



THE COMMERCE SOCIETY
SHRI RAM COLLEGE OF COMMERCE



INDIA'S OCEANIC VOYAGE:
MARITIME CAPABILITIES, TRADE
CORRIDORS AND FUTURE VISION

RECOGNISED BY:





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Testimonials

"The Maritime Report prepared by The Commerce Society of SRCC is an exceptionally insightful and well-structured document that captures the evolving dynamics of the maritime sector in India. It reflects a deep understanding of Indian maritime heritage, Global Shipping trends, Port Infrastructure Developments, and the critical role of logistics in driving international trade. What stands out is the report's ability to blend technological analysis with practical industry perspectives in Indian Maritime space. The clarity in presenting complex maritime concepts makes it valuable not only for industry professionals but also for policymakers, academicians and aspiring logistics professionals. The report effectively highlights emerging challenges and opportunities, particularly in areas such as Maritime diplomacy, technological expansion, and supply chain resilience. It serves as a useful reference for stakeholders looking to navigate the rapidly changing global trade environment. Overall, the SRCC Maritime Report is a commendable effort and a significant contribution to strengthening knowledge and awareness in India's maritime and logistics ecosystem."

-Mr. Vanish Ahluwalia
Maritime & SCM Industry Expert- DoMS,
IIT Madras
Group Vice President- Seahorse Ship Agencies

"India's Oceanic Voyage: Maritime Capabilities, Trade Corridors and Future Vision is a result of an excellent effort made by the Commerce Society of the Shri Ram College of Commerce in putting together this volume. It serves as an insightful repository for various aspects of India's maritime identity. What makes this volume stand apart is its holistic approach to examine a wide spectrum of issues concerning India's growing maritime capabilities. This involves context setting discussions on the history of India's maritime trade, issues such as maritime infrastructure and maritime domain awareness, to forward looking dimensions such as the infusion of new technologies in India's maritime capabilities. This volume would serve as an excellent primer for all those interested in grasping the vast canvas of opportunities awaiting maritime India."

-Dr. Sayantan Haldar
Associate Fellow, Strategic Studies
Programme
Observer Research Foundation, India

"I found this report on 'India's Oceanic Voyage' both insightful and engaging. It does a commendable job of bringing together India's maritime past, present realities, and future ambitions in a clear and structured manner. The way it connects policy reforms, infrastructure development, and global trade dynamics makes it especially relevant for today's maritime discourse. What I particularly appreciate is the balanced perspective—it not only highlights India's strengths and opportunities but also acknowledges the challenges that need to be addressed. The focus on initiatives like Sagarmala and the Maritime Amrit Kaal Vision 2047 adds strong forward-looking value. Overall, this is a thoughtful and well-researched piece that will be useful for policymakers, industry professionals, and students alike as India continues to strengthen its position in the global maritime space."

-Mr. Ravi Kumar Moka

**Dy. Director General of Tech/Coastal Shipping
Directorate General of Shipping
Government of India**

"I have gone through the document, and I must say it was very informative. It clearly reflects an in-depth study and a well-structured understanding of the subject. The report effectively highlights how maritime strength is not just about trade routes but plays a crucial role in shaping a country's overall economic growth and global standing. It is evident from global history that nations which have emerged as powerful economies have done so with strong maritime capabilities. I also appreciate how you have captured the ongoing efforts by the government to reshape India's maritime sector. The way you have identified both the progress made and the future steps required adds strong value to the analysis. These insights make it clear that continued focus on this sector can have a significant long-term impact on strengthening the country's economy."

-Commander P.C. Mouli

**Directorate General of Naval Armament
Inspection
Government of India**

"The report 'India's Oceanic Voyage: Maritime Capabilities, Trade Corridors and Future Vision' provides a clear and simple overview of India's oceanic journey and its growing importance in global maritime trade. It discusses key topics such as major ports, trade routes, transshipment, challenges like rerouting during geopolitical tensions, and initiatives like the Green Port Policy. The content is well-structured and easy to understand, making complex ideas accessible. Overall, it is an informative and insightful report for anyone interested in India's maritime sector and its future development. However, there are a few areas where the report can be further improved:

1. Major Ports: The report mentions 13 major ports, whereas currently we have 12.

2. Coastline Length: The report states India's coastline as 7,517 km; however, as per the latest re-verification (April 2025) by the National Hydrographic Office (NHO), the total coastline length, including islands, is 11,098.81 km.

3. National Waterways: The report mentions 14,500 km as the total waterway length, which corresponds to navigable length. As per the National Waterways Act, 2016, India has 111 declared National Waterways with a total length of 20,163.50 km."

