight friendly corridor.

Project Description	Details
Name of the project	Freight friendly expressway from Ahmedabad to JNPT

Project Description	Details
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland connectivity and Multi-modal logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to

Project Description	Details
	rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. Ahmedabad currently moves 60,000 TEUs annually to JNPT and this traffic is estimated to increase to 1.9 lac TEUs by 2025. The route is mentioned below: ■ NE 1 from Ahmedabad to Vadodara ■ NH 8 from Vadodara to Ghodbunder ■ State highway 42 from Ghodbunder to Thane ■ NH 4 from Thane to JNPT Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Ahmedabad and JNPT. The existing status of the stretch is mentioned below: ■ 6 laning from Ahmedabad to Vadodara completed recently ■ 6 laning of Vadodara Surat section under construction ■ 6 laning of Surat Dahisar section completed ■ 4 laning of NH 4B connecting JNPT to Mumbai Pune Expressway under way ■ Mumbai Vadodara Expressway project - 2 phases under construction; 1 phase scrapped due to land acquisition

Project Description	Details
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

Odisha project details

Port Modernization

Project Description	Details
Name of the project	Development of Outer harbour at Paradip port for Cape Size Ships
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Location and Feasibility analysis conducted
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	The Development of Outer Paradip Port is planned south of the existing paradip port. The port will be developed on the reclaimed land and will involve construction of breakwaters, capital dredging for approach channel and manoeuvring basin, reclamation of the terminal areas, construction of berths, supply and installation of material handling equipment, onshore infrastructure and marine support systems. The port is planned to handle cape size vessels. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	By 2025, the Paradip port is expected to handle an additionla coal traffic of 35 MTPA, which the existing port facility cannot handle. Even after upgradation of the most of the facilities and provision of new berths at Paradip, the port is likely to face capacity constraints to handle the cargo projected for the port. Therefore, possibility of the development of an outer harbour was explored.

Project Description	Details
Name of the project	Development of IWT terminal at Paradip Port

Project Description	Details
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Inland Water Transportation, Coastal Shipping
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR is under preparation
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Development of IWT terminal for the movement of coal from Talchar mines to Paradip and Dhamra port. The coking coal imported at the port could also be transferred to the IWT terminal being developed at Irada near Kalinganagar steel plants. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Presently the major cargoes are transported through Railway and Roads Hence, the Inland Water Way authority of India IWAI intends to develop National water way No.5 from Talcher to Paradip and Dhamara

Project Description	Details
	through the rivers. For the purpose Paradip Port Trust (PPT) proposes to develop a transport terminal at Paradip.

Project Description	Details
Name of the project	Expansion of the MCHP stackyard for additional coal storage
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	PPT
Project Brief with priority (High, Medium, Low)	The expansion project proposes to add an additional row of stock pile towards the North of Existing stock yard and also provides one stream of conveyor

Project Description	Details
	and Stacker cum Reclaimer. This measure will increase the capacity of the stackyard from 0.97 MT to 1.45 MT and terminal capacity from 24 MTPA to 36 MTPA. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The utilization of the equipment at MCHP is very high, which is likely to impact the maintenance schedule requirement. The yard will further support the storage for the proposed EQ1 to 3 berths mechanisation.Therefore this expansion of the MCHP stackyard shall be done on priority.

Project Description	Details
Name of the project	**Handling of Thermal Coal Through IOHP**
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Note Prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Consequent to decline in iron ore traffic through IOHP, the port authority proposes to handle Thermal coal in addition to Iron ore. The proposal envisages unloading thermal coal rakes in BOXN wagons at Wagon Tippler and loading through IOHP. In fact coal loading was already carried out in the past and there is nothing new in handling coal per se. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial	As Iron Ore export is banned and IOHP is handling very less traffic compared to its rated capacity and

Project Description	Details
area etc. with empirical data, if available)	virtually lying vacant . The facility can be effectively utilised to handle coal as well after creating relative infrastructure i.e. additional conveyors etc.

Port connectivity

Project Description	Details
Name of the project	Doubling of the existing rail link connecting Dhamra Port to Bhadrak on Chennai- Howrah main line
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Dhamra Port has in its possession a 125 meter wide corridor from Dhamra to Bhadrak which can accommodate two rail tracks and a four lane road along with service lines viz. transmission line and pipe lines. Dhamra presently operates a private rail link from Dhamra Terminal Yard (DTY) to Bhadrak; a stretch of approx 62Kms.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Dhamra Port (Project Proponent) and Indian Railways (implementing agency)
Project Brief with priority (High, Medium, Low)	

Project Description	Details
	For Phase-I, DPCL has constructed the 62 km rail connectivity (single rail track) from Dhamra to Bhadrak/Ranital Link Cabin on the main Howrah-Chennai line. From Bhadrak, East Coast Railway Network connects Dhamra to industrial regions of southern Orissa and Chattisgarh while South eastern Railway Network provides connectivity to the mineral rich belt of Jharkhand, West Bengal & Northern Orissa. DPCL is also in the process of doubling its rail system between Bhadrak and Dhamra Terminal Yard (DTY) under two phases. Under Ph-I, two stations at Bansara and Tihari having train crossing facilities have been operationalized. Under Ph-II expansion plans, Dhamra is planning to double its rail system, which will lead to the line capacity being augmented up to 40-45 trains each way with a head-way of 30 minutes Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Dhamra Port announced its CoD in May 2011 and since its commissioning in 2011, Dhamra has gone a long way in ramping up its cargo capacity. Dhamra started operations with 2 berths of 12 MMTPA capacity each; 1 for iron ore export and another for coal import. Despite there being a blanket ban on iron ore export, Dhamra has still managed to overcome these challenges and registered ~15.5 MMTPA of cargo in FY 15. All cargo moving into and out of Dhamra is carried on railways. Under its Phase- II expansion plan, Dhamra is presently erecting 2

