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Enhancing Port and Coastal Infrastructure A Primer on Potential Areas

3-4 April, 2018

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BACKGROUND NOTE

Enhancing Port and Coastal Infrastructure A Primer on Potential Areas

ABSTRACT

Port and coastal sector play a key role in a country's economic and social development. As sea-borne trade grows, the need for port modernization and development, efficient capacity utilization, technologies for ship building and repairing, and overall coastal infrastructure assume significance. A robust and well-conceived port and coastal infrastructure would act as a catalyst to promote economic activity in the coastal areas, contribute to growth of blue economy and expand the livelihood choices for the coastal communities. Against this backdrop, this note analyses the potential of SAGARMALA project for port-led development; investment opportunities in coastal areas; scope for promoting blue economy; maritime support infrastructure including containerization, bunkering and dredging; inland waterways; coastal shipping, ship repair, dry docks, and related regulatory issues.

Besides building hard infrastructure, the SAGARMALA project should focus on the "software" aspects, i.e. the regulatory environment required to support the projected growth of cargo. One policy that needs the government's attention is on 'cabotage' - or norms that govern plying of foreign ships on the coastal belt. Enabling the trans-shipment of containers through foreign-flagged vessels would encourage a modal shift from road and rail to coastal shipping. The note also provides an outline of the initiatives to develop inland waterways. For successful ship repair, the operations should be set up in favourable locations, and efficiency should be improved. Favourable taxation and duties for repair related services and ship parts, and appropriate infrastructure could also help.

Turning to the bunker industry (providing fuel to ships), it is found that facilities have to be located close to a busy port or within a busy trade route to increase volumes, as it will minimize the diversion for ships. Besides, a bunkering facility near the refinery can reduce transportation cost. Goods and Services Tax (GST) rate may be reduced to a minimal rate of 0.5 per cent for foreign-going ships for improving bunkering volumes. Among the wish list of reforms, the setting up of an Indian Bunker Industry Association, a National Standard Code of Practice for Bunkering, and prevention of monopoly of a single supplier may be given emphasis. It is equally important to address the challenges of environmental sustainability as shipping activity grows. With commercial shipping, naval and ocean space sectors set to drive technology in the maritime world. These sectors will have to be integrated to optimally use the Blue Economy through a suitable regulatory framework, technical standardization on a global scale, and cooperation between stakeholders. Besides, regulators must ensure that the green/efficient ships are more profitable than the ones with higher GHG emissions.

For better outcome, investment planning of ports and coastal infrastructure must go hand-in-hand with a policy structure that relaxes the cabotage rules to boost inward investment through FDI in port and vessel capacity; facilitates greener technology by making it easier and cheaper to adopt them; enables operational business models for ship repair and bunkering by helping entrepreneurs in site selection and getting clearances.

About the Author



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(View expressed here are personal.)

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A Primer on Potential Areas

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Port and Coastal Infrastructure

Introduction

India's 7,500 kilo metre-long coastline, its potentially navigable waterways length of 14,500 kilo metre as well as its strategically important geographical location on the crucial global maritime trade routes present a picture of huge potential. They can help attract fresh investments, generate employment, boost tax revenues and ensure that the country achieves the coveted double-digit economic growth in an inclusive and a sustainable manner.

While India's maritime transport is somewhat developed as is evidenced by the fact that 95 per cent of its trade by value and 70 per cent by volume are conducted through that mode, the sector faces several hurdles including those related to the need for better infrastructure and improved operational efficiency. Viewing these challenges as opportunities, the Centre conceptualized, and is taking forward the ambitious *Sagarmala* project – or a garland of ports -- on a mission mode for port-led development. By 2025, the *Sagarmala* aims to mobilize investment of around Rs 4 lakh crore (Rs 4 trillion) towards infrastructure building, and help save Rs 35,000 crore (Rs 0.35 trillion) per annum in terms of logistics cost, increase the share of water-borne transport in India's freight modal mix from 6 per cent to 12 per cent, increase exports by \$110 billion, as well as generate four million direct jobs and six million indirect jobs.

A related aspect garnering greater attention of the policy makers as an alternative development strategy is the concept of 'Blue Economy' – or the sustainable development of ocean and water body resources. Constituting the core of the 'Blue Economy' concept is the wide range of economic activities arising out of a well-planned port network, shipping and inland waterways transportation. The planned port-led development in a sustainable manner also aims to boost industrialization and the Centre's 'Make in India' initiative, and simultaneously help in improving the lives of coastal communities through skilling programmes as well as promotion of sectors such as coastal tourism and fisheries.

Ports have been playing a vital role in the Indian subcontinent since historical times. For instance, the port at Lothal in Gujarat was among the active centers of maritime activity since 3700 BCE, connecting the Lothal dock to the Sabarmati river and the hinterland on one side, and the Harappan civilization on the other. There were strong maritime trade linkages with other parts of the world and Indians demonstrated rich navigation skills. Its first navy was chartered by Chandragupta Maurya when he established an Admiralty Division in 325 BCE with a Charter including responsibility for navigation on the seas, oceans, lakes and rivers. The great Cholas ruled the waves from 984 to 1042 AD, with Rajendra Chola controlling even the Straits of Mallaca, the most important gateway to the Indian peninsula. Later, British contributed to maritime trade as

they used India as a base port for transporting the merchandise from India and its neighbourhood. Post independence, India further developed the ports making them Port Trusts controlled by the Board of Trustees.

Slow GDP growth in the initial years after Independence in India resulted in low imports and exports. The ports were therefore not a focus of development. The policy makers at that time felt that the building road and rail infrastructure was more urgent from the point of view of development of backward areas through sovereign investment via public sector undertakings. Even in the early 2000, when the country's economic growth gathered momentum, the ports were not considered as an important cog in the wheel as the growth was mainly on account of services and IT sectors.

However, as India became more prosperous, the rising middle class aspired for higher consumption of all goods. This led to higher imports for both consumption and manufacturing goods. Soon, the ports were seen as an important part of the country's infrastructure. They were then benchmarked with international port operating standards to interact smoothly with the foreign ship operators. India underscored the importance of modern port and an efficient customs regime. At the same time, in other parts of the world, PPP (Private-Public Participation), as a mode of attracting private investment and managerial prowess was becoming popular. India too, realising its budgetary constraints, embarked on the journey of PPP for modernising ports. The twelve major ports of India have over 70 PPP based projects for enhancing the cargo handling capacity of the ports. The PPP projects have their own share of difficulties arising from long-term contracts in a changing world. Nevertheless, they contributed to the port capacity and modernisation. The growing importance of port connectivity to the hinterland is being realised through road and rail projects in close coordination with the States and through PPP initiatives.