-Mr. Shashank Yadav

**Associate Director- Ports and Marine
Architecture, Engineering, Construction,
Operations, and Management (AECOM)**

"It gives me great pleasure to commend and offer my endorsement for the research report, "India's Oceanic Voyage: Maritime Capabilities, Trade Corridors and Future Vision," curated by the Commerce Society of Shri Ram College of Commerce (SRCC). Having spent decades navigating the strategic and operational complexities in the naval dimension, it is heartening to see such a rigorous academic engagement with our nation's maritime narrative from one of the most premier institutions in India. The well-researched and analytically robust report reflects a mature understanding of the maritime domain and addresses, with clarity and substance, an area that is central to India's economic resurgence and strategic posture. The report traces the evolution of India's maritime sector, linking historical foundations with present-day imperatives in a comprehensive manner. Its examination of port infrastructure, logistics frameworks, and trade corridors is inclusive and anchored on current policy developments. Of particular relevance is the delineation of India's maritime ambitions within the broader strategic context of the Indian Ocean Region, underscoring the criticality of sea lines of communication, chokepoints, and regional partnerships in shaping national outcomes. The analysis of structural reforms is balanced and well-articulated. The transition towards the landlord port model, the growing role of public-private partnerships, and legislative enablers such as the Major Ports Authorities Act are examined with appropriate emphasis. The discussion on Sagarmala and related initiatives reflects a clear appreciation of the linkage between infrastructure modernisation and economic competitiveness. Comparative insights, both across India's coastal dynamics and with leading global ports, add further analytical depth.

The report demonstrates significant forward-looking clarity. Its deliberations on Maritime India Vision 2030 and Maritime Amrit Kaal Vision 2047, highlight the scale of ambition required if India is to emerge as a leading maritime power by 2047. The emphasis on sustainability, technological integration, and supply chain resilience is both timely and relevant. The themes explored in this report resonate closely with those articulated in my own work, 'Maritime Sector Development: A Gateway to Viksit Bharat' (Observer Research Foundation, February 2026), particularly the centrality of maritime capability in shaping national power and economic transformation. I have emphasized that India's ascent to a developed economy by 2047 is inextricably linked to our blue economy and port-led development."

**-Vice Admiral Puneet Kumar Bahl (Retired)
Indian Navy**

"The Maritime Report prepared by The Commerce Society of SRCC is a well-researched and thoughtfully executed report that provides valuable insights into the evolving maritime and logistics sector. The report effectively highlights important industry trends, opportunities, and challenges while maintaining clarity and strong structure throughout. It is commendable to see the effort put in by the team in covering such a relevant and dynamic sector with depth and professionalism. Overall, it is an impressive initiative and a valuable contribution to understanding India's maritime ecosystem"

**-Adv. Manisha Tiwari
Maritime Lawyer
Managing Partner- Shail & Partners Co.**

Abstract

The global trade landscape is rapidly transforming, particularly with respect to the participation of growing economies like India. Amidst this, it is crucial to hover around the mechanics facilitating such advancements in trade, not only for the Global South but also for the regions far and beyond, the discourse around which is rather scant.

This report aims to ponder over the momentousness of the Indian Ocean and Indian Ocean Region (IOR) with regard to the aforementioned concerns. The Indian ocean is the third-largest of the world's five oceanic divisions, covering approximately one-fifth of the total ocean area of the world.

India's maritime legacy is as vast and dynamic as its 11,098-kilometer coastline, which anchors 13 major ports and over 200 minor ones. Positioned along the world's busiest shipping routes, India is not just a key trading hub but a rising global power. In 2023, the nation contributed 16 percent of global growth, and according to some estimates, it is on course to become the third-largest economy within the next three years. As India ascends the global stage, its maritime sector emerges as a linchpin for commerce, connectivity, and international cooperation.

It also covers the significance of maritime trade for a country, including the lexicon associated with it and highlights the Indian

Ocean's sway over India's maritime trade strategy, providing readers with a brief timeline of the IOR's growing importance for India and covering landmark acts in this regard, like the Indian Ports Act and the Coastal Shipping Bill.

The report further explores India's port infrastructure, drawing comparisons with its eastern and western ports and with International ports like Colombo and Singapore. It snowballs to India's strategic maritime corridors and major sea lanes in the IOR. The report offers an extensive discourse on India's maritime trade partnerships in the IOR, the impact of China's String of Pearls strategy on India and the reforms surrounding the maritime landscape. Through these efforts, India seeks to strengthen its position as a leading global maritime power and encourage the growth of a sustainable "blue economy".

As India charts its course towards becoming a developed economy by 2047, the maritime sector has emerged as one of the nation's most strategic pillars. The future focuses on sustainable development, greater connectivity, and leveraging technology to overcome challenges like piracy and congestion, solidifying India's role in global commerce and governance. In conclusion, the report acts as a seer, offering insights on what the future holds for India's maritime capabilities by foregrounding the Maritime Amrit Kaal Vision 2047.