Project Description	Details
	new bulk berths, container berths, LNG terminal and LPG terminals. All these terminals are scheduled to be commissioned phase-wise by FY 20. Post completion of Phase- II developments, Dhamra would have a total of 54 MMTPA of bulk handling capacity (including 5 MMTPA of steel coil exports from Kalinganagar), 5 MMTPA of LNG, 1.6 MMTPA of LPG and 1.8mn TEUs of container capacity. In order to cope up with its phenomenal growth path, Dhamra needs expansion of its rail network to match up with its berth capacity. In order to achieve the growth and berth expansion, Dhamra would require doubling of its rail netwrok by 2020 in order to synchronize the import/export volumes with rail capacity.

Project Description	Details
Name of the project	Product pipeline from Paradip to Hyderabad
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG/IOCL
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Due to expansion of Paradip refinery, the eastern region will have surplus MS/HSD while AP region would have MS/HSD deficit of ~5.5MMTPA by 2025 (even after vizag refniery expansion). Hence a 4.5 MMTPA capacity pipeline from Paradip refinery to Hyderabad will help meet the AP demand of MS/HSD

Project Description	Details
Name of the project	Double rail track from Gopalpur Port to Chatarpur
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Chatrapur is a key connecting point on trunk rail line between Chennai and Howrah. This link is vital for rail connectivity to the port
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	State
Project Brief with priority (High, Medium, Low)	Priority: Low
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	NA

Tamil Nadu project details

Port Modernization

Project Description	Details
Name of the project	LNG Import Terminal in Ennore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Tamil Nadu has a potential of 5MTPA gas demand coming primarily from fertilizer and refineries. IOCL has signed a contract for a LNG berth at Ennore port. Hence a re-gasification terminal could be built at Ennore to cater to Tamil Nadu hinterland demand

Project Description	Details
Name of the project	Development of Additional Container Berths
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept note prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	A quay length of 600 m could be created parallel to berths 8 and 9, but at an offset of about 250 m South. This can accommodate two container berths and also allows space for another berth perpendicular to berth 9 (as originally planned as shallow water berth). The backup area behind the proposed container berths could be created by way of reclamation. Priority: Low
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	This development will provide a capacity addition of 1.4 MTEUs.

Project Description	Details
Name of the project	Development of MLT II for handling POL products at Ennore Port
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalization)	Feasibility study over. Port will issue RFQ shortly
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	A new oil berth will be constructed south of the MLT I berth and adjacent to it. It will be in the form of a service platform with pairs of berthing and mooring dolphins on either side. The berth will be connected to a 33 acre Tank farm area through 2 x 24" + 2 x 12" pipelines running 1.8 km over trestle and 2.5 km on land. The Tank farm will have, initially, 5 x 5000 KL tanks and 3 bays of TLF for road evacuation.

Project Description	Details
	Priority High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The traffic at the existing MLT I has gone beyond its assessed capacity resulting in very high pre berthing detention of tankers.

Project Description	Details
Name of the project	NCB 1 – Utilisation of its full capacity
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept note prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	The port and NTPL may utilise the spare capacity of this berth way of putting up a take-off conveyor from

Project Description	Details
	the transfer tower near the port boundary. This may earn additional revenue to both port and NTPL. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Technically this berth has a capacity of 8 to 8.5 MT. Against this the actual requirement of NTPL is only 6 MT, thus leaving a spare capacity of 2 to 2.5 MT.

Project Description	Details
Name of the project	SBM in Chennai to handle crude oil demand of CPCL Manali to handle 10 MTPA of traffic
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Examination of techno economic viability

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	CPCL
Project Brief with priority (High, Medium, Low)	The crude oil requirement of Manali Refinery is handled at Chennai Port where tankers upto suezmax could be handled. This project looks into the feasiblity of locating a single buoy mooring system whereby very large crude carriers of 330,000 dwt could be handled. The SBM will be located at 32 m water depths available at about 11 km from the landfall point. The SBM will be connected to the proposed 42 " crude oil pipeline from Chennai port running along the coast at a point called Ernavur through a 48" submarine pipeline. Priority Medium.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	By handling VLCCs it is possible to avail of the freight differential of about US $ 3 /Te of imported crude oil.