Globally also, ports have played a crucial role in development. "Ports create significant economic payoffs for their city and state – they help generate jobs, add value, mobilise new investment, bring tax revenues and support trade through reducing logistics costs. One tonne of port throughput is associated with a value addition of \$ 100, and 1 mn tonne increase in the port throughput is associated with 300 new jobs being created in the port region in the short- term," according to OECD. The success stories of ports supporting industrial growth include the Port of Rotterdam's petrochemical and refinery complex, steel cluster in Pohang and electronics cluster in Shenzhen. The archetypes models in port-led development broadly are energy-based, material based or discrete-manufacturing based. Strategically placed port infrastructure and port-led development with sovereign backing have ensured prosperity of many maritime nations and have been a successful GDP-multiplier. In India, currently, logistics costs are high, and multi-modal transportation has been an expensive exercise. There is increased congestion and pollution at the existing ports. The land pool available with the Major Ports (government-owned ports) has not been adequately and strategically aligned systematically with creation of port-based industries. India has a long way to go to match the prowess of the other leading countries in port-led development. A dynamic regulatory environment must underpin the physical part of logistics. Laws must be modernized and archaic regulations need updating to face the changes in procedures and technology. Federal and provincial policies must be integrated to ensure seamless movement of cargo. Coastal policies such as the cabotage must face the realities and act as a facilitator for trade.

SAGARMALA and Port-led Development

The potential of Indian Ports is obvious from the following picture. It also explains the trans-literal meaning of *Sagarmala* - a 'garland of ports'.



Understandably, port-led development is the central to the *Sagarmala* strategy. The selection of projects under the *Sagarmala* will be from the four thrust areas given below (See Box 1).

Box 1: Four Pillars of SAGARMALA

1. Port Modernization.

- Port efficiency improvement
- 40+ efficiency-enhancing projects at major ports
- 6-8 new ports

2. Port Connectivity

- Coastal and inland waterways projects
- Port and industrial connectivity-7 dry ports and 80 connectivity projects

3. Port-led Industrialization

- 14 Coastal Economic Zones
- 12 high potential industries (across energy, materials and discrete manufacturing)

4. Coastal Community Development

- Skill Development
- Uplifting fishermen and other local communities
- Island Development

Indian ports have some inherent capacity restrictions and misdue to the draft available to handle modern and larger ships. The average size of the vessel calling at Indian ports is 5000-6000 TEU (Twenty ton equivalent, a unit to measure the size of a container), while at the Chinese ports the average size is over 12000 TEUs. The Ports are not physically equipped to handle large

trans-shipments and consequently over 90 per cent of India-bound cargo is trans-shipped from Sri Lanka, Singapore or Dubai. Regulatory policies are also to blame for such large leakages of Indian business to foreign ports. *Sagarmala* project has been designed to address some of these concerns. Four strategies have been identified under the project. They include reducing the time/cost of transporting domestic cargo through optimizing modal mix, optimizing cost of EXIM container movement, lowering logistics cost of bulk commodities by locating future industrial capacities near the coast, and improving export competitiveness by developing port proximate discrete manufacturing clusters.

Among the focus areas is huge cargo growth through the coastal shipping of bulk commodities. Indian ports handled about a 1050 MTPA (million metric tonnes per annum) in 2014-15. By 2025, the volume is expected to be 2500 MTPA. In 2014 composition of cargo (in MTPA) was POL (351), Coal (231), Containers (115) and others (275); adding up to a total of 972 MTPA. It is estimated that by 2025, POL (540), Coal (978), Containers (375), and others (607), would together account for 2500 MTPA. In order to handle double the amount of cargo within the next seven years, the capacity of port would have to be enhanced through greater efficiency, mechanization and reactivation of the dormant coastal terminals, as well as setting up of new ports and terminals. The non-major ports (state government or privately owned) would also need efficiency enhancements. The capacity enhancement plans envisaged in the *Sagarmala* project are shown in Table 2.

Table 2: Capacity Enhancement Plans at the Major Ports under the Sagarmala Project

Name	Existing Capacity MTPA	Ongoing	Additions in <i>Sagarmala</i>	Capacity MTPA
Kandla	121.4	24.5	55	185.9
Mumbai	44.5	29.5	4.0	48.5
JNPT	79.4	60.0	45	124.4
Marmagao	43.8	0	35	78.8
Kamarajar/Ennore	37	42	3	82
Chennai	86	0	12	98
VO Chidambarnar	44.6	38.9	30.5	75.2
New Mangalore	77.8	6.7	5.5	90
Cochin	49.7	4.1	2	51.7
Vishakhapatnam	96.8	38.8	8	143.5
Paradip	119.8	65.6	10	195.4
Kolkata	70.9	10.8	12	82.9
Total	871.5	320.9	222.1	1414.5

Source: IPA

The *Sagarmala* project envisions connectivity improvement. Capacity and length of several pipeline projects have been planned as these can handle liquid imports and exports at 15 per cent cost savings as against the same through the railway mode. The project basically recognizes the importance of national waterways as a mode of transporting goods to the ports from hinterland. China has successfully built such capacity by connecting Yangtze River basin to Shanghai. To be able to undertake development of national waterways as a cheaper mode of cargo transportation, the Indian Government has declared 111 rivers as national waterways.

The project also takes into account the huge cargo-carrying network of Indian Railways. However, despite huge investments in railways, cargo evacuation still poses a problem. Congestion of rail lines, used for cargo and passenger movement, needs to be resolved. Doubling the rail lines and last mile connectivity are also vital. The Ministry of Shipping has set up a Port Railway Company to alleviate problems faced by ports in last mile evacuation. As part of the plan, the east and west freight corridor development has also been fast-tracked. Besides, an equally ambitious *Bharatmala* (garland of roads) project, separately being executed through the Ministry of Roads Transport and Highways, would help in joining various ports and provide the much needed last mile connectivity to the national highways.

Port-led industrialization would also boost the 'Make In India' initiative, which is the third pillar of the Sagarmala project. Coastal Economic Zones (CEZ) have been carved out to promote establishment of industry cluster around ports. Twelve types of industries covering energy, goods and others have been identified on the basis of their potential to boost water transport. Locations for these industries have been mapped in details from the point of view of logistics efficiency. A total of 14 CEZs have been mapped along the entire coastline based on their suitability and proximity to both major and minor ports. Industry clusters within the CEZs are generally a combination of energy, bulk goods or discrete goods such as food processing, automotive, electronics, apparel, leather products, footwear and furniture. Achieving the well being of the coastal district residents -- accounting for a fifth of India's population -- is an important goal of the *Sagarmala* program. A Community Development Fund could be set up for this purpose to fund projects for employment generation, value addition, and skill development of the coastal communities.