Introduction

“Whoever rules the waves, rules the world.” - Alfred Thayer Mahan

Historical Significance of Maritime Power

For centuries, oceanic trade and connectivity has shaped civilisations and modern economies. There is a de-facto inter-relation between Maritime power and a country attaining a Comprehensive National Power across the globe. Civilisations like the Phoenician, Greek, Roman and Chinese dominated their times because of their maritime capabilities. Sea power empowered these Thalassocracies to establish overseas dominance, warranting cultural, religious, and economic exchanges. Alfred Thayer Mahan, in his book ‘The Influence of Sea Power upon History: 1660 to 1783’, has reiterated the importance of sea power and the consequences of sea blindness by citing examples from the Battles of Waterloo and Zama.

Markers of Maritime Capabilities

In modern context, this competency is reflected in the infrastructural capabilities like ports, sea lines of communication, cabotage, chokepoints, etc. Efficient port performance, connectivity, regulation and governance highlight the institutional capacity of nations and also reflect their economic priorities. It is often implied that a longer coastline yields greater prosperity for a nation because a coastline stands as a beacon of power as it attracts economic prospects. However, this may not be true for many countries. For instance, India’s coastline is measured at 11,098 km, surrounded by the Arabian Sea, the Bay of Bengal and the Indian Ocean.

However, sea blindness with respect to policy making over several decades after independence retarded India’s capability to emerge as a maritime leviathan.

Status quo for Indian Maritime Landscape

Currently, the country possesses 13 major ports and 200 minor ports, yet until the opening of the Vizhinjam port, 75% of Indian origin or destination containers were transshipped at foreign ports every year, with the Colombo port alone handling 2.5 million TEU of these shipments. This paradox is appalling given India’s history of maritime exchanges dating back to the 3rd millennium BCE. The rationale behind this structural lagging is further discussed in the report.

Trade Geography and Corridors in the IOR

Along the same lines, the report delineates the pre-eminence of the Indian Ocean for India, which has been grossly shrouded over the years in formal discourse. For India, the Indian Ocean, covering 20% of the Earth, is not merely a fount of aesthetics and nature, rather, it is a whole economic artery in itself. India’s 95% trade by volume and 77% trade by value passes through the Indian Ocean Region (IOR). Apart from handling substantial amounts of seaborne trade, the IOR boasts of the Strait of Malacca and the Strait of Hormuz, which are chokepoints in the sea lines of communication, holding significance for both India and the globe. For India, its core

maritime operations are concluded within a three ring structure, connecting with Sri Lanka, the Gulf, East Africa and the ASEAN nations. This comprehensive concatenation is underexplored in the existing works of maritime studies.

Structural Reforms and Shortcomings

Maritime capabilities cannot solely be evaluated within the purview of infrastructural assessment as structural reforms, policymaking, regulations and bilateral partnerships play a paramount role here. As discussed before, such reforms were slow to come in India. In 2005, the National Maritime Development Programme was launched, identifying 276 projects to be taken up in a 7 year time period. Times changed as Public-Private Partnerships and commercialisation began to take precedence in ports development. However, loopholes and inefficiencies have troubled their implementations.

Partnerships in the IOR

International associations like IORA and BIMSTEC have led conversations surrounding the development of the Indian Ocean Region. India has been an active participant in these forums and has made a key contribution in its decision making bodies.

Bilateral partnerships with Sri Lanka, Oman, Mauritius and Indonesia have complemented efforts for cross-border cooperation. Lately, this cooperation seems to be under threat as India's strategic rival, China, has augmented its maritime capabilities with the String of Pearls strategy, the consequences of which shall be covered further in the report.

The Imminence of Maritime Priorities

Challenges in maritime governance are visible in comprehensive studies. Customs reforms and digitalisation help to iron out such issues but there is still a long way to go. With the Maritime Amrit Kaal Vision 2047 taking center court in the present scenario, it is essential that maritime capabilities are brought to the spotlight and are investigated with an eagle-eyed lens. Against this backdrop, this report aims to present a holistic understanding of India's oceanic engagements, shaped by its history, structural reforms and infrastructural capacities and how resolving the recurring challenges would shape the maritime future.

Historical Evolution- Key Terminologies & IOR

Introduction

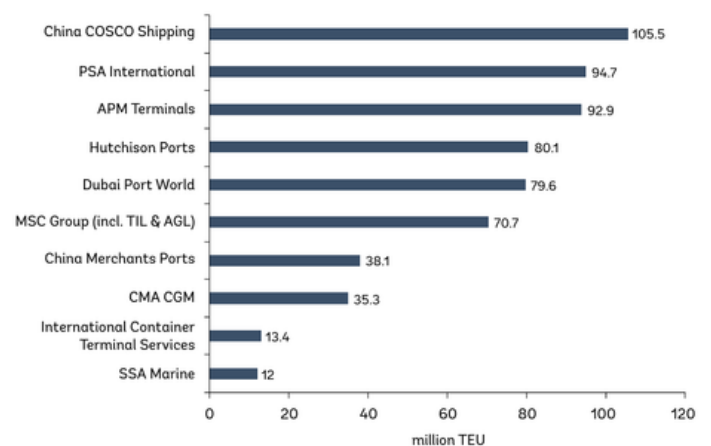
Historically, seaports have been the main entry points for international trade. They have developed into sophisticated, integrated logistics platforms from simple, rudimentary interfaces where goods were moved between land and sea. Beginning with first generation ports (prior to 1950) that concentrated on simple cargo transfer, the port concept has advanced through several "generations" since the middle of the 20th century. Fourth generation ports (post 2000) are distinguished by physically distinct terminals connected by shared administrations or international operators. Containerisation, the expansion of vessel sizes, and the shift from public service models to private sector involvement particularly through the "landlord port" model have all contributed to this evolution. A new era can be characterised by digitalisation, decarbonisation and the requirement for supply chain resilience in an increasingly unstable global environment is now upon ports.