Project Description	Details
Name of the project	Dedicated coastal berth for food grain imports
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept note prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	The coastal berths are proposed to be built next to the proposed NCB IV (Figure 1.2). The facility would comprise of construction of 360m quay, dredging in front of the berths to -10.7m and provision of Uloader systems and a bulk storage facility. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The potential for coastal exports and imports of Food grains through VOC Port has been assessed as ~1.28 MTPA. This traffic is in addition to international traffic. Considering the above, it is proposed to develop a food grain handling facilities at VOC Port to ensure speedy and economical operation.
Name of the project	Installation of buoys at Pamban channel
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging,	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept stage
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Tamil Nadu Maritime Board
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Pamban channel is the only channel in the south which connects east of India to west by sea route. Coastal ships have great advantage in using the channel. The port makes money from pilotage duty at channel. The channel is subject to rough weather conditions and as a result the ships have to wait for a few days. Pamban also doesnt have a proper anchorage area. Hence construction of bouys at the channel is required

PLI

Project Description	Details
Name of the project	Marine cluster at Ennore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Shipbuilding, Ship Repair and Ship Breaking
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	The shipbuilding market is currently dominated by China, Korea and Japan which cumulatively account for ~90% of the world's production. India currently commands only ~0.2% of the global shipbuilding market share. The ship-building market is currently on a downturn with excess capacities globally. However, strong demand is expected in the long term. India can prepare itself for the upturn target a 10 million GT ship-building industry

Project Description	Details
	by 2025, through a comprehensive model of industry imperatives and government support. There are certain factors which are favorable for the growth of shipbuilding industry in India: 1) Growth in coastal shipping: As per the studies conducted, it was estimated that there is a potential of coastal shipping of 150-200 MTPA of thermal coal and 35-45 MTPA of other commodities like steel, cement, food grains, fertilizers, etc. in India by 2025. To enable the same, it would require development of vessel fleet to handle coastal cargo. 2) Opportunity in defence sector: The opportunity for the Indian companies in defence shipbuilding is ~INR 2.3 Lac Cr over the next 8-10 years. Ennore can be a potential location for establishing a marine cluster. Kattupalli has a mega shipyard and there is a proposal for a new steel cluster near Chennai/Ennore. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $5 billion marine cluster at Ennore can result in addition of 1 lac new jobs and INR 13k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Petrochemical cluster at Ennore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)	Maritime financing & Cluster Development

Project Description	Details
b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Ministry of Chemicals and Fertilisers
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The demand for petrochemicals in the country would be in the range of 60 – 75 MTPA by 2025. With the demand expected to rise to ~65 MTPA in the base case and production expected to go up to 40 MTPA, it can be seen that India will require significant capacity addition. We estimate that 25 MTPA of additional production capacity will be required to achieve zero trade balance in petrochemicals. As a 5 MMTPA LNG regasification terminal is coming up in Ennore set up by IOCL, we propose a petrochemical cluster based on gas usage to be set up in Ennore

Project Description	Details
Name of the project	Greenfield refinery at Tamil Nadu
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Opportunities in Maritime States
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	MS/HSD demand in Tamil Nadu is expected to go up to 15 MMTPA in 2025 while the supply would be around 7MMTPA. Additionally Nagarjuna refinery construction has been delayed due to cyclone and overall economic slowdown. CPCL refinery cannot expand due to environmental and safet concerns. Hence a 5 MMTPA refinery can be set up near Cuddalore with a ramp up

Project Description	Details
	potential of another 5 MMTPA by 2025.

Project Description	Details
Name of the project	Export based leather and footwear cluster in Perambur in Tamil Nadu
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	The leather industry is one of the major foreign exchange earners to the country. India exported around USD 6Bn of leather and associated products in 2014. The exports have grown at a rapid pace achieving

Project Description	Details
	annual growth of around 9 per cent over last 4 years. Nearly 20 per cent of the leather manufacturing units export their products. India has 3 key leather clusters with significant export volumes- Tamil Nadu, Uttar Pradesh and West Bengal. USA—with 13.3 per cent share, Germany (12.8 per cent), UK (12.5 per cent), Italy (8.4 per cent) and Hong Kong (7.4 per cent) were the top five destinations for Indian leather produce. At 42 per cent, footwear forms the largest share of leather and leather products exports from India. India has grown tremendously from being a raw leather exporter to becoming a supplier of high value added products in the last few decades. Despite all the progress Indian leather exports cater to around 3.5 per cent of global leather imports. It is interesting to note that while China has significantly higher share than India when it comes to value added leather articles – Footwear, apparel, goods, etc., India has almost twice the share in export of raw hides and skins. Analysis on leather industry cost competitiveness between Asian countries reveals that India ranks behind China on most aspects. India has highest the logistics costs in Asian countries and fairs badly on raw material and labour related costs as well.To increase the export competitiveness of Indian manufactured leather and leather products, building leather cluster near ports would reduce the transportation costs involved in product exports. Additionally most of the chemicals used from leather industry are imported so their hinterland travel cost can also be reduced by having leather cluster near ports. Input water for desalination process can also be

