India's blue economy priorities: maritime sector

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Blue economy is an all-inclusive concept based on seas and shorelines. India has prioritized its blue economy policies, and maritime development (logistics, infrastructure and shipping) is one of them. For charting the nation's growth, a regular review of global trends and India's plans is imperative. The major drivers or focal areas will be decarbonization and digitalization. Increased costs due to transformations, including technology acceptances and investments in port development to improve productivity will be on predictable paths. Shipping route alternatives (Northern Sea route, Belt and Road Initiative, etc.) will be in the discourses. Digitalization measures such as Maritime Single Window, Port Community Systems, etc. will get traction. India needs to shift gears with its Sagarmala projects and keep pace with the global transformative changes, especially on the digital front. Based on its new National Logistics Policy, logistics costs as a large head need to be considered along with performance metrics. This article juxtaposes global trends and indices, and lists a few issues that India must address.

Keywords: Blue economy, decarbonization, emission abatement, maritime policy, port modernization.

Introduction

HUMAN civilizations have largely thrived along water bodies. While nation-states vied for control of the seas as naval capabilities increased, there were anodyne objectives of trade and commerce that drove expeditions across the seas. With the Industrial Revolution, the European colonial powers used the mercantilism models for their economic prosperity. Furthermore, exploitation for economic benefits continues and oceans are considered from the perspective of climate change, sustainability and a clean environment. In justifiable terms, the dependence on rivers and oceans will endure.

The 21st century is witnessing changing technologies and newer ideas. Blue economy is one such idea. The expression of the term 'blue economy' (BE) is attributed to Pauli[1]. However, the elements of BE are identified under many other terms such as 'marine economy', 'coastal economy' and 'ocean economy' amongst others, and 'green economy' by the same token aligning with the United Nations Sustainable Development Goals 14 policy directions. To take the BE concept forward and wide, clusters have also been mooted and formed for networking, etc.[2]. India envisages value addition from BE to services, maritime trade, shipping, etc.[3]. Table 1 shows the priority areas identified under the broad scope of BE for maritime transport and shipping. These have been selected from the proposal in the policy document. It needs a mention that concretizing the ideas and monitoring the status of many initiatives are yet to be firmly in place.

Regarding the priority of maritime logistics, infrastructure and shipping, India's flagship project is the Sagarmala programme. This programme has plans for 802 projects (INR 5.4 lakh crores; target completion 2035), but the progress stands at 220 projects (INR 1.12 lakh crores)[4]. A Rajya Sabha Report has observations on the lesser quantum of budgetary allotments to the Scheme[5]. In the 2023–24 Budget, allocation of INR 22.19 billion (with a 23.8% increase over the revised estimates of 2022–23) has Sagarmala's share at INR 4.5 billion[4]. Though there have been mentions of the slow progress of the Sagarmala projects, appreciable progress is on record. Table 2 projects a few growth parameters of India pertinent to the maritime sector[6].

This article brings in the perspective of maritime transport juxtaposing some of the developments worldwide. The broad approaches could be viewed under decarbonization and digitalization, and the two major components of maritime transport, viz. ports and ships.

Global maritime trade: drivers and trends

The global maritime carriage amounts to 2.3 billion tonnes[7] and post-COVID-19 slowdown phases are supposedly over. In the past five decades, container (liner) trade and dry cargo carriage (mostly by containers) have overtaken volumes shipped by energy carriers (petroleum), and work to three-quarters of the world's loaded cargoes. The strategies of the major liner operators are expected to drive the freight rates and demand situations.

Withstanding a pressing trend for large container vessel builds, for effectively decarbonizing, around 3500 ships need to be built/refitted annually till 2050 (ref. 7). However, the shrinkage in ship financing due to change of modes and failure of financial institutions in the recent past are expected to keep the numbers in the order books low.