Blue Economy

Ocean resources have immense potential to contribute to economic growth and development. Fisheries, minerals, rare earth metals, coral reefs and other marine living and non-living resources are vital for human life and opens scope for various industrial applications. Blue economy (a broader terminology used for marine economy or coastal economy) is increasingly receiving greater attention among the governments, policy makers and people worldwide as an alternative development strategy. Oceans are the most important route for trade and commerce among countries for centuries. Port and shipping in that sense is a core sector of blue economy. A well-planned network of ports nationally and regionally would boost trade among countries and boost economic activity in the country/region. Investment in ports is therefore necessary to develop modern port terminals, cargo handling facilities, and so on. SAGARMALA as discussed above is a novel step in that direction to enable India and other coastal nations in the Indian Ocean region to benefit from the huge potential existing in blue economy for diversification of occupations and economic opportunities. Marine industries need to be promoted through investments in which the port and shipping infrastructure would be a key enabler. With dedicated budgets and plans, a investment in costal economic zones, coastal employment zones, hotels, connectivity infrastructure in the coastal areas, blue economy can be a driver of growth and development in India.

Cabotage Policy

While the *Sagarmala* plan is mainly an intensive exercise to build the infrastructure that can be termed as the "hardware"; there has to be a clear focus on the "software", i.e. the regulatory environment required to support the projected growth of cargo. The cargo projected for 2025 in the Perspective Plan assumes that there will be a natural growth of cargo as well as an increase

of cargo due to enhanced “ease of doing business” -- i.e. easier norms for inward investment in coastal vessels, as well as rationalisation of the Merchant Shipping Act 1958 and the Indian Ports Act 1908. One such policy that may need the attention of the Government is the policy governing plying of foreign ships on the coastal belt -- known as the “cabotage”.

The term ‘cabotage’ refers to the policy of ‘reserving coastal trade for national flag vessels’. In India’s context, the primary objective of having a cabotage policy is to support Indian tonnage, protect Indian shipping, as well as provide training and employment opportunities to Indian Seafarers. Foreign flag vessels however can take license from the Directorate General of Shipping, Government of India for coastal trade, subject to NoC from the Indian National Ship-owners’ Association (INSA).

Case Against Cabotage Relaxation

Cabotage restrictions are applicable in most countries to protect the domestic shipping industry from foreign competition as well as for the purpose of national security. China and USA are known to impose absolute cabotage restrictions. The objective behind such a restriction is prevention of unfair competition from foreign flag vessels, because the operational cost of Indian vessels is estimated to be higher than that of foreign vessels due to duties and taxes on bunker fuel, income tax on seafarer’s income, and other taxes paid by Indian flag vessels.

However, to make Indian vessels more affordable to operate and strengthen coastal shipping in India, the Government of India has exempted Customs and Excise Duty leviable on specified bunker fuels (fuel used by the ship) used in Indian flag vessels for transportation of EXIM and empty containers between two or more ports in India. In the Union Budget 2015-16, service tax abatement rate for transportation of goods in sea vessels was raised from 60 per cent to 70 per cent. Another reason for imposing such a cabotage restriction is that the INSA member lines are already in the business of transporting EXIM and empty containers (during the return from the destination) along the coast. Relaxing cabotage restriction would affect viability of Indian Shipping companies and hurt the growth of Indian tonnage.

The case for cabotage restriction is also that the provision of NoC is always available to foreign shipping lines, when there is no Indian flag tonnage. It is also argued that the relaxation for ICTT Vallarpadam has not resulted in any positive impact. Also, there would be National Security considerations especially in situations such as a war. Besides, in spite of 100 per cent FDI allowed in shipping, no foreign shipping line is flagging their ships in India.

Case for Cabotage Relaxation

Over 70 per cent of Indian cargo is being transshipped through Colombo, Singapore and Jebel Ali Ports due to high port charges and slow moving customs. The operating cost of Indian flag vessels is around 35-40 per cent higher than foreign flag vessels. If the cabotage restriction is removed, then the logistics costs for end customer would be at least 40-45 per cent cheaper on the sea leg of the transport, and than, the transshipments are expected to shift from Colombo to Indian Ports.

The reduced freight in turn would help shift EXIM cargo from Roadways to waterways (The logistics sector has so far been dominated by road and rail transport, despite water transport being fuel-efficient, cost-effective and environment-friendly). The trans-shipment at Indian ports due to cabotage relaxation would enhance port revenue even as the relaxation would also encourage containerized trade while discouraging monopoly by Indian flag vessels. In addition, the relaxation would improve efficiency of container movement (particularly empties); with ports capable of

handling large vessels (6000 TEUs) will act as hub ports while the other ports will act as feeder ports and large vessel calls would reduce Terminal Handling Charges (THC).

Cabotage has been relaxed from time to time in the past. The Central Government had decided to ease cabotage for special vessels such as Roll-On Roll-Off (Ro-Ro), Hybrid Roll-On Roll-Off (Hybrid Ro-Ro), Roll-On Roll-Off cum Passenger (Ro-Pax), Pure Car Carriers, Pure Car and Truck Carriers, LNG vessels and Over-Dimensional cargo or Project Cargo Carriers for a period of five years on 14 September 2015. The Government has also relaxed cabotage restrictions for ports which tranship at least 50 per cent of the container handled by them. The cabotage relaxation would enable shipping lines to consolidate Indian EXIM and empty containers at trans-shipment ports in India for onward transportation to destination ports by main shipping lines. Several States (Gujarat and Kerala), Ports (Vizag, Krishnapatnam and Adani), Ministries (Textiles and Commerce) and Industry Associations (CSLA) have demanded cabotage relaxation.

International Experience

Historically, cabotage restrictions were justified by the need to preserve security, to avoid shipping shortages in case of conflict, when the lack of access to foreign carriers could leave the military without adequate means for moving men and material to the war zone. From this point of view, cabotage restrictions aimed at ensuring that local shipping companies carry locally generated cargo to protect local waterways and ensure strategic deliveries and shipments. Maintaining national merchant fleets is another important motivation for cabotage restriction. It is often argued that maintaining a national fleet may reduce the adverse impact of freight expenditures on the balance of payments. It can also contribute to ensure economic growth and social well-being by developing local capacity in several segments of the maritime transport value chain, particularly shipbuilding and repair, ship ownership, registration, operation and seafarers.

Facilitating international trade in a predictable and stable environment is another reason cited for restricting the entry of foreign service providers for cabotage services. This is particularly relevant for locations that rely on shipping of goods and passengers such as remote islands. In this case, services offered may be insufficient if the shipping is left in the hands of unpredictable and volatile free market. The position of domestic constituencies (supporting cabotage restrictions) in national debates on possible relaxation of cabotage regimes suggests that the rationale for many cabotage regulations today is labour interests and the need to protect local industries from foreign competition.

Different flags lead to different requirements for manning levels and minimum wages, as well as to different taxation levels and related regimes. For instance, concerns voiced over the relaxation of cabotage regulation in some countries where related to the fact that increasing competition among transport operators may cause reduction in the operating costs by changing employment practices, thus weakening labour and safety standards for seafarers.