Project Description	Details
	taken directly from the sea. Perambur is a potential location for development of leather cluster because of its proximity to to Chennai and Ennore port. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $4 billion leather and footwear cluster in Perambur can result in addition of 2 lac new jobs and INR 20k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Steel cluster at Ennore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Maritime Financing & Cluster Development
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Considering the expected demand of steel in India by 2025, there is a potential for setting up coastal capacities of ~40 MTPA close to the demand centres. Setting up coastal steel cluster is the most economical mode of expansion and would result in average savings of ~INR 1000 per tonne of steel produced. This is primarily due to reduction in transportation of coking coal, transportation of iron-ore through slurry pipeline and reduction in transporation cost of steel due to potential of coastal shipping. Due to proximity to the demand centre- automobile cluster around Chennai, Ennore/Chennai is one of the possible locations for setting up steel cluster of capacity 20 MTPA. Priority: Low
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $13 billion steel cluster at Chennai/Ennore can result in addition of 1 lac new jobs and INR 16k Cr earnings of foreign exchange

Project Description	Details
Name of the project	Power cluster in Tamil Nadu
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster	Opportunities in Maritime States

Project Description	Details
Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	India's demand for coal in 2014-15 was around 850 MTPA primarily coming from coal fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent. Power demand in the country is expected to reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then in "24/7 power to all", the peak demand could be as high as 280 GW. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal based thermal power plants will continue to meet more than 70 per cent of the country's requirement. Tamil Nadu is an industrial state with high power demand. Current consumption in Tamil Nadu is 93 bn units. Tamil Nadu will continue to dominate the urban and industrial landscape of the country, the power demand is expected to witness a

Project Description	Details
	steady growth for the next 10 years. Power demand in Tamil Nadu demand is likely to reach around 300 bn units. This will require significant capacity expansion in the state. While pithead plants are more economical as it is cheaper to wire the power than transporting thermal coal from the mine head to the plants near the demand centres. But due to the resource limitations on the magnitude of pithead plants as well as the dual structure of power sector, capacity will be set up within the state. Since SECL and MCL are expected to account for bulk of the coal production, Tamil Nadu is likely to be served by MCL. Power complexes can be set up in the coastal region of the state. Coastal power complex can leverage the coastal shipping of thermal coal from MCL to coastal power clusters, to significantly reduce the logistics cost which could be as high as 30 per cent of cost of power production. Tamil Nadu is already a successful model, having plants at Tuticorin port, in Ennore, Cuddalore and Chennai, and are getting thermal coal via coastal shipping. Central Tamil Nadu- Sirkazhi could have a 5 GW power cluster in Tamil Nadu. There is already an IL&FS power complex at Cuddalore, which could also potentially be expanded. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Development of a $ 3 bn power complex in Tamil Nadu would result in value addition of ~INR 5000 Cr to the economy. It will enable the state to meet its future energy demand.

Port Connectivity

Project Description	Details
Name of the project	Four lane road from Northern gate of port to Thachur, outer ring corridor - 6 laning with service roads
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	State
Project Brief with priority (High, Medium, Low)	A new 4 lane road is proposed from Kamarajar Port to Thatchur on NH-5 with a length of 21.148 Km and a link to TPP Road with a length of 4.35 Km for providing seamless evacuation of cargo from Kamarajar Port. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial	This project will facilitate evacuation of cargo.

Project Description	Details
area etc. with empirical data, if available)	
Name of the project	**Northern Rail Link connecting north of Minjur to KPL**
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	DPR prepared
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The Kamaraj port in Ennore is giving a push to various port connectivity projects both road and rail so that the growing Corporate Port does not face the problems of evacuation. the port poised to reach a traffic turnover of sixty million tons in the next 2 years, authorities are laying emphasis on connectivity projects so that enhanced cargo handling at the port does not pose a threat of congestion. The present railway link between the Port and Atthipattu Pudu Nagar has a limited handling capacity of seven rakes a day. The proposed project for laying a single railway line to a distance of 13.4 kilometer will have a capacity to evacuate 24 railway rakes a day. This project will facilitate seamless evacuation of cargo.

Project Description	Details
Name of the project	Augmentation of road connectivity to Cuddalore
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Tamil Nadu Maritime Board
Project Brief with priority (High, Medium, Low)	
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	NH 45A (Chennai - Nagapattinam) connects the port by a 1km long road. There is a proper road connectivity to the neighboring districts from the port. However considering traffic growth due to the port development and for faster evacuation, the existing road need to be augmented

Project Description	Details
Name of the project	Replacement of 30" crude oil pipeline with 42" pipeline to enhance capacity of CPCL Manali
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Contractor finalisation
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	CPCL
Project Brief with priority (High, Medium, Low)	The crude oil requirement of Manali Refinery is handled at Chennai Port and evacuated through a 30" dia 8 mm thick and 7.5 km long pipeline which was laid in 1969. It passes through highly inhabited city areas. Over the years many petrol retail stations have come along the route. Because of the age, the pipeline has not only become vulnerable because of its physical condition but also has a limitation to evacuate tankers within

Project Description	Details
	stipulated time due to reduced pumping pressure. The new 42" dia 12.5 mm thickness is laid along a 17 km route along the coast avoiding the thickly populated areas. This line will enable evacuating a suezmax tanker with 130,000 T parcel within stipulated time. Priority High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The old pipeline is posing danger to the populated area and the new line is essential.