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Table 1. Blue economy: India's priority areas[3]

Priority areas	Significant actionable points/keywords
National Accounting Framework for Blue Economy (BE) and Ocean Governance	To study and adopt global best practices
Coastal marine spatial planning and tourism	To adapt coastal marine spatial planning; link to tourism potential/impacts; to frame National Marine Litter Policy
Marine fisheries, aquaculture and fish processing (marine living resources)	To frame policies and methods for fishing; protect vulnerable areas; enhance mariculture; monitor ocean health; control bioprospecting
Manufacturing, emerging industries, trade, technology, services and skill development (marine manufacturing)	To encourage capital inflows; improve ease of doing business; develop sector-specific policies; erect R&D hubs in coastal states (typical thrust areas: artificial intelligence, deep-sea mining, marine logistics and shipping)
Logistics, infrastructure and shipping (including transhipments)	To promote shipbuilding to EEDI standards; promote ports-led industrialization; Sagarmala initiatives; establish Maritime Development Fund to support sub-sectors; logistics: hub and spoke, warehousing, freight corridors, multimodal network, etc.); establish transhipment hubs; to frame National Maritime Policy
Coastal and deep-sea mining and offshore energy (marine non-living resources)	To prioritize investments in deep-sea mining; explore renewable energy options; build National Marine Resources database
Security, strategic dimensions and international engagement (ocean security and international interface)	To develop appropriate BE policies; create awareness; seek international cooperation; develop training modules/institutions to nurture BE orientation

Table 2. India's growth parameters[4,6]

Parameters	Metrics	Remarks
Cargo traffic (major ports)	2.12% CAGR (2016–17 to 2021–22) 2023: 9.4% growth (year-to-year)	
Greenfield ports (planned)	Ten non-major ports; capacity: 319.31 million tonnes	Phase-I targets
Inland waterways	14 under development for cargo and passenger movement; cargoes: 108.79 MMT* (2021–22); 91.6 MMT (April–December 2022–23)	*Million metric tonnes; cargo growth rate compared with similar periods of the previous year: 19.5%
Sagarmala projects	Ports modernization: 89/63/89 Ports connectivity: 69/67/73 Ports led industrialization: 9/21/3 Coastal community development: 20/19/43 Coastal shipping and inland water transport: 33/61/143	Completed/under implementation/under development

Promotion of gender equality in actual job participation will be louder. The median value of participation in maritime workforce remains static. A policy relook will be timely considering sea careers in particular. Considering emission-mitigating measures, the rethink on alternate sea routes will attract a few clinical analyses. The Belt Road Initiative of China has an alternate argument with India-driven India–Middle East–Europe Economic Corridor. Work on this Corridor is already in progress (multimodal backbone) in the Arabian Peninsula. Of the 2900 km rail connections, about 1000 km remains. When this becomes a reality, peace and geopolitical factors permitting, European ports (in Greece, France and Italy) will be reachable at times 40% faster than the Suez transits. There are discussions on the Northern Sea Route through the Arctic; however, this is expected to not have a denting impact (<5%) in terms of maritime trade, which could shift to this route.

A significant factor which goes unnoticed is the spending on training. The training cost as a proportion of payroll cost has been on the decline in the last five years. The blip could be due to the COVID-19 pandemic, but the lowest value of 0.28 in 2022 reflects a possible trend of training being placed at the bottom of the maritime budgets[7].

On the support side, legal and regulatory frameworks are on the anvil to facilitate digital transitions (maritime single window (MSW), electronic bill of lading (eBL), etc.), pollution measures and extending to the protection of biodiversity, etc. These are not discussed herein. The discussions on decarbonization and digitalization trends follow. It is worth mentioning that research on technology innovations such as artificial intelligence/machine learning based condition monitoring and decision-making, digital twins, autonomous vessels, etc. is progressing.