China, Brazil and India have succeeded in developing their shipping supply-side capacity; thanks to cabotage regimes. However, maritime cabotage regimes may not be the sole element explaining the success of the expansion of supply-side capacity. For example, in the case of China and India, infrastructure investment projects and programs focused on training and other incentives have contributed to this objective. In the case of Brazil (*and other countries in Latin America*), Wilmsmeier (2014) suggested that cabotage restrictions may have induced an evolution in the services structures leading global carriers to “convert” regional shipping

lines into regional feeder operators (to overcome existing cabotage restrictions) and to increase supply-side capacity while at the same time, reducing effective competition.

The impact on competition was also highlighted by a study (World Bank, 2014) which considered the link between cabotage restrictions in the *Philippines* and the oligopolistic shipping market structure which led to high shipping costs and low quality of service. In Nigeria, the Coastal and Inland Shipping (Cabotage) Act was passed in 2003 and its objective was to reserve commercial transportation of goods and services within Nigerian coastal and inland water to vessels registered in Nigeria and owned by Nigerians. Its objectives included stimulating and protecting national shipping companies, increasing national ship ownership and promoting training of Nigerians in maritime transport technology and as seafarers. There is a wide consensus that the Act has not achieved its objectives. Since its implementation, shipping activities by national ship-owners have declined. Foreign-owned and foreign-crewed vessels still dominate services and commercial operations of carriage of goods and passengers in the inland and coastal waters of Nigeria. In addition, there is a shortage of trained sailors, making it impossible to comply with provisions on local employment. However, different studies, such Akodu, Bisi *et al.* (2015), Bello Olowookere, Ganiyu (2011) and Okeke, V.O.S. *et al* (2012), suggest that this situation could derive from incomplete implementation of Government policies and that this, in turn, relates to two main reasons.

The cases of the EU and of New Zealand provide interesting insights into the impact of relaxing maritime cabotage regimes with regard to market developments, including changes on market shares by local companies, prices, frequency and quality of services. Both regimes were relaxed in the 1990s. A 2014 report by the European Commission examined developments between 2001 and 2010 in the European cabotage market, which encompasses EU and EFTA members. The main findings of this report are: (i) abolishing maritime cabotage market access barriers did not seem to have led to a significant increase in the number of ship-owners interested in providing cabotage services; (ii) vessels flying non-national flags for cabotage of goods increased; (iii) cargo volumes remained generally stable during the period (except for the crisis years), with some countries recording increased cargo volumes; (iv) cabotage liberalisation have had a positive impact in terms of modernisation of national fleets under pressure of wider competition and in improving the quality of services offer.

New Zealand adopted maritime cabotage liberalization in 1994, through its Maritime Transport Act. Cavana (2004) and Liu (2009) analyzed the impact of this change in the cabotage regulation of New Zealand and found that: (i) the impact of liberalization was greater in the container shipping sector and particularly in the carriage of domestic containers between the North and South Islands; (ii) due to the extra competition and improved carrier utilization capacity by the international ship operators, freight rates dropped fairly quickly in the period immediately following liberalization, and stabilized to some extent since that time; (iii) Cavana (2004) estimated the fall in coastal freight rates at around 20-25 per cent between 1994 and 2000. He also found instances where freight rates for containers and freight travelling from the North to the South Island dropped by up to 50 per cent, (iv) following liberalization, international carriers secured a share of approximately 10-15 per cent of the domestic coastal container market. It appears that domestic carriers were able to retain the vast majority of the market but, in order to do so, they had to reduce freight rates substantially; (v) Cavana also found instances where some domestic shipping operators saw increase in their coastal shipping business activities; (vi) the number of commercial vessels permanently deployed on coastal routes in New Zealand

remained largely unchanged in the six years since the act came into force. The only sector where there was a decline in the number of vessels deployed was the liquid bulk sector, but this decline was found to be unrelated to competition from foreign operators; (vii) the volume of general (and containerized) cargoes shipped around New Zealand coasts increased by about 5 per cent p.a. between 1995 and 2004. The paper also reported a case where volumes shipped increased by about 100 per cent for one major domestic coastal ship operator; (viii) liberalization led to an intensified competition for domestic cargoes between coastal shipping, rail and road and a significant increase in the frequency of services between the major ports of the South and North Islands of New Zealand.

A country's ability to connect to global and regional transport networks is a key determinant of its integration in global supply chains and of shipping costs – a factor that is critical to ensure price competitiveness and success in maintaining export market shares. Maritime transport connectivity is about the nature of maritime connections, including aspects such as the number of regular maritime services, their frequency and reliability. Improved liner shipping connectivity can help reduce trade costs and has a direct and positive bearing on trade volumes. By effectively excluding foreigners from entering the market and treating foreign maritime service providers less favourably than domestic ones, maritime cabotage restrictions restrain competition. Lack of competition can result in increased costs as they would force carriers to resort to tranship cargoes in third countries or using domestic feeder services that are more expensive, implying added operational costs for shippers and thus, negatively affecting trade. Limited quality of logistics services provided and weak links in global trade lanes can, in turn, have a negative impact on the efficiency in supply chains and connectivity.

The United States Merchant Marine Act of 1920 (Jones Act) is the most restrictive example of cabotage laws. A report published by the US International Trade Commission (2002), estimated the annual economic gain from repealing the act to the residents of Puerto Rico, Alaska and Hawaii to be between \$ 5 billion to \$ 15 billion (in current-value dollars). A study by Justin Lewis found coastal water transport in the US would be about 60 per cent cheaper, and that consumers using these services would stand to gain over \$500 million annually, by relaxing or eliminating the Jones Act. The alternative to using international shipping services for relay in the US is typically to move goods via land. Estimates suggest that more than 500,000 qualifying containers moved over highway and rail in 2012. If these containers were allowed to stay on the water and tranship in international liner services, the economic benefit to supply chain participants - shippers, carriers and consumers - could have exceeded \$200 million.

Panteia (2015) examined the impact of several maritime cabotage regimes with regard to the international competitiveness of the EU marine transport sector, as part of a study commissioned by the European Commission to review the EU maritime transport strategy. The inability of foreign flagged vessels from moving domestic cargo within two ports of the same country resulted in cargo being carried in a less efficient way to the port of final destination and thus increased costs. Cabotage restrictions required shipping companies to hire national services at less competitive rates, and this, in turn, affected feeding and relay operations.

Cabotage restrictions can be a source of inefficiencies for carriers because they raise costs and limit the quality of the services provided. In contrast, improving linkages between domestic freight transport and international freight transport can contribute, through feeder operations, in generating cargo volumes and thus reducing trade costs. The operation of foreign service providers in cabotage domestic markets can bring benefits with regard to certain types and

quantities of cargo (mostly containerized cargo). For instance, the use of larger and more advanced foreign-flagged vessels can reduce costs by taking advantage of economies of scale and cargo optimization. Allowing the shipment of domestic cargo in the domestic leg of an international vessel with spare capacity (due to imbalanced trade) could be affordable than shipping them on smaller ships that lack scale and transferring them to an international ship. Similarly, export and import cargo can benefit from economies of scale by avoiding unnecessary cargo transfers from a domestic vessel to an international vessel. From the connectivity perspective, this means that relaxation of cabotage regimes can facilitate connections to feeder ports, which in turn, can mean increased access to trans-shipment hubs.