Project Description	Details
Name of the project	Connectivity to Enayam through Nagarcoil
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Nagarcoil is a key town on the rute from Thiruvananthapuram to Enayam. This will provide road access from the port to the town from which onward access to hinterland points in Kerala and TN can be provided
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	State
Project Brief with priority (High, Medium, Low)	Priority: Low
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	NA

Project Description	Details
Name of the project	**Development of Coastal road to the East of container Terminal II at Chennai Port**
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Ongoing
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	ChpT, JV between M/s.Sripathy Associates & EMJAY constructions
Project Brief with priority (High, Medium, Low)	In the absence of an access road in the portion between M/s. Suraj Agro Industries and old harbour entrance, ChPT does not have access to the Outer Protection Arm breakwater and revetment at East Quay for any immediate rectification or repair works and to carry out further development works. This road also provides access to the upcoming coastal berth of capacity 1MTPA. Therefore, the ChPT Personnel and vehicles have to pass through the area

Project Description	Details
	leased to the 2nd Container Terminal Operator, M/s. Chennai International Terminals Pvt. Ltd; for accessing the Outer Protection Arm Breakwater and revetment with the consent of the Licensee. Hence, the Port planned to provide an exclusive road access east of the 2nd Container Terminal area after carrying out the shore protection in the left out portion of coastal road. Due to instability of the shore area at left out portion of coastal road, it is proposed to provide two lane traffic (8m width) after adequately strengthening the existing revetment along the eastern side of the M/s. CITPL compound from M/s. Suraj Agro Industries to Old Harbour Entrance. The Core stone and armour layer below the existing revetment shall be the base for forming the road on top. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The increasing demand for Coastal shipping at Chennai Port and this road provides access to the upcoming coastal berth of capacity 1MTPA

Project Description	Details
Name of the project	Hare Island - Red Gate - TTPS Circle Road Connectivity, Tuticorin Port
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Port
Project Brief with priority (High, Medium, Low)	Development of new road from Hare island to Red gate of Tuticorin Port and renovation of existing 4 lane road from Red gate to TTPS Circle Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The project is important for Hare island connetivity

Project Description	Details
Name of the project	Freight friendly expressway from Whitefield industrial cluster (Bangalore) to Enayam
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster	Hinterland connectivity and Multi-modal logistics

Project Description	Details
Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time

Project Description	Details
	from factory to port. Bangalore currently generates 3 lac TEUs annually. In absence of port at Enayam, Bangalore cargo goes to Chennai, Tuticorin and JNPT ports. Enayam port, once developed, would be most optimal port for Bangalore cargo.The current route is as below: ■ SH 45 from Whitefield to Attibele ■ NH 45 from Attibele to Krishnagiri ■ NH 7 from Krishnagiri to Kavalkinaru ■ NH 47 from Kavalkinaru to Enayam Considering the existing traffic and the estimated increase in future from Bangalore, it is suggested that a frieght friendly corridor be developed between Bangalore and Enayam. The current status is as below: ■ 6 laned upto Krishnagiri ■ 4 laned from Krishnagiri to Kavalkinaru ■ 2 laned road from Kavalkinaru to Enayam
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

Project Description	Details
Name of the project	Freight friendly expressway from Tirupur industrial cluster (Coimbatore) to Enayam
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi	Hinterland connectivity and Multi-modal logistics

Project Description	Details
Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent.

Project Description	Details
	In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. In absence of the port at Enayam, Coimbatore cargo goes to Chennai and Tuticorin ports. The proposed port at Enayam, once developed, would be the most optimal port for cargo of Coimbatore. The route is as below: ■ SH 172 to Kangayam ■ NH 67 to Vallaikoil ■ SH 84c to Aravaakurichi ■ NH 7 to Kavalkinary ■ NH 47 to Enayam Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Coimbatore and Enayam. The existing status of the stretch is mentioned below: ■ 4 laned from Aravakurichi to Kavalkinaru ■ 2 laned road from Kavalkinaru to Enayam
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

Project Description	Details
Name of the project	Freight friendly expressway from Whitefield industrial cluster (Bangalore) to Chennai
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led	Hinterland connectivity and Multi-modal logistics

Project Description	Details
Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR, Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without

Project Description	Details
	additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. Bangalore currently generates 3 lac TEUs annually and 1.5 lac TEUs go to Chennai port. This traffic is expected to increase to 3.4 lac TEUs by 2025. The existing route is as below: ■ SH 45 from Whitefield to Attibele ■ NH 45 from Attibele to Maduravoyal ■ Poonamallee High Road to Chennai Port Considering the existing traffic and the estimated increase in future from Bangalore, it is suggested that a frieght friendly corridor be developed between Bangalore and Chennai. The current status is as below: ■ 6 laning from Attibele to Walajahpet Completed ■ 6 laning underway from Walajahpet to Poonamalle The stretch is identified as one of the proposed expressways Priority: ?
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.

West Bengal project details

Port Modernization

Project Description	Details
Name of the project	Development of Multipurpose berth of 5 MTPA outside dock basin, Haldia Dock Complex
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility has already been established
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KOPT/Haldia
Project Brief with priority (High, Medium, Low)	Due to depth limitations at the HDC, it was planned to ramp up transloading

	operations at the Sand heads during dry season and at Kanika Sands, an island off the Orissa coast, during monsoon. For this a 270 m multipurpose jetty is planned to be constructed upstream of Oil Jetty III to be known as Outer Terminal 1 (OT1) Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	This facility is proposed to support transloading and also handling liquid cargo to free up dock lock capacity by handling small parcel size of liquid cargo.