Decarbonization, digitalization: ports and ships

Decarbonization

For a simple reckoning, shipping contributes to about 2.5–3% of the global emissions (total to consider: 50 billion tonnes of carbon dioxide). On a comparative scale, a ship emits CO_2 at 1/16th of what a road-running truck does (large containership 5 g/metric tonne-km; road freight carriers 80 g/metric tonne-km)[8]. These emissions occur largely in the shipping lanes and about 70% of ship emissions are realized within 400 km of the coastline[9]. For the present

Table 3. Indices for emission control

Measures for action/monitoring	Descriptive information	Compliance issues
Energy efficiency design index	Index defining energy efficiency; ship design innovations; ships compliance; intention: reduction in carbon intensity	In effect: 1 January 2013
Energy efficiency existing ships index	Measure attained energy efficiency; intention: improve technical performance of existing ships	In effect: 1 November 2022 Review: 1 January 2026
Carbon intensity index	Measure of fuel consumption; graded ratings accorded to ships; Intention: improving carbon intensity with a slew of measures (just-in-time arrivals, speed/ballast/trim, optimization, etc.)	In effect: 1 January 2023 Refinements required: penalties for multiple ship visits; calculation methodologies

discussion, the status of European Union (EU) can be considered for an understanding of the efforts. Almost 40% of commodities being handled by the EU ports relate to energy. EU has shown a certain degree of seriousness with the EU Green Deal and a slew of measures to support the Fit for 55 (i.e. 55% emission reduction by 2030). Table 3 captures the emission efforts, and the brief notes on status and issues.

Electrification appears to be a feasible solution, while the generation of electric power from emission-free sources remains to be resolved. While the total energy use in the system (usually expressed in MMtoe, i.e. million metric tonness of oil equivalent) includes all the resources, the shift to renewables in the domestic sector appears achievable. It is the energy demand of the energy sector itself that requires consideration. The globe's electricity demand is around 20.4% of the final energy demand (energy consumed), and the focus is on the remaining demand of 79.6% (ref. 8). It is opined that all this need not be met by renewables and as electrification increases, the energy requirements also will come down. While ports are grid-connected and can harvest some renewables, the non-grid consumers (ships, aircrafts, trucks, etc.), which account for about 30% of the total energy usage, need better solutions.

Another solution often proposed up is the onshore power supply (OPS). A look at the ports and vessels suited for OPS will be of interest. Out of the identified 43 ports (fitted under the EU Directive 2014), only 15 have facilities for OPS. Among about 11 types of vessels (sea-going), only 796 have the capability for OPS and there are 122 vessels in the order books which will have OPS facility fitted[8].

Incidentally, since Indian ports do not feature in the Reports[8], it may be presumed that OPS facilities are yet to be fully functional in the subcontinent. However, there are Indian administrative circulars with standard operating procedures for providing ships with power demand of up to 150 kW. Standardization apart, the decisive factor for a port to offer this facility would be that the shore power generation from renewable source/s low-emission resources or otherwise contributing to the reduction in vessel emissions. Further, the vessels must frequent the berths and have higher resident time. Container ships and cruise vessels appear to be ideal for this option. Considering all these, a port may decide to go for the high investment for OPS facility.

The port residence time is another factor contributing to the emissions. On an average, ships spend 9% of their time in anchorages and about 15% of the fuel is consumed during this phase and while manoeuvring in port, which involves stop–start–low speed engine operations[10]. An interactive synergy between ports and stakeholders is imperative. The synergy needed is not only for the ships and shipping-related personnel, but also for the related government agencies, suppliers and, importantly, the supply-chain enablers.

In terms of reducing global shipping emissions by half by the middle of this century, it is estimated that US$ 1.4 trillion will be the investment needed[7]. Considering the Indian efforts, it is estimated that over US$ 400 billion is required annually to develop the energy infrastructure. This will involve moving away from the reliability of coal (70% of electrical energy is generated with coal-aided means). Incidentally, India spent about US$ 17 billion on energy transition measures in 2021–22.

Fuels: Being the major factor in the decarbonization scheme, cost, technology assurance and environmental footprint will be the questions to answer. Through the transformation from sail to steam ships, 3 trillion tonnes is estimated to have been emitted (considering 1000 billion tonnes of fossil fuels has been burnt)[11]. Fuels could be the basic way to cut down the emissions. Among the present active global fleet, about 98.8% is on conventional fuels and a minuscule 1.2% on alternate fuels (liquefied natural gas, liquefied petroleum gas, methanol, battery/hybrid). Looking at the order books, conventional fuel still prevails with 78.9% and the rest opt for alternate fuels[12]. The major issue is the absence of a silver bullet technology (fuel option) readiness. Scalability and regulations could be other factors. A brief illustrative discussion follows.