The effect of relaxing cabotage regulations on enhancing the trans-shipment potential of domestic ports and therefore improving connectivity can be illustrated by the case of Uruguay and Sri Lanka. In the Uruguay case, Argentina, Brazil and Uruguay are served by the same lines. Although a much smaller economy, Uruguay is accommodating the same services, not only for its own imports and exports, but also for transit cargo from Paraguay and for trans-shipment services into Argentina and Brazil, where cabotage restrictions limit trans-shipment potential of national ports. Malaysia removed its cabotage policy for Sabah and Sarawak on 1 June 2017. The belief that maritime cabotage policy had restricted transport options, resulted in a monopolized shipping industry, and increased the cost of consumer goods motivated this change. Indeed, goods exported from Eastern Malaysia were left in transit for prolonged periods because vessels travelling out of Eastern Malaysia were unable to carry a full load. Consequently, manufacturers in Eastern Malaysia lost their ability to compete successfully in the market. By the time their goods arrived at the port of discharge, the prices of those goods were no longer competitive. The delay and issue of vessel frequency also resulted in increased port charges and a risk of cargo theft. Additionally, goods transported from peninsular Malaysia to Eastern Malaysia passed through a long supply chain before being discharged, resulting in increased freight costs. The lifting of cabotage laws is expected to make Eastern Malaysian ports more accessible, increasing trading activities and attracting more container traffic routes going through the Straits of Malacca.

Increased seaborne trade resulting from the recent Chinese economic boom had prompted several countries in Asia to compete for trans-shipment. Since 2013 China has gradually relaxed its maritime cabotage restrictions within the Shanghai free trade area in a bid to promote the area and boost the trans-shipment volumes of Shanghai. As a result, foreign registered vessels may now carry containers between Shanghai and other Chinese ports; although vessels must still have Chinese owners. Previously the formal position was that this could only be done by Chinese-owned and -flagged vessels, thereby preventing the use of, among others, foreign flagged ships of the China Ocean Shipping (Group) Company and China Shipping Container Lines. This recent change has raised concerns about Hong Kong (China), owing to its decreasing throughput and connectivity. The case of Sri Lanka is interesting as it has outgrown its larger neighbours. Colombo accommodates large container ships which are deployed on services between Asia and Europe, as well as on some services to Africa and South America. Feeding from Colombo to ports in India can be done with ships under any flag, as these services are not affected by the Indian cabotage restrictions.

Of late, several countries have relaxed their cabotage regimes as part of broader strategies to increase competitiveness, improve connectivity and adapt to the emerging trends. In India, cabotage regime was changed recently in the context of broader reforms to improve logistics for trade and competitiveness, reducing costs. The Government has relaxed cabotage restrictions

for specialized vessels, which are short in supply. In this case, enabling the trans-shipment of containers through foreign flagged vessels would encourage a modal shift from road and rail to coastal shipping.

Waterways Development

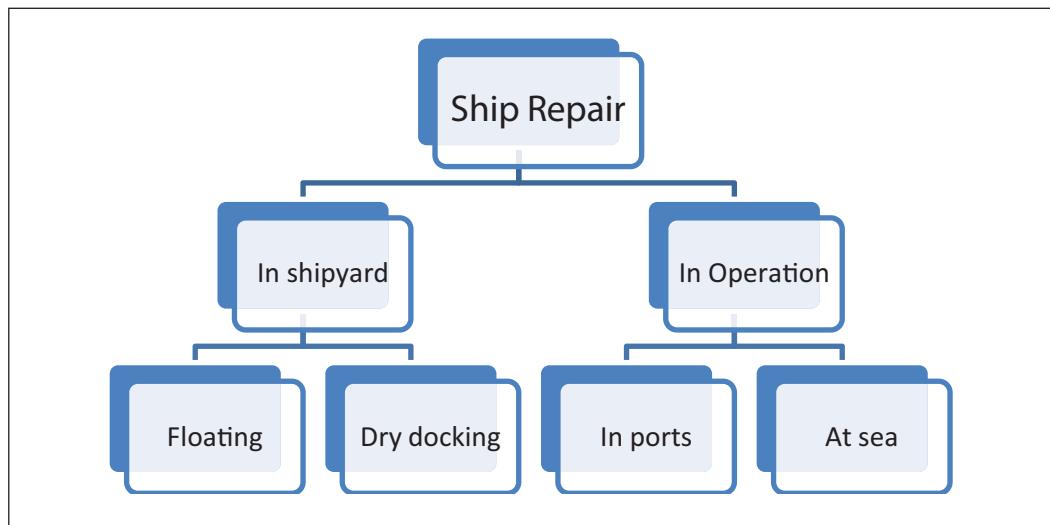
Waterways are a cost-effective mode for transportation of hinterland cargo to and away from the ports. The Government has embarked upon the sectoral growth of waterways in a big way. The number of National Waterways has been increased from a mere five to hundred and eleven by a parliamentary decree. This entitles the Central Government to develop and invest funds in these waterways. The World Bank has granted a loan for developing the National Waterway 1, i.e. the Ganges. There is the Indo Bangladesh Protocol (IBP), commonly called Inland Water Transit and Trade Protocol between India and Bangladesh which was established in 2009. The two countries are expected to make arrangements for use of water transport to their mutual commercial benefit. Its key features include 'conservancy and pilotage' where each country will maintain the river routes in its territory in a navigable condition. Both the nations would provide the essential pilotage and conservancy services, including hydrographic surveys and supply of charts for commercial navigational use to inland water transport operators, and aid to night navigation where facilities for such navigation already exist. The IBP route will have the following specific inland water routes: (i) Kolkata-Silghat-Kolkata (about 1720 km one way); (ii) Kolkata-Karimganj-Kolkata (about 1318 km one way); (iii) Silghat-Karimganj-Silghat (about 1416 km one way); (iv) Dhulian-Rajshahi-Dhulian (about 78 km one way). The new investment opportunities include those on the National Waterway 2 -- i.e. the Brahmaputra River, where a multi-modal logistic hub is being planned at Jogighopa, along NH-31 and approximately three km from Railway siding at Jogighopa. A well-integrated multimodal transport system encompassing road-rail-waterway network would increase the logistic efficiency of North-East India. Besides, the Government of India is implementing Jal Marg Vikas Project for capacity augmentation of NW-1 which entails various sub-projects such as development of multimodal terminals at Varanasi, Sahibganj and Haldia, fairway development with smart navigational aids to facilitate the movement of 1500-2000 ton vessels on NW-1.