Project Description	**Details**
Name of the project	Development of an oil Jetty Outside dock basin at Haldia
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept Note Prepared.

Project Description	Details
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KOPT/Haldia
Project Brief with priority (High, Medium, Low)	A L-shaped Oil Jetty is planned to handle edible and chemical handling, with the possibility of twin berthing arrangement is proposed towards east of lock entrance to handle vessels of 10,000 to 20,000 DWT. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Shifting of large number of small tankers with small parcels to outside the dock basin will ease the congestion at the lock gate. Moreover, Edible oil traffic is growing at the rate of almost 15% per annum on account of demand for this cargo in the north eastern states and Haldia being the nearest feeder port, this traffic is bound to maintain the same rate of growth.

Project Description	Details
Name of the project	LPG Import Terminal In Eastern Ports
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	MoP&NG
Project Brief with priority (High, Medium, Low)	Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	The demand for LPG in the country in 2015 was ~ 15 MTPA and it is expected to remain strong in the next few years. In view of past trends, LPG demand has been growing at around 5 per cent per annum over the last ten years and is expected to grow at a similar pace over the next 10 years as well. According to estimates, the LPG demand could go up to 29-35 MTPA by 2025. Domestic supply of LPG is not expected to keep up with the demand for LPG and with LPG demand poised to outpace domestic

Project Description	Details
	production in the next decade, increase in LPG import capacity is required. In the present scenario, we have an import capacity of 7-8 MTPA of LPG. There are plans for adding another 3 MTPA of import capacity in the next few years taking the total projected import capacity for LPG to 10 MTPA by 2025. However, as seen earlier, consumption demand in 2025 is expected to reach ~33 MMTPA in the base case by 2025. Of this, 14 MTPA is expected to be produced domestically and with planned import capacity of ~10 MTPA leaves a supply gap of 8-9 MMTPA, for which capacity is needed to be built. The Eastern states have strong demand for LPG but there are no significant plans for adding LPG importing capacity in the region. It is expected that the regional LPG demand would exceed the regional supply by ~6MTPA by 2025. Some part of this deficit (~ 2MTPA) will be met by excess LPG available in the Southern India. It is proposed to build additional 4 MTPA of capacity on the Eastern ports. Haldia, Paradip and Dhamra ports could serve as

Project Description	Details
	potential locations for building these importing terminals. A LPG pipeline connecting Paradip-Haldia-Durgapur is being built by IOCL and could aid in evacuation of LPG imported on these ports.

Project Description	Details
Name of the project	Mechanisation of Berth 3 at Haldia Dock Complex, West Bengal
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KOPT/Haldia

Project Description	Details
Project Brief with priority (High, Medium, Low)	Berth will be mechanised with two mobile harbour cranes with integrated hoppers, a conveyor syatem and a stack yard with stacker-reclaimers and wagon loader. With these, the berth may handle 3 MTPA. It could be further enhanced to 4 to 4.5 MTPA by reducing the dwell time. Priority : High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Presently, Berth 3 is under utilised by handling small parcels of POL along with mix of other cargo, while the land and other infrastructure for handling coal is available.

Project Description	Details
Name of the project	Building Barge Jetties to Support the Anchorage Operations, Kolkata Port Trust
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources	Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.)

Project Description	Details
j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	KOPT/Haldia
Project Brief with priority (High, Medium, Low)	This jetty shall be designed to simultaneously handle two barges of size upto 3000 DWT drawing a draft of about 3.5 m. The berth would be sized 300 m long and 20 m wide. The bulk material shall be unloaded using barge handlers and put to mobile hoppers with an underneath conveyor. The conveyor shall carry the material to the existing stackyard behind Eastern berths. The handling capacity of jetty shall be 4 MTPA. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Due to draft restrictions the ships have to be lightered at the Sagar Anchorages to permissible draft. Suitable facilities are needed at the port (outer anchorage) to unload the barges used in the lighterage operations.

Port led industrialization

Project Description	Details
Name of the project	Export based leather and footwear cluster in Kolkata (Bantala) in West Bengal
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led	Cluster Development

Project Description	Details
Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	The leather industry is one of the major foreign exchange earners to the country. India exported around USD 6Bn of leather and associated products in 2014. The exports have grown at a rapid pace achieving annual growth of around 9 per cent over last 4 years. Nearly 20 per cent of the leather manufacturing units export their products. India has 3 key leather clusters with significant export volumes- Tamil Nadu, Uttar Pradesh and West Bengal. USA—with 13.3 per cent share, Germany (12.8 per cent), UK (12.5 per cent), Italy (8.4 per cent) and Hong Kong (7.4 per cent) were the top five destinations for Indian