Generations of Ports		
Generation	Period of Development	Key Characteristics
First Generation Ports	Prior to 1950	Basic sea approach, transfer of goods, temporary storage, and delivery functions. Mainly served as simple cargo handling points.
Second Generation Ports	1950–1980	Includes features of first generation plus value-added activities and presence of industrial plants near the port. Functions as a handling and service center.
Third Generation Ports	Since 1980	Includes first and second generation features plus port–city integration, extended services beyond port boundaries, and integrated data systems. Acts as a logistics platform for trade.
Fourth Generation Ports	Since 2000	Network of physically separate ports or terminals connected through common operators or centralized administration, forming integrated port systems.

Brief description of the research gap and scope (IOR)

Although the fundamentals of international maritime trade have been

largely stable for decades, the current transitory era creates a research gap about how ports in developing regions like the Indian Ocean Region (IOR) adapt to concurrent challenges of climate change, cyber threats and shifting geopolitical alliances. The vulnerability of international trade to ongoing disruptions and the need for developing economies to improve their institutional capacity to monitor and control freight rate volatility are the main topics of current maritime analysis. Particularly in the northern Indian Ocean, persistent disruptions at significant chokepoints necessitate a change in attention towards South Asian ports as viable rerouting options, necessitating the development of new network reliability strategies.

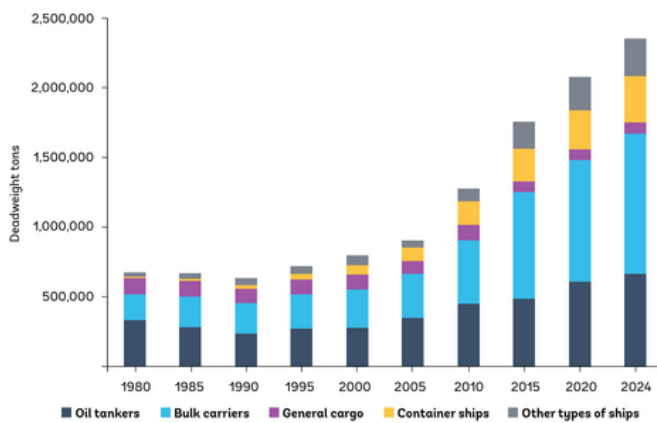


Source: World Bank, based on Drewry Maritime Research (2024).

Describing maritime trade and its significance to countries

Maritime transport is the backbone of the global economy, with ships carrying 70% of the traded goods by value and 80% by volume, ports serve as strategic transport hubs that facilitate national, regional and global trade at a comparatively low cost acting as key logistics drivers for economic development. For developing countries and

Small Island Developing States (SIDS), ports are even more vital as these countries have depended disproportionately on maritime transport for their integration into international markets. Other than the trade the sector helps in boosting the employment and tax revenue for the government supporting between 4% and 13% of national employment in various coastal and island economies.



Source: World Bank, based on data from UNCTADstat (2025).

Brief description of certain key terminologies in maritime trade

Sea Lines of Communication: These are the maritime trade networks and routes through which ports serve as crucial gateways, facilitating global value chains and manufactured goods movement.

Choke Points and Corridors: Chokepoints are narrow maritime passages (e.g. Suez Canal, Strait of Hormuz) where disruptions can reroute global traffic and double freight rates. Corridors are dedicated axes (e.g. the Alameda Corridor or rail shuttles) that provide ports with efficient access to inland distribution systems reducing urban congestion.

Berths: Specified locations within a port where vessels are tied up for cargo loading or unloading operations.

Transshipment: The process of unloading cargo from one vessel to another vessel within the same port, typical of hub and spoke shipping networks.

Deadweight Tonnage (DWT): It is a measure used to express the capacity of the world fleet, It is used specifically for bulk carriers and tankers, to handle the total weight a ship can safely carry.

Twenty Foot Equivalent Unit (TEU): It is a unit of measurement used to quantify the capacity of container ships and the throughput of container terminals which is standardised across the world.