Ship Repair

All ships and offshore platforms undergo scheduled and unscheduled repair and maintenance during their lifecycle. The ship repair industry is closely linked to the ship building industry and requires capital intensive investment in dry-docks, skilled labour and specialized equipment. Every ship is mandated to have a planned maintenance system (PMS). The PMS along with the regulatory requirements define surveys for the asset in terms of annual, intermediate and special surveys. Each survey has a well-defined list of the ship parts and equipment, which are tested, checked or overhauled. Generally, ships under 15 years of age are required to be dry-docked once in every five years and the frequency increases to twice in five years for ships beyond 15 years in age. The requirements get stricter for aging ships. A ship is only required to be dry-docked for repair of underwater parts and painting of the hull. These statutory tasks are classified under Scheduled repairs (see Chart below). The costs of these repairs are borne by the ship owners or charterers based on the charter type.

Unscheduled repairs are often damage related to (fire, collision, grounding, unexpected failure of machinery or poor workmanship during construction) or necessitated by deteriorating

performance. For these repairs, the expenses are shared among insurance companies, ship owners/charterers and equipment manufacturers based on the repair. The third type of ship repair is related to conversions. In order to comply with the changing regulations, business requirements or increase life cycle, ships also undergo modernization and upgrades/conversions. These are planned and generally longer in duration.

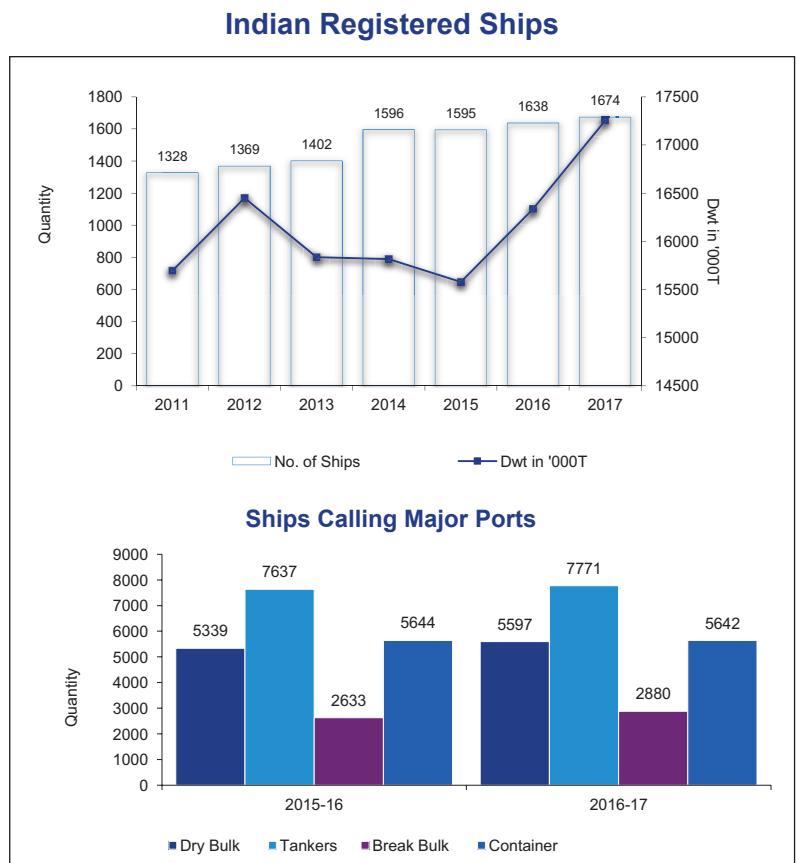


The repair process of a ship is an expensive event in the ship's life cycle. During the Ship repair process, the ship is off-hire, but its expenses for hiring of crew, finance costs, insurance are ongoing. The cash outflow during the ship repair is burden on the ship owner especially in the present economic condition where the charter rates for various cargoes are subdued. Hence globally, the ship repair jobs are undertaken with a highly competitive bidding process and the tasks are performed under relatively short deadlines. It benefits the ship owner and the shipyards to improve their utilization.

For a ship repair facility to be successful, they should have the following key success factors. (a) Favourable location: This relates to the proximity to an important trade route which will reduce the fuel and off hire time of the ship; (b) cost effectiveness: (i) ship repair tasks are mainly manual and labour intensive. So low labour cost is an advantage. (ii) availability of OEMs' inventory and service centers reduce overhaul cost of the major machineries. (iii) favourable taxation and duties for repair related services and ship parts in transit, (c) Quick Turnaround time: (i) reduces off-hire period for the ship owners; (ii) increases dock utilization of the shipyard- this requires project management skills and planning to achieve system optimization high level efficiencies, and (d) Appropriate infrastructure: (i) dry docks and floating docks of appropriate size, (ii) availability of high capacity cranes, and (iii) wet basins with sufficient draft for carrying out floating repairs.

The following graph shows the growth of Indian registered ships in terms of quantity and deadweight. The deadweight of Indian fleet is forecasted to grow to 37Mn DWT Tonnes in 2030 from the existing 17.25Mn DWT tonnes.

Inland waterways development and coastal transportation promotion through *Sagarmala* will increase the Indian fleet of inland and coastal ships. These ships will provide resident demand for domestic repair facilities. Additionally, there are over 21,000 ship calls to Major Indian ports annually with India located along the Mediterranean trade route that constitutes of approximately 7-9 per cent of the global trade. Indian ship repair facilities can use the location advantage to



attract a share of these ships for repair. There are many ship repair specialized shipyards catering to the ships operating in Mediterranean trade route. Dubai Dry docks, Colombo Dockyard, Vinashin shipyards (Vietnam) and shipyards in Singapore (Keppel, Sembwang, ASL etc) cater to large size tankers and bulk carriers. In the last decade, ship repair facilities in Oman, Qatar & Bahrain could capture some market share from South-East Asia. Indian ship owners having large ships (>20,000T Dwt) have been consistently favouring foreign ship repair facilities over Indian shipyards due to lack of cost competitiveness and high turnaround time. An average special survey repair in Indian shipyards takes approximately 33 days compared to 14-18 days in the global competitors¹. Factoring the additional days of voyage to the competitor, the ship owner loses 10 days of chartering revenue by docking in Indian shipyards. A ship repair facility requires a large dry dock or floating dry dock. Dry docks greater than 200m in length and 32.5m in breadth are required at minimum to handle handymaxes and panamax sized ships. Ships less than 10,000 dwt can be towed up a slipway using a powerful winch. Following are the major ship repair facilities in India (See Table 3).

Table 3: Ship Repair Facility in India

Name of the Shipyard	Dock Type	Dock Size (length)
Reliance Defence & Engineering Limited (RDEL)	Dry Dock	600 m
Cochin Shipyard Ltd.	Dry Dock	270 m x 45 m
Sembmarine	Floating Dry dock	200 m x 32.2 m
Lavgan, Chowgule	Ship Lift	116 m x 26 m

Note: Facilities of ABG shipyard & Bharti are not included as they are non- operational. L&T shipyard is focusing on naval orders only.