Project Description	Details
	leather produce. At 42 per cent, footwear forms the largest share of leather and leather products exports from India. India has grown tremendously from being a raw leather exporter to becoming a supplier of high value added products in the last few decades. Despite all the progress Indian leather exports cater to around 3.5 per cent of global leather imports. It is interesting to note that while China has significantly higher share than India when it comes to value added leather articles – Footwear, apparel, goods, etc., India has almost twice the share in export of raw hides and skins. Analysis on leather industry cost competitiveness between Asian countries reveals that India ranks behind China on most aspects. India has highest the logistics costs in Asian countries and fairs badly on raw material and labour related costs as well.To increase the export competitiveness of Indian manufactured leather and leather products, building leather cluster near ports would reduce the transportation costs involved in product exports. Additionally most of the chemicals used from leather industry are imported so their hinterland travel cost can also be reduced by having leather cluster near ports. Input water for desalination process can also be taken directly from the sea. Kolkata/Bantala is a potential location for development of leather cluster as it can be connected to Haldia port and exports from Northern India and West Bengal can be clubbed to gain from economies of scale. Overall Haldia port could be developed as a key port for exporting leather footwear and

Project Description	Details
	goods from North India. Priority: Medium
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	A $4 billion leather and footwear cluster in Perambur can result in addition of 2 lac new jobs and INR 20k Cr earnings of foreign exchange

Port Connectivity

Project Description	Details
Name of the project	Rail connectivity between proposed Port at Sagar Island and Kashinagar Rail station.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/DPR, SPV formation, Bidding Stage, Contractor Finalization)	Cabinet approval received on 9/5/13 for development of Sagar Port with connectivity. Proposal for Land acquisition has been sent to the Government of West Bengal.
Project Proponent/implementing (e.g. State/Port/NHAI/APIIC etc.)	Kolkata Port Trust.
Project brief with priority (High, Medium, Low)	Rail connectivity between the Proposed port at Sagar Island and Kashinagar station to be constructed for movement of Import and export cargo. Priority: Medium

Project Description	Details
Justification of priority (e.g. High traffic numbers, connecting industrial area etc. with empirical data, if available)	. Total daily incoming and outgoing rakes are estimated to be 6 in the initial phase increasing to 36 over the master plan horizon.

Project Description	Details
Name of the project	Road connectivity between proposed Port at Sagar Island and Muriganga bridge & between Muriganga bridge and proposed Rail yard at Kashinagar.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics
Project Stage (Concept, Feasibility/DPR, SPV formation, Bidding Stage, Contractor Finalization)	Cabinet approval received on 9/5/13 for development of Sagar Port with connectivity. Proposal for Land acquisition has been sent to the Government of West Bengal.
Project Proponent/implementing (e.g. State/Port/NHAI/APIIC etc.)	Kolkata Port Trust.

Project brief with priority (High, Medium, Low)	Road connectivity between the port and bridge at River Muriganga & bridge to Rail yard at Kashinagar to be constructed before 2020 is critical for commissioning of the Sagar port. Priority: High
Justification of priority (e.g. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Based on the traffic forecast the total Passenger Car Equivalent (PCE/PCU) movement are estimated to be about 4,000 per day increasing to about 11,000 per day over the master plan horizon,

Project Description	**Details**
Name of the project	Construction of RoB cum Flyover at Ranichak level crossing at Kolkata Port, Kolkata, west Bengal
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	NHAI has decided to execute the project through existing SPV namely 'CHPRCL' through their letter dated 27-Aug-15. Subsequently, a letter has been received from KoPT dated 08th Sept 2015, stating that KoPT will act as assignee of SDC, till its formation in the existing SPV of NHAI.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NHAI
Project Brief with priority (High, Medium, Low)	RoB cum Flyover at Ranichak level crossing shall be constructed at Kolkata port for the smooth evacuation of Cargo. Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Trucks have to wait at Ranichak level crossing during the passage of rail creating traffic congestion.

Project Description	Details
Name of the project	Setting up of 2nd Railway Line from Durgachak take off point to 'A' cabin at Durgachak at HDC, Haldia.
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Feasibility Study Report (FR) & DPR has been prepared by Rail Vikash Nigam Limited (RVNL), earlier engaged by Indian Port Rail Corporation Limited (IPRCL),. In principle approval of Indian Railway for implementation of the Project has been obtained
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	(i) Kolkata Port Trust (KoPT), Haldia Dock Complex.
Project Brief with priority (High, Medium, Low)	i) Construction of a BG Track (second line) of length 2.50 KM, (from take off point to A Cabin) ii) Modification of the existing line of 2.50 KM (from take off point to A Cabin), iii) Modification of the existing line of 5.80 KM (from A Cabin to G Cabin), iv) Construction of a shunting neck (BG Track of length 1.2 KM, (near A Cabin) v) Signaling & Tele-communication : introduction of new and replacement of the existing, v) Overhead electrification on the new line as well as modification of the existing line, vi) Construction of Central Cabin, vii) Connectivity between HDC track and South Eastern Railway's (SER) Track at take off point at Durgachak.
Justification of priority (eg. High traffic numbers, connecting industrial	Congestion in the existing single line increasing the turn round time. KoPT has set up railway handling facilities for handling rail borne cargo

Project Description	Details
area etc. with empirical data, if available)	at Haldia Dock Complex as terminal agent of South Eastern Railway. There is a single line connecting the Durgachak Station of South Eastern Railway with the General Marshalling Yard of HDC. covering a stretch of 2.5 km. During the year 2014-15, about 22 million tonnes of rail borne cargo was handled at HDC. there has been an average movement of 35 rakes (inward and outward taken together) per day through the abovementioned single line connectivity. The rail borne cargo is projected to increase singificantly in the near future which may require average movement of 50 rakes per daybetween Durgachak Station and Genral Marshalling Yard of HDC. In keeping with the above, South Eastern Railway has requested KoPT to set up the 2nd railway line from Durgachak Station to A cabin of HDC. Besides, there is a necessity to modify the existing single line connectivity also to increase maximum permissible spped of the rakes to 50 kmph.