Methanol is a candidate gaining attention. It meets tier III, has less SO_x, and particulate matter (PM) reduction is >95%; NO_x by >80% compared to conventional fuels. It can reduce CO_2 by 15% (tank to wake). The major attraction is that methanol can be liquid at ambient conditions, and land-based infrastructure to store/supply is lower than other alternate fuels requiring cryogenics/pressurization. It has the lowest safety risk compared to LNG, hydrogen and ammonia. The availability cited is for >100 ports and the fuel has been used for seven years; currently, 20 methanol-fuelled

dual fuel (DF) vessels are in operation. Likewise, there is the literature campaigning for other fuels. LNG has shouldered its way, but it remains to be seen if it would be sustained given the methane slip potential, etc. For want of theme and space, the discussion on other fuel options is eschewed.

A bold variant under discussion is the nuclear option. The calorific value of the nuclear option (80 million MJ/kg) compared to conventional fossil fuel (41 MJ/kg) and to an alternate fuel, methanol (20 MJ/kg), makes it a tempting option[11]. On an average, this energy option equates to almost 4 million times more per metric tonne of any alternate fuels currently under consideration. The stringent radiation levels, though operationally possible, need demonstrations to bring user confidence to acceptable levels. Identifying maritime shipping as one of the hard-to-abate sectors, the Economic Survey of India proposes green hydrogen under the long-term strategy[13]. Presently, under various alternate fuel and carbon control options, about 23 pathways/feedstocks are projected in the UNCTAD Report[7]. This would be a crucial choice the ship owner has to be convinced about. From the vessel perspective of bringing down emissions, three major challenges are posited[14]:

(i) *Fleet size existing and expected:* Large 'installed base of engines with single-fuel technology'. Though vessels with DF technology are being sailed out of the yards, fossil fuel remains as the bridging fuel. This trend is expected to continue through the transition stages till mature technologies win the confidence of the industry. Few biofuels can be a good option on single fuel (SF) engines, but limited availability, cost, etc. could be a deterrent to the vessels to try out.

(ii) *Increasing tonnage:* The dead weight tonnage (DWT) of the global fleet is expected to grow by 60%. This would imply that from about 3.1 billion, the DWT is expected to grow to 5.1 billion in 2050. This directly increases the energy demand and if alternate fuels are not in copious availability along with technology convenience, emission reductions will not reach the targeted levels. However, the shipping tonnage growth has been rather slow due to the COVID-19 pandemic pauses, energy transition and expensive interventions (ballast water management systems, scrubbers, etc.).

(iii) *Compliance and monitoring of regulations:* If the ratification and follow-up of the International Maritime Organization (IMO) Regulations by the member states are slow, no rapid reductions may be envisaged.

Digitalization

It is expected that the Facilitation of International maritime Traffic Convention requirements (1 January 2024) will make port optimization possible. The MSW backbone is expected to facilitate electronic exchange of information between ships and ports. MSW can bring practices of customs declarations, phytosanitary, container release, etc. under one roof. To emphasize, if 50% of the industry adopts eB/Ls, the savings would be to the tune of US$ 4 billion/year. The major issue seen here is interoperability, wherein various bodies (ports, etc.) are expected to use the sharing with ease. Adopting technology-agnostic standards will ease the perils of software creation and harmonization. Here, low margins make new software development unattractive, but potential exists for an MSW solution monopoly, possibly.

Harmonization of data standards (varying ports demand) and port vessel management systems are the other challenges. The agreement between Ports of Rotterdam and Singapore on forming a digital corridor is worth mentioning. On the same token, there are about 63 automated container terminals, with the Asia-Pacific region (China–East–Far East) having about 22 (ref. 15). This report[15] includes a survey of the terminals, which observes increased safety to be the major reason for yards preferring automation[15]. Other factors such as reduction in unit cost of container handling, performance variability and labour cost will help in yard performance and automation. All said, cost remains the major deterrent and the projected return on investment being in the range of about six years, the will to automate wilts.