Some of the major ports have dry docking facilities which are rented out to ship owners or ship repair contractors on the daily basis to carry out the tasks. Following are the large sized dry docks available in Major Ports (See Table 4).

Table 4: Dry Docks in Major Ports

Name of Major Port	Dock Type	Dock Size (length)
Kandla Port Trust	Floating dock	95 m x 20 m
Kolkata Port Trust	Dry Dock No. 1 & 2	172 m x 22.8 m
	Kidderpore Dry Dock No. 1	160 m x 19.5 m
	Kidderpore Dry Dock No. 2	143 m x 19.5 m
	Kidderpore Dry Dock No. 3	102 m x 14.6 m
Mumbai Port Trust	Hughes Dry Dock	170 m x 30 m
Paradip Port Trust	Dry Dock	75 m x 15 m
Visakhapatnam Port Trust	Dry Dock	120 m x 19 m

Note: Floating dry dock in Mormugao has partially sunk.

From the above infrastructure, only three shipyards are capable of repairing handymaxes. The RDEL facility is dedicated for naval ship building, so there is only one ship repair facility each in the west and east coast. Infrastructure for ship repair is limited and needs to be increased to support large sized ships. There are a few small repair yards (e.g. VijaiMarine, Mandovi, Dempo, Modest) on the west coast.

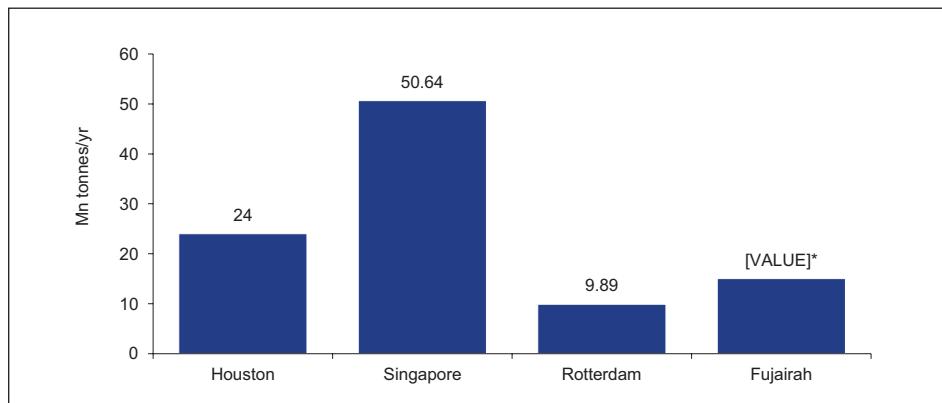
Revenues from ship repair (commercial and defense vessels) at commercial yards in India amounted to INR 750 crore in 2015, while in the short term there is a potential to fetch INR 2,500 crore. In order to enable the growth of the ship repair industry, major ports have to invest in upgrading their existing dry docks to a larger size with adequate crane facility and workshops (piping, steel cutting & M/C). The ports can undertake a concession agreement where the facility is leased out to the ship repair contractors for an annual fee. This would enable international ships to avail such a facility in case of quick unscheduled and schedule repair. Also, a maritime cluster dedicated to ship repair -- which enables a strong presence of global OEMs and ancillary support to produce inventory of parts for the OEMs -- is required. Presence of classification societies in the cluster will minimize delay in surveys and certifications. Besides, the government should implement a policy for all Indian Registered ship operating on Indian coast to provide Indian ship repair facilities with the Right of First Refusal or Right to match options. As part of maritime cluster development, practical training centres in ship repair and ship building will have to be opened to enhance skill-sets of workers. In addition, there should be Reduced Port dues for ships calling ship repair facilities within port limits. Also, exemption of customs and excise duties on ship parts needs to be given for domestic ship repair for at least 3-5 years.

Bunkering

The bunker industry refers to the supply chain segment that provides fuel to ships. The target market segment is ships that may ply in coastal waters or ocean going. The fuel ranges from residual fuel oil of 180 Cst or 380 Cst to diesel or gas oil grades. The popular bunkering ports are located not in oil-producing countries but in ports of other countries, that are located adjacent to busy shipping lanes. These ports, over decades, have developed as very cost and time efficient in

bunkering operations. The main bunkering ports are Singapore, Fujairah, Rotterdam and Houston, which together represent approximately 25 per cent of global bunker volumes (See Chart below). The average bunker prices of these ports are also used as an index for comparison – “Global 4 ports average”.

Bunkering Volumes (2017)



Note: Fujairah volumes are forecast

In India, average monthly bunkering volumes are 150,000T. India's main competitor is Colombo where average monthly bunkering volumes are 55,000T. Last year, the bunkering industry faced a minor disruption when 18 per cent GST was introduced. But it was then cut to 5 per cent on 6 October 2017. Bunkering trade in Indian ports caters mostly to coastal shipping, government vessels and small quantities to foreign flagged vessels. The bunkering ports in India are Kochi, Mumbai, Gujarat ports and a few other ports. The bunkering of ships generally occur at anchorage in order to save berth dues and other port related charges at berth. Bunker barges load their tanks from the shore storage tanks and deliver to the ships at the anchorage. To increase bunkering volumes, the bunkering facility has to be located close to a busy port or within a busy trade route, which would minimize the diversion for the ships. The price of the bunkers with respect to MOPS (Mean of Platts Singapore) is the next key deciding factor for ships to choose the bunkering locations.

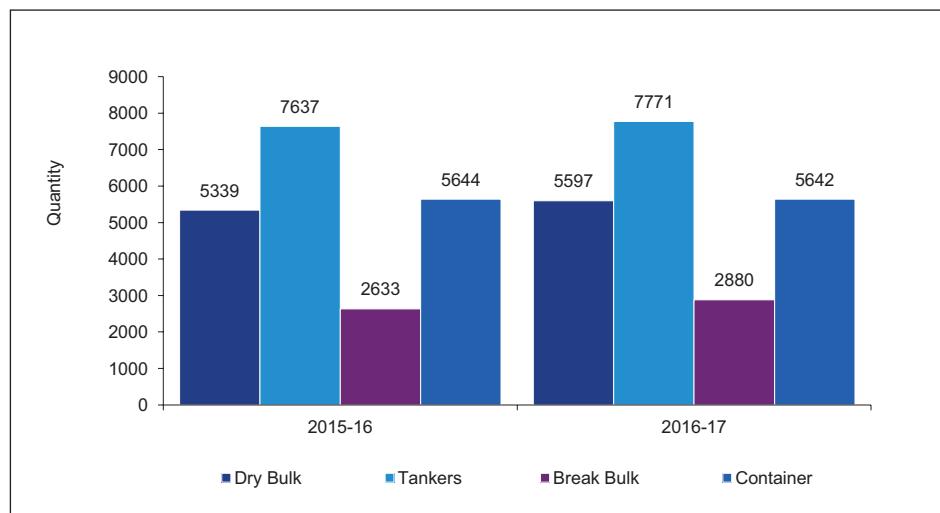
Bunkering cost is the sum of bunker cost, duties and/or taxes, transport cost, storage and barging cost. Bunker costs in Mumbai are at a premium to that in Singapore but similar to that in Colombo. Bunkering requires infrastructure including storage tanks (heated), pipeline till terminal, jetty with mooring dolphins and coastal barges – (1500T – 2000T DWT; RSV 1). The bunkering business requires management of the price risks which is a combination of international crude prices, the foreign exchange rates and local factors. The bunker supplier takes on the risk when he purchases the stocks. However this is an opportunity risk, where he stands to gain if prices move his way or lose if it moves downwards. There are over 21,000 ship calls to Major Ports in India. So there are opportunities of bunkering these international ships if the bunker prices can be made competitive with MOPS (See Chart below).