Project Description	Details
Name of the project	New Multi Modal Hub Development in North Bengal(Darjeeling)
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster	Hinterland connectivity and Multi-modal logistics

Project Description	Details
Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Setting up multimodal hubs at the right locations enables the overall transportation grid of the country to function efficiently and also reduce the cost and time taken to export from the country making the exporters competitive in the global market. There are certain locations in India which do not have multi-modal logistics hub making logistics inefficienct for the cargo generated in the region. Certain locations for multimodal hubs have been identified through the multi-model optimisation model where the total exim traffic at each container generating point in the country and the traffic required for daily service were analysed. These container generating points were superimposed on the existing multimodal hub network in the country to locate regions where containers have to travel long distances to reach an aggregation point. The presence of these ICDs

Project Description	Details
	reduces the distance that the commodities have totravel in order to be aggregated for formal transport. North Bengal (Darjeeling) is one of the locations identified for development of multi-modal logistics hub/ICD. It is estimated that a capacity of 1,20,000 TEUs would be required by 2020.
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	Development of ICD would result in reduction of transit time and cost for the cargo.

Project Description	Details
Name of the project	Improvement of existing road connecting Kolkata Port to NH6 and Kolkata Port to nearby Industrial Clusters
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources	Hinterland Connectivity and Multi Modal Logistics

Project Description	Details
j. International Cooperation k. Others	
Project Brief with priority (High, Medium, Low)	
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Project approved in principal by Chalrman KoPT. Detailed estimation underway.
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	Kolkata Port Trust
Project Brief with priority (High, Medium, Low)	Road Stretch I (Coal Dock Road) from Kolkata Port to Diamond Harbor via remount road (~2 Km) Road Stretch II (Sonarpur Road) from Kolkata Port to Hyde Road (~2 Km) Road Stretch III (Sonai Road) from Kolkata Port to Hyde Road (~2 Km) All three stretches to be implemented simultaneously Priority: High
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	There is High Container Traffic flow of 5.28 Lakh TEUs per annum from Kolkata Port towards NH6 using the three roads mentionbed above. The container freight numbers is estimated to grow upto 6.5 Lakh TEUs by 2020 meriting urgent concretization /modification of these three existing road. In addition these roads serve industrial clusters in the vicinity of the port.

Project Description	Details
Name of the project	Freight friendly expressway from Panagarh (Durgapur) to Haldia
Project category a. Sagarmala - New Green Field Ports, Port Modernisation, Port Led Development (including Dredging, breakwaters etc.) b. Hinterland Connectivity and Multi Modal Logistics c. Maritime Education, Training and Skill Development d. Maritime Financing & Cluster Development e. Inland Water Transportation, Coastal Shipping f. Shipbuilding, Ship Repair and Ship Breaking g. Opportunities in Maritime States h. Cruise Shipping and Light House Tourism i. Island Development and Aquatic Resources j. International Cooperation k. Others	Hinterland connectivity and Multi-modal logistics
Project Stage (Concept, Feasibility/ DPR, SPV formation, Bidding Stage, Contractor Finalisation)	Concept
Project Proponent/implementing (e.g., State/Port/NHAI/APIIC etc.)	NPP
Project Brief with priority (High, Medium, Low)	Due to the high freight charges on rail and first and last mile connectivity issues, rail movement in India is currently more economical than road only for a transportation distance beyond 1,000–1,300 km. This makes the north and northwest cluster (NCR,

Project Description	Details
	Punjab, Haryana, Uttaranchal, Uttar Pradesh, Rajasthan) the primary hinterland where rail becomes viable for inland container transportation. For most other routes connecting hinterlands to ports, road is the preffered mode due to lower cost.Road is economical compared to rail for distance up to 500-1000 km from the port and is convenient for the final exporters/importers as it provides delivery at the doorstep without additional handlings. Currently the condition of highway stretches is inconsistent. In addition the Indian coastline does not have a coastal road network. Dedicated freight roads/toll lanes are needed to improve road transit time from factory to port. Durgapur currently moves 76,000 TEUs annually to Kolkata/ Haldi and this traffic is estimated to increase to 1.7 lac TEUs by 2025. The route is mentioned below: ■ NH 2 From Panagarh to Dankuni ■ NH 6 from Dankuni to Kolaghat ■ NH 41 from Kolaghat to Haldia Considering the existing traffic and the estimated increase in future it is suggested that a frieght friendly corridor be developed between Durgapur and Haldia/Kolkata. The existing status of the stretch is

Project Description	Details
	mentioned below: ■ Enrire stretch has been 4 lanes NHAI has identified Kolkata Dhanbad as one of 7 experssway projects but feasibility to be revisited Panagarh Dankuni also identified as a 6 laning project under NHDP 6 Priotiy: ?
Justification of priority (eg. High traffic numbers, connecting industrial area etc. with empirical data, if available)	~1-2 days can be reduced in the transit time of containers by developing freight friendly corridor.