Port Community Systems (PCS) for sharing data (fuel consumptions, formalities, etc.) are yet to be established well in many ports. According to 2020 reports, only 47 out of possible 174 (member states of IMO) had PCS[10]. India's PCS has been upgraded into the National Logistics Portal (January 2023), and more ports and stakeholders are expected to join in. Enterprise Business System, Electronic Payment/Delivery Order/Letter of Credit, Enterprise Bill of Lading (a blockchain platform), RFID technology, Vessel Traffic Management System and Vessel Traffic Services are a few measures already on stream.

Trends in modern ports

Port operations include many ship–shore connected activities. Pre-arrival preparations, pilotage, manoeuvring, tug assistance, anchorage services, towing, mooring/unmooring, bunkers (fuels/lubes/water), loading/unloading, waste disposals, customs, crew/personnel services, inspections, cargo documentation and maintenance require good integration and monitoring. As regulations weigh in, monitoring for compliance (ballast water, funnel smoke, etc.) and support measures (OPS, reception facilities) add up to the portfolio.

The Tuas Port operated by PSA (Port of Singapore Authority) provides an impression of how port operations may become modern (Figure 1). Extending the examples, the Port of Rotterdam houses about 120 companies (directly

or indirectly related to shipping). Rotterdam also has plans to store around 37 million metric tonnes of CO_2 emanating from the Port. In the Indian ecosystem, such a hub would greatly reduce time and cost for the operators.

Almost 60% of the maritime trade is carried out through containers (TEUs or twenty equivalent units), with the current economic value pegged at US$ 14 trillion (ref. 16). Port productivity in many instances is linked to TEU clearance formalities and monitoring, and port moves per hour (TEUs moved by port cranes in an hour). A reflective index is the vessel turnaround in a port. The average turnaround for all Indian ports (2022–23; till 22 December 2022) is 50.01 h, and that for a container ship (major ports only), it is 27.29 h. Globally, a turnaround below 24 h is considered for productivity metrics[4]. As a figure to compare, cargo ships average only 10 h of stay in Norwegian ports. The average waiting time for a container ship in a port in a developing country is 8 h and about 4.5 h in developed country. This is the time from entering the port (anchorage) to the berth[7]. Container freight station dwell time and port moves per hour (a measure of the number of TEUs moved on/off from ships) are the other indices considered for assessing port productivity. Still on productivity, the time to move a container (load or unload a container) is another parameter. Indian ports have registered good scores (2.8 min for <500 units; 0.6 min for 4001–6000 units)[6]. Modernized port equipment (cranes/gantry) is crucial for swifter operations.

A major challenge lies in checking the TEU's internals for narcotics and chemical/biological/radiological/nuclear/explosive materials. While X-ray and gamma-ray scanners are used in many ports, cosmic-ray tomography scanners are being tested. Being intrinsically safe (no artificial radiation), these scanners have higher penetrative ability in profiling shapes of objects, etc. Indian ports have been adopting prevalent radio frequency identification access control systems. Such indices are expected to be the major parameters while ports get digitized.

While digitizing, high investment levels, spatial planning, energy and project development skills, and continuity of operation while moving towards transition will be the challenges that ports have to resolve. Table 4 shows the status of few performance indicators and the targets envisaged under Maritime India Vision (MIV) 2030 (ref. 17).

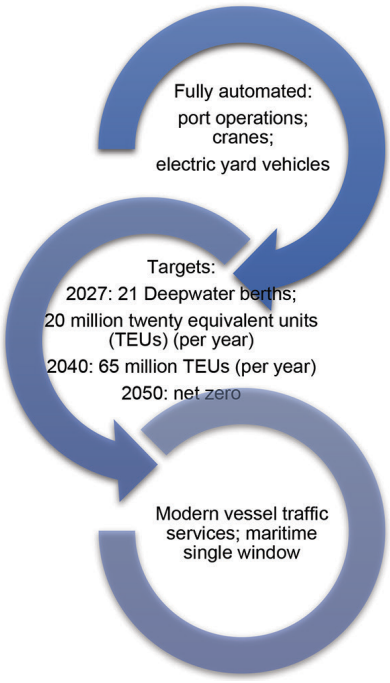

Figure 1. Features of a modern port (Tuas).