Port-led development: It is a strategy where ports are positioned as central contributors to national economic growth usually seen in countries near choke points supporting trade led freight strategies and generating maritime business clusters.

Cabotage: Laws or policies regulating the transport of goods or passengers between two places in the same country by a transport operator from another country, its liberalisation is often a component of port policy reform.

Importance of the Indian Ocean for India

India's economic stability and regional power depend on the Indian Ocean. In order to promote private involvement in terminal operations, India moved from government owned port to PPP structure and now Nearly one-fourth of all cargo movement in the nation is currently handled by large private conglomerates like Adani Ports, which oversee important facilities like Mundra Port.

There are chances of rerouting via South Asian ports during tensions in the Strait of Hormuz or the Red Sea, which may have a major impact on regional transshipment operations and network reliability, further highlighting the strategic significance of the Indian Ocean. India's Green Port Policy, which links port operations with national climate targets to ensure that in long-term businesses do docs on the environment too.

Evolution Timeline of the Marine Sector

India's marine heritage is vast, spanning from the beginning of human history to the present, shipbuilding and seafaring have been documented as part of India's culture throughout this entire time. Ships were constructed of teak and were used for trade and shipping with faraway places such as the Arabian Peninsula, Egypt, Africa and the Roman Empire. This demonstrates how the ancient Indians had perfected the art of shipbuilding according to the manuscript called "YuktikaIpataru".

For many centuries, Indian maritime trade routes have been used for a variety of different types of commerce between countries globally. However, foreign trade with India has witnessed relatively low levels of growth since 1950, which corresponds with national and international trends. Consequently, there has not been sufficient demand for ships that can transport goods out of India. Exports produced in India also continue to grow at a significantly slower pace than imports into India and ultimately result in little growth for shipping as well.

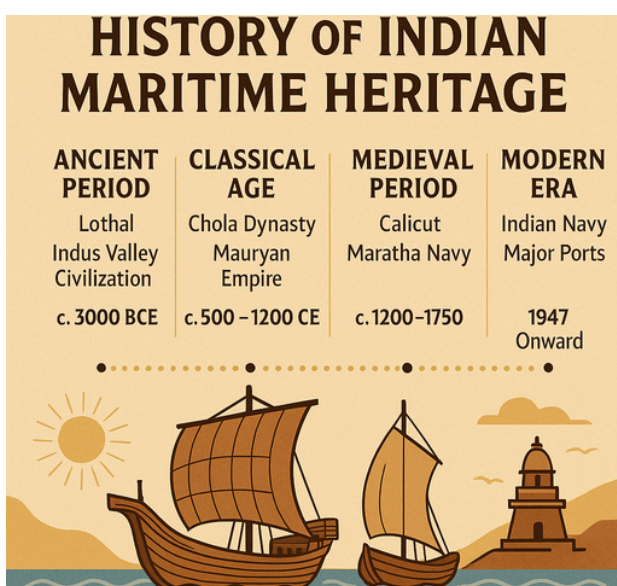
Marine Sector during the Ancient Era (3000-3200 BCE)-

Indus Valley Civilization (3000-1300 BCE)

In the years that followed, evidence from archaeological sites at Lothal, Mohenjodaro and Harappa indicated trade and commercial activity via maritime routes between Mesopotamia and the Indus Valley Civilization. These findings suggest that the Harappan people conducted long distance sea commerce with other civilizations. The discovery of a dry dock at Lothal, approximately 400 km southwest of modern Ahmedabad and dating back to 2400 B.C.E. shows their knowledge of tidal fluctuations, wind patterns and nautical engineering principles. This dry dock's location was significant as it lay along the changing bank of the Sabarmati River. Vessels built at Lothal sailed to distant ports in China, the eastern coast of Africa, Arabia, and possibly Babylon through trade routes established via the Red Sea and Persian Gulf. Given that iron was unavailable, it's likely that Harappan maritime vessels were constructed from teak wood sourced from ancient forests in present day Kerala, India.

Vedic Age (2000-500 BC)

Ships, boats, and sailing on the sea are frequently found in ancient Vedic texts. The earliest of these texts is the Rig Veda, which mentions Varuna (the god of the sea), as well as the ocean pathways utilized by traders on ships for transporting goods from one region to another.



Traders travelled across oceans to acquire commodities and riches through trade. Later texts, such as those found in the Ramayana and Mahabharata, provide stories about ships and sea travel, while chronicles of sailors and their journeys through water can be found in the Puranas.

Nandas and Mauryas (500 - 200 BC)

Maritime commerce flourished throughout Asia during the Nanda and Mauryan dynasties providing an opportunity for Indians to engage in international trade while promoting their culture and religion across large areas of the world where they traded with merchants from Greece and Rome. Accounts from Greek historians and from Megasthenes also indicate that the navy and administrative abilities of the Mauryan Empire were able to successfully support its large volumes of trade during the reign of Chandragupta Maurya. The navy of Ancient India is considered the earliest known example of an organised naval force. The Arthashastra by Chanakya outlines a formal institution responsible for the control of the waters, describes naval warfare and specifies the different types of vessels used for merchant shipping and military operations.