A bunkering facility near the refinery can reduce the transportation cost. Barging costs can be reduced if the refinery is in close proximity to the port or has a terminal in the port. Following is a list of refineries near major ports and the number ships calling the port in its proximity (See Table 5).

Table 5: List of Refineries near Major Ports

Refineries	Ports Nearby	Estimated Ship Calls (2016-17)
Haldia Refinery	Haldia & Kolkata Port trust	3,402
Paradip Refinery	Paradip	1,585
Mumbai Refinery HPCL	Mumbai Port Trust, JNPT,	4,875
Visakhapatnam Refinery HPCL	Vizag Port, Gangavaram, Kakinada	>2500
BPCL Kochi Refinery	Cochin Port	1,657
Jamnagar & Essar Refinery	Kandla, Navlaki, Sikka, Vadinar, Salaya	>3,500

Bunkering Volumes (2017)



Note: volumes are based on forecasts.

Assuming India is able to provide bunkers to 10 per cent of the ship calls in Table 5, then an additional 2 Mn tonnes per year of bunker volumes can be supplied from India. Considering the growth of cargo handled in Indian ports and increase in coastal movement, the potential for bunkering volume would be close to 8 Mn tonnes per year.

To improve the bunkering volumes in the country, GST rate will have to be reduced to a minimal rate of 0.5 per cent for foreign-going ships. Besides, an Association should be formed for the Indian bunker industry that includes all stakeholders - refineries, physical suppliers, barge owners, bunker traders and brokers. A National Standard Code of Practice for Bunkering should be formulated defining strict guidelines for quality control, equipment, barges and documentation. Also, there should be mandatory usage of mass flowmeters and developing accredited independent testing laboratories, as well as streamlined and uniform customs process throughout the country. The process should be transparent, seamless and accessible even during holidays. A competitive licensing process should be evolved for bunker suppliers at ports and prevention of monopoly of a single supplier.

Upcoming Regulations

Marine fuel demand is approximately 4 per cent of the global oil demand in 2016². Marine requirement is residual fuel, so the residual marine fuel demand would be approximately 50 per cent of the global residual fuel demand. In 2016, the IMO announced that the effective date for the reduction of marine fuel Sulphur will be 2020. Under the new global cap, ships will have to use marine fuels with a Sulphur content of no more than 0.5 per cent against the current limit of 3.5 per cent in an effort to reduce greenhouse gas emissions. However, the Emission Control Areas (ECAs) would remain at the 2015 standard of 0.1 per cent of content. The date of 2020 is also subject to the availability of the specified marine fuel. Shipping companies are obliged to comply with the regulations and there are three options: (i) switch to 0.5 per cent fuel from 2020 onwards, in the form of LSFO or middle distillates; (ii) continue burning HSFO, combined with a scrubbing facility aboard; and (iii) switch to an alternative fuel- such as LNG-which will achieve at least the same sulphur oxide (SOx) emissions reduction.

LNG bunkering is not expected to play a big role in the near future as the existing number of LNG fueled ships are low and the new building order book for LNG fueled ships are not high. Installation of Scrubbers is the cheapest option as the vessel would continue to use the high-sulphur bunker fuel. However, there are limitations on installation of the scrubbers that can be achieved by 2020. The most likely scenario will be refineries maximizing middle distillates yields, which would be blended with fuel oil to produce 0.5 per cent max blend fuel. Indian refineries will have to plan their capacities to produce more Diesel and LSFO to cater to the new regulations for a short time period. Thereafter, an increase in penetration of scrubbers would increase the use of fuel oil.

Technology, Innovation and Sustainability

The question is how prepared we are? Such a query arises in the context of the increasing activity of shipping, which acts as the ‘prime mover’ of trade. As trade grows, the role of shipping grows. As shipping activity grows, it creates challenges for environment and sustainability. Growth is unavoidable, but only technology and innovation can contain its negative externalities. Lloyds Register in its vision 2030 document suggested that commercial shipping, naval and ocean space sectors will drive technology in the maritime world. These three sectors will have to be integrated to optimally use the ocean economy, sometimes called the blue economy. Their success will be determined by a suitable regulatory framework, technical standardization on a world wide scale, and more importantly by the cooperation between the maritime stakeholders. In commercial shipping, technology will enable ships that are smarter, data driven, greener, with flexible powering options, fully connected wirelessly on-board and digitally connected through satellites. Smart ships of various capacities built for the waterways or the coasts or high seas building would provide a great investment opportunity under the *Sagarmala Plan*.

Environmental Issues

The Lloyds Vision 2030 Report introduces a concept of ‘Horizon Scanning’, which means answering a question ‘How will future be different?’ Technology trends, the report says, are intimately tied up with a huge canvas of issues covering societal trends, sustainable resource exploitation, jobs, wealth, peace and war. For the purposes of this discussion we can choose to focus on the use of environment-friendly fuels, designs and innovation. LNG is forecast to grow a significant market share by 2030. This provides huge opportunities for a retrofit market. While we emphasize,

once again, with reference to the entire paper that technology is not a barrier, a suitable policy environment is a barrier. The regulators must ensure that the green/efficient ships are more profitable than the ones with higher GHG emissions.

Policy Recommendations

It is felt that under the *Sagarmala* Project, investment planning of ports and coastal infrastructure must go hand-in-hand with a *policy structure* that: (i) boosts inward investment through FDI in port capacity and vessel capacity. This can be achieved by further relaxing the cabotage rules etc. (ii) facilitates greener technology by making it easier and cheaper to adopt such technologies; (iii) enables operational business models for ship repair, and bunkering by helping interested entrepreneurs in site selection and getting clearances. In this regard, old unused smaller ports can be considered. Besides, innovative solutions must be tried and given a chance. Also, the major ports must shed the ‘business as usual’ attitude.

Endnotes

¹ AT Kearney analysis

² World Oil Outlook 2017