India's issues

(i) *Financing:* Capital markets, banks, strategic public private partnerships (PPP) modes, variable gap funding, monetization, bonds, etc. can contribute; however, shipbuilding financing needs an effective model. A major issue in context is that ship financing is beset with treatment akin to manufacturing or any other conventional sector.

(ii) *Shipbuilding:* Over the years, Indian yards have faced an erosion in commercial shipbuilding, especially of big ocean-going ships by national and foreign companies (tug builds have found good support). The lack of vision, upgradation of yards and upskilling are some of the issues. The state of much of the yard production training needs to be brought up to the quality of Asian majors. Rationalizing/incentivizing tax regimes and policies, friendlier laws may be based on models followed by other successful nations[18]. While big shipbuilding has lagged, defence builds have been brisk. The thrust has been on indigenization to almost 80% levels and the interest to expand the fleet to 200 numbers by 2027 has kept the yards busy[4]. However, the single-client nature of defence (read Indian Navy) has resulted in underbidding apart from poor productivity, increased debts and delays[18]. Financial assistance, first right of refusal (procuring/repairing), inclusion of shipyards under infrastructure, SoP for tug procurement/chartering/deep-sea fishing vessels, etc. are a few of the measures intended to boost the building numbers[4]. The uncertainty in alternate fuel technologies firming up, trends in the use of bio-friendly composites and large ships are a few factors to reckon with, while there are boosting measures undertaken by the Government of India.

(iii) *Ship recycling:* In 2022, 32.3% (2.43 million gross tonnes) of the total tonnage was sold to India[7]. Though less than 0.5% of the active fleet tonnage came up for recycling, in the future, due to CII (carbon intensity indicator), emission requirements and container ship order books looking for new builds would go up. Being a top recycling destination, India must capitalize

Table 4. Maritime India Vision (MIV) 2030: key performance indicators envisaged[17]

Factors	2020 Status	Target 2030
Major ports with >300 million tonnes per annum cargo-handling capacity	–	3
Indian cargo transhipment handled by Indian ports	25%	>75%
Cargo handled at major ports by public private partnerships/other operators	51%	>85%
Average turnaround time (container vessel)	25 h	< 20 h
Average dwell time (container vessel)	55 h	< 40 h
Average ship daily output (gross tonnage)	16,500	> 30,000
Global ranking: ship-building and ship repair	20+	Top 10
Global ranking: ship recycling	2	1
Cruise passengers (yearly)	468,000	>1,500,000
Share of Indian seafarers across the globe	12%	>25%
Share of renewable energy (major ports)	<10%	>60%

on this situation withstanding the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009, requirements, etc.

(iv) *Protectionism and incentivization:* India has recently relaxed the rules for cargo carriage on its shores further by allowing foreign-flagged vessels to carry Indian cargoes (yet to be fully in effect as this article goes to press), which was a privilege of domestic flagged ships. There have been tariff incentives of discounts up to 40% if cargoes are shifted to inland waterways mode from others and exemption from port-related charges for ro-pax operations for limited periods. The African nations have used similar protective models, but failed. The reasons could be inefficient management, but the greater effect of competition cannot be ignored. India would be witnessing such competition with the realization of the National Waterways plans.