Satavahanas (200-220 CE)

Satavahanas were the first native Indian rulers to use coins with images of ships on them, showing their strong maritime connections. The presence of coins with images of ships at various locations indicates that Indian culture, language and Hinduism likely spread to certain parts of Southeast Asia through maritime trade routes.

Gupta Dynasty (320 - 500 AD) - The Golden Age

The Gupta Empire was a time period associated with considerable benefit

culturally and scientifically. Key rulers in this area of growth include Chandra Gupta I, Samudra Gupta and Chandra Gupta II, whose reigns saw an increase in territory controlled as well as the amount of influence held over the surrounding area. Well recorded by Chinese visitors to India such as Fa Hien and Huein Tsang, the Gupta Empire was an extensive area of trade, a centre of Buddhism, and used advanced sailing and navigation techniques. Maritime trade grew throughout this period and connected India with Europe, Africa and the Southeast Asian region. Several new ports opened along the eastern and western seaboard, leading to increased trade across oceans. The Gupta Empire was an era of economic development and artistic creation, as well as architectural development.

Southern Dynasties

The Pandyas developed their skills as boatmen and traders of pearls across a trading network that extended all the way to China.

The Cheras were also trading with the Greeks and Romans by travelling through the rivers that empty into the Arabian Sea with the use of the monsoon winds from such Indian ports as Tyndis (modern day Periyapattanam), Muziris (modern day Pattanam) to Arabia.

The Vijayanagar Empire maintained a strong maritime presence in Southeast Asia during its reign (1336-1646 AD) while at the same time spreading Indian culture.



India's Maritime History: Sea-faring groups and Maritime Icons

By Dr. Neeta Khandpekar

Abstract

One can find during sea-faring groups along the vast coastline of Indian Peninsula and in the process has given rise to famous maritime icons. The first half of the paper highlights sea faring

The picture of 16th and 17th Centuries Konkan depicts peaceful coexistence of various religious communities (groups) engaged in maritime activities such as fishing, sea-faring, sea-trade, navigation, shipbuilding and net-weaving along its long coastline. These



groups on the west coast of India and the second half deals with some of the maritime icons like Siddis, Kunjali's, Kanhoji Angre and Marthanda Verma.

groups included Kolis, Gabbits, Bhandaris, Bhois, Mangelas, Daldis and Agris. Many of these groups supplied crew for the Maratha navy. The Kolis

Marine Sector during the Medieval Era (8th-19th century)-

In its heyday, India's marine sector was supported and enhanced by numerous powerful dynasties such as the Chola dynasty that made significant contributions to the Indian Ocean trade. The shipbuilding techniques of the Indian shipbuilders such as stitched ships and dhows, combined with the strength of the Indian navy allowed for the protection of trade routes during this period in history. As a result, the Indian merchant class was able to trade in goods such as spices and textiles with South East Asia, China and the Middle East, thus establishing India as a significant maritime trading hub.

This entire maritime system changed drastically with the onset of colonial rule in India. Numerous European nations such as Portugal, the Netherlands and Great Britain began to disrupt the local maritime authority. They set up trading posts along the Indian coastline and built significant ports in places such as Mumbai, Kolkata and Chennai. The ultimate result was the

loss of Indian merchants' authority over overseas trade. India was eventually used as a centre for European, particularly East India Company, commercial ventures throughout Asia.

Marine Sector during 1800s-

The shipping industry of India in the 1800s was controlled by the British East India Company and later by Britain itself, which caused the destruction of India's indigenous shipbuilding industry and control of its vast trade routes through the Indian Ocean. Additionally, Great Britain shifted from India's Control of the Indian Ocean to that of Britain through the 1800s.

The British East India Company depended significantly on its navy to ensure that it could outthrust all other nations engaged in trade in the Indian Ocean. Thus, it was able to protect its commercial interests and gradually push Indian merchants to the side. Although after 1814 the British East India Company lost its monopoly to trade in the Indian Ocean. Indian businesses did not find themselves in a better position. Although British privateers were able to trade within the Indian Ocean, every one of their ships was required to have British crew members and be commanded by a British officer.

Shipbuilding in Indian shipyards, particularly at Bombay and Surat had developed a reputation for using high quality teak with ship construction considered superior to that produced by British yards. The British colonial authorities implemented a number of regulations against the industry and there was also a great amount of agitation by Thames shipbuilders against the shipbuilding of India, thereby preventing the shipbuilding of India from becoming an important component of the British

economy. However, the high level of craftsmanship of ships built in India could not go completely unrecognized and a number of Indian built ships entered the British Royal Navy in the 19th Century.

There was a shift in shipping in the 19th century with the arrival of and increasing usage of steam powered vessels in the major port cities. The introduction of steam power provided faster and more reliable maritime transport. The opening of the Suez Canal in 1869 provided an important stimulus to maritime trade and reduced the sea distance between Britain and India and highlighted the increasing importance of coastal cities connected by this new direct route.

Marine Sector during Pre-Independence-

The early 1900s saw India's marine industry deteriorating significantly during British colonialism. Although indigenous shipbuilding was continuing to decline, Indian vessels were becoming increasingly reliant on the technology of Western countries because of the implementation of steamships replacing traditional boats. It was also during this period that the first Indian owned vessels started appearing with the launching of SS Loyalty, which ultimately upset the British monopoly on sea trade. Nevertheless, through all this early effort, the majority of the policies governing the development of maritime activities in India were not geared toward developing a maritime capability for India but instead were focused on the extraction of resources from India. However, these early Maritime reforms created a base for the resurrection of the Marine Industry in India following independence.



Marine Sector during Post-Independence & Modern Era (1947 - Present)

When India was divided into India and Pakistan, the Royal Indian Navy was split up between the two countries. India got approximately 66% of the navy's military vessel assets. After India became a republic on January 26, 1950, the naval service was renamed the Indian Navy as part of the change in identity. The emblem was redesignated to include the Ashoka Lion instead of the British Crown, with a different motto. This new motto was stated as a Vedic invocation to Lord Varuna, "Sam no Varunah!" ("That we may prosper together by thee, Varunah."). The motto from the Indian national emblem, 'Satyamev Jayate' (Truth Always Prevails), was placed below the emblem. Subsequently, Vice Admiral R D Katari became India's first Chief of Naval Staff on April 22, 1958, a significant accomplishment in establishing naval forces as an entirely Indianized military service.

Maritime India Vision 2030 (MIV 2030) and Maritime Amrit Kaal Vision 2047-

In March 2021, India's government announced the Maritime India Vision 2030, which will provide a 10 year plan to enhance India's overall maritime

capabilities. This plan will include a Maritime Development Fund (MDF), which will be established to substantiate and financially support the activities outlined in this vision. Overall, this vision will provide approximately ₹3 lakh crore (approximately \$41.44 billion) in investments for port infrastructures, with the potential for the creation of approximately 2 million jobs throughout the maritime industry.

The Maritime Amrit Kaal Vision 2047 expands upon this vision, providing a longer term, comprehensive approach to establishing India as a premier global maritime and shipbuilding leader by 2047.

The approach will be based on large scale investments projected at approximately ₹80 lakh crore

along with initiatives that include modernized ports, enhanced inland waterways, more environmentally friendly shipping solutions (e.g., hydrogen, methanol), and the incorporation of advanced technologies to achieve greater sustainability and efficiency in waterways.

After years of stagnation, the maritime sector in India has finally gained the strategic importance and policy support necessary to make India a true maritime powerhouse. Supporting the continued development of this sector will require successful partnerships to create a robust maritime industry capable of competing on an international scale, as well as creating an effective domestic shipping ecosystem that will help carry India's commerce globally and project India's capabilities internationally.

Policy Reforms & Structural Shifts in Maritime Governance

Premise

Rahul stood on the hot, dusty road outside the Mumbai port office. It was the summer of 2002 and he was tired. He had been waiting since morning just to get one paper signed.

Rahul ran a small business selling shirts to shops in Europe but getting his boxes onto a ship was a nightmare. He looked out at the water. A big cargo ship was sitting there, far from the dock. It had been waiting four days just to park. The cranes that lifted the heavy containers were old and often broke down. Even when they worked, they were slow. The people working there were government staff who didn't seem to care if the ship left today or next week. There was no rush.

Rahul knocked on the glass window of the office. "Sir, is my paper ready?" he asked. "Come back after lunch," the clerk said, sipping his tea. Rahul felt a knot in his stomach. His boxes were stuck in the yard. Every day they sat there, he had to pay a fine called "demurrage". On top of that, his buyer in Europe was emailing him, asking why the shipment was late again.

Back then, the "Port Trusts" ran everything. It felt like a slow government department, not a business. They owned the land, the machines, and set the prices. Rahul had no choice but to wait. He wiped his face and thought, "how can we do business if our gates to the world are always closed?"

Introduction

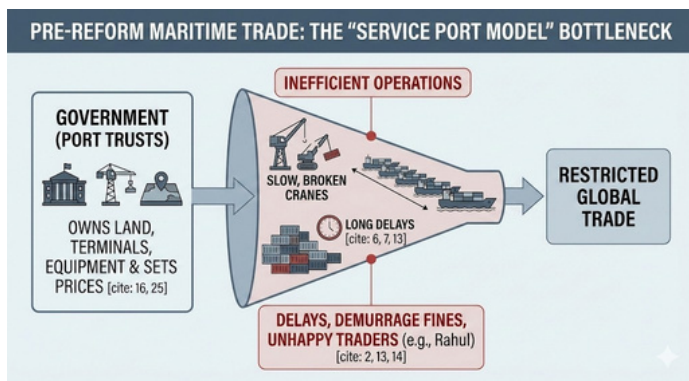
Rahul's story isn't just an isolated case of frustration. It captures a bottleneck that gripped the entire Indian economy before 2005. While individual traders were battling daily delays, the nation was watching massive economic opportunities slip through its fingers.