(v) *Inland waterways and short sea shipping:* India's use of inland waters (as a measure of domestic cargo movements) is at 6%, which is much lower than the global average[19]. The reasons are non-navigable stretches, sedimentation, backhaul cargo limitations, connectivity to hinterland, paperwork delays, etc. A single solution to improve this transportation to more productive and efficient levels is to strengthen the multimodal network. The benefits of the internal waterways and coastal/short sea shipping can extend to neighbourhoods (Bangladesh, Nepal and other landlocked regions). Short sea shipping will additionally relieve congestion, lower emissions, lesser accidents and energize ancillary businesses. Effectively, costs appear to be a major factor. On the same note, the export–import costs form 14% of the GDP, while global averages stay at around 8%. Though the computation of this as a percentage of GDP remains to be well explained, the high logistics costs remain to be resolved. On an average, moving a metric tonne of cargo costs INR 1.19 by inland waterways, INR 1.41 by rail and INR 2.28 by road (by truck)[19]. Hinterland connectivity and modernization of the modes (digitalization, etc.) can reduce these costs further.

(vi) *Capitalizing on geopolitical changes:* The global urge to locate an alternate 'factory of the world' could be more pronounced in the coming years. However, the Indian response has been rather slow by developing infrastructure, supply chain logistics, etc. Reacting to the post-COVID-19 measures in China, the industry mood had been to reshore or near shore. One survey on the emerging markets logistics index indicated intentions to reduce involvement in mainland China; Southeast Asia (13.6% of respondents) and India (13.4% of the respondents) were the preferred destinations to shift the production/sourcing activities[20]. The war situation, sanctions, energy needs, etc. make the equation complex. A de-hyphenated approach to foreign trade and other agreements would appear to be a moderate solution.

(vii) *Upskilling and reskilling:* The changes in energy options, digitalization and automation, etc. require new competencies. This requires a dynamic, perennial academia–industry engagement.

India has been shifting reliance on PPP models for port development to drive industrialization envisaged in the MIV 2030. Figure 2 projects the initiatives under the Vision document. While 91 PPP projects (INR 59,200 crores) have been approved so far; 52 projects (INR 37,200 crores) are operational. The capacity addition due to PPP is around 550 million tonnes per annum[4]. This seems to be a productive model, wherein the investor is allowed to reap the benefits. Productivity depends on improving the infrastructure and reducing the logistics costs. The present plans promise better results.

The recent logistics performance index (LPI) of the World Bank ranks India at 38 among 139 countries. India's economic volumes based on GDP (purchasing power parity and current prices) place it among the top five positions (for the size of economy), but going by any per capita comparison, say with the G20 countries, India features at the bottom. Assuming that the logistics cost (e.g. transport) has a bearing on the purchasing power, it may be mentioned that there is scope for reduction in the logistics cost.