Looking at the geography, India is a maritime powerhouse. Data from the Ministry of Ports, Shipping and Waterways highlights a coastline stretching over 7,500 kilometres, a natural gateway to the world. Currently, the ministry reports that nearly 95% of India's trading volume moves by sea, making our ports the literal pulse of our economy.

However, a long coastline is only as valuable as the efficiency of its gates. For decades, India relied on the "Service Port Model", a legacy system where the government acted as the sole operator, owning the land, managing the terminals and maintaining the equipment. As Rahul's experience illustrates, this state monopoly often bred stagnation and inefficiency. Recognizing this, the government initiated a pivot toward the **Landlord Port Model**.

Under this modern framework, the government retains ownership of the land but relies on the expertise of private companies to handle operations. This shift has injected much needed capital, global technology and a competitive edge into the sector. This transformation has unfolded through three major milestones:

- 1. The National Maritime Development Programme (NMDP) 2005:** This served as the first genuine roadmap, signalling that India was finally open for large scale maritime investment.
- 2. Public-Private Partnerships (PPP):** By inviting private players to develop and run terminals, the government moved from being an operator to a facilitator and collaborator.
- 3. The Major Ports Authorities Act, 2021:** This was the independence day for ports, granting them the autonomy to make business decisions in real time rather than waiting for bureaucratic greenlight and red-tapism.



The First Step: National Maritime Development Programme (NMDP), 2005

To solve the problems faced by traders like Rahul, the government realized that minor changes were not enough. In 2005, the Department of Shipping launched the National Maritime Development Programme (NMDP). According to a Press Information Bureau (PIB) release from that year, this programme served as a detailed roadmap to modernize the maritime sector.

The government identified 276 projects to be completed over a period of seven years. The plan involved a massive investment of

approximately Rs. 55,804 Crores. The objective was not merely to replace old machinery, but to expand the actual capacity of the ports to handle more cargo.

The programme focused on three specific areas to assist traders:

- 1. Construction of Jetties and Berths:** The goal was to build more docking spaces. This ensured vessels had a designated parking space, reducing waiting times in open waters.
- 2. Deepening Channels:** The plan also involved deepening channels near ports to accommodate larger and modern ships.
- 3. Rail and Road Connectivity:** Unloading a ship is only half the job; the cargo must also leave the port. The NMDP included projects to improve the train lines and roads connecting ports to the rest of India.

This programme was a turning point. It represented the government's official admission that the old infrastructure was insufficient and that significant investment was needed to fix this infrastructure deficit.

The Rise of Public-Private Partnerships (PPP)

Although the government had a plan to build infrastructure, they realized they couldn't afford to fund it all themselves. They also knew that government run operations tended to be slow. To solve both problems, they brought in private companies to help, marking the start of Public-Private Partnerships (PPP).

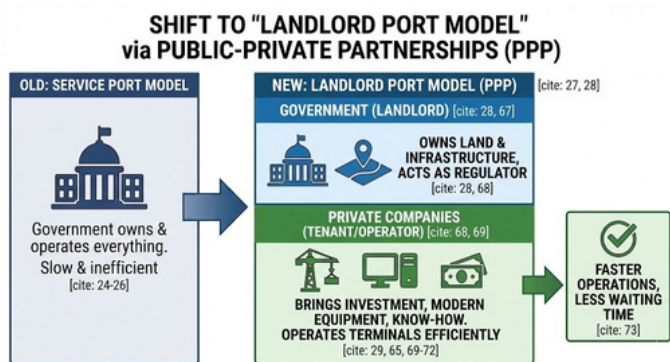
According to the Ministry of Shipping, the plan was straightforward. The government provided the land and waterfront access. In return, private companies brought in

capital, equipment and operational expertise. This transition shifted the sector from the Service Port concept to the Landlord Port concept.

In this model, the Port Trust retains control over the property and ensures rules are followed. The private company acts as a tenant, responsible for the actual work of loading and unloading ships.

This change significantly improved the situation for traders like Rahul and because private companies were driven to make a profit, they operated quickly. They installed modern cranes that could lift heavy containers in minutes rather than hours and introduced computer systems to track cargo.

The results were evident, improved and ships spent less time waiting. By allowing private players to handle operations, the government ensured that Indian ports could compete with global standards without bearing the entire financial burden.



Complete Commercialisation: The Major Ports Authorities Act, 2021

Even with private companies involved, the ports still faced significant challenges. The government bodies running them, known