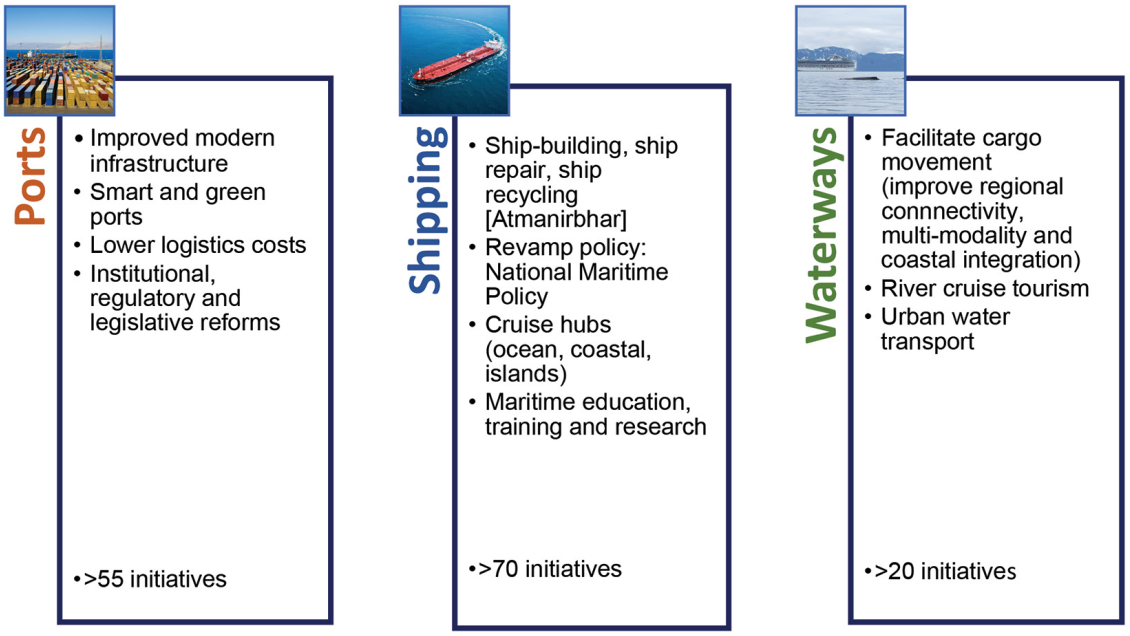

Figure 2. MIV 2030 initiatives.

Table 5. India's maritime metrics[3,6,8]

Features	Metrics	Remarks
Coastline	7512 km; 9 coastal states; 1382 islands	Fisherfolk and coastal communities: 4 million
Ports	12 major/>187 non-major	Annual cargo handled: 1400 million tonnes
Exclusive economic zone	2 million km	Exclusive rights to explore: polymetallic nodules/sulphides
Inland waters	314,400 km^2	Total surface area: 3,287,260 km^2 approximately 10% water surface; approximately 14,850 km length 111 (24 states) declared as National Waterways
Vessel data	Flagged: 1859; 18,133 dwt	Growth (2022–23): 7.1%
	Owned: 914 (national flag); 227 (foreign flag)	About 1.4% of the world total tonnage
Shipbuilding-capacity	Maximum 110,000–200,000 dwt (capesize); Shipyards: 43	
Ship recycling capacity	4.5 MMTPA (LDT)*	*Million metric tonnes per annum (light displacement tonnage)

Another vertical under the shipping sector where growth has been found wanting is in the ship repair front suffering from the same maladies of the shipbuilding sector. Competition from yards having locational advantage, high taxation, non-availability of spares and productivity issues (Indian vessels prefer to do the repairs outside) are plaguing problems. Presently valued at US$ 12 billion, with the technological developments and predictive maintenance approaches (condition-based monitoring, inspections with drones, underwater remote vehicles, etc.), ship repair has a high potential wherein India can find a good share.

A growth area which can be capitalized by riparian spots of tourist attraction and accessible from the coastal harbours is cruise tourism. For the year 2022–23 (till 31 December 2022), 142 cruise vessels had called on five Indian ports bringing 306,288 passengers (domestic and international), which is a drop from the 2019–20 figures of 451 vessels (467,579)[4]. Discounted rationalized tariffs have been proposed to give a fillip to the sector. However, the real issues are that the destinations require facilities of international standards (airport-like luggage handling, connectivity, terminal comfort, etc.).

Logistics apart, India's BE priorities must work for improving indices such as per capita (India's rank: 142/197), GDP, etc. by boosting real investments (physical, energy, human capital) and fostering innovation ambience through academia–industry synergies. Table 5 provides some metrics, which reflect the potential for growth and transformation. The global drivers will apply for India also while charting the progress.

Conclusion

The overall policy outlook recommended in the UNCTAD Report reflects the key drivers discussed herein[7]. The

keywords include decarbonization, digitalization (associated knowledge and skill development), feature port performance, connectivity and public–private sector participation. The legal and regulatory issues need exclusive analyses, many deserving omphalos attention.

The actions under Sagarmala projects, transhipment hubs planned in the Galathea Bay (Andaman and Nicobar Islands) and Vizhinjam, revamping of archaic laws, policy relook for coastal shipping, etc. will set the tone for the vision envisaged in 2030 or beyond in 2047. MSW and PCS are a few measures which will keep the ports in tune with the times. The ES 2022–23 projects the share of exports (goods and services) as part of GDP expanding despite the slowdown (COVID-19 pandemic, etc.)[13]. This trend seems to continue. Trade momentum in energy imports and India transforming into the preferred destination will sustain the maritime sector. The optimistic temper is expected to keep the momentum of the growth in the maritime transport sector, and this appears to be the right period for India to enter an epoch of maritime development under its BE canvas.

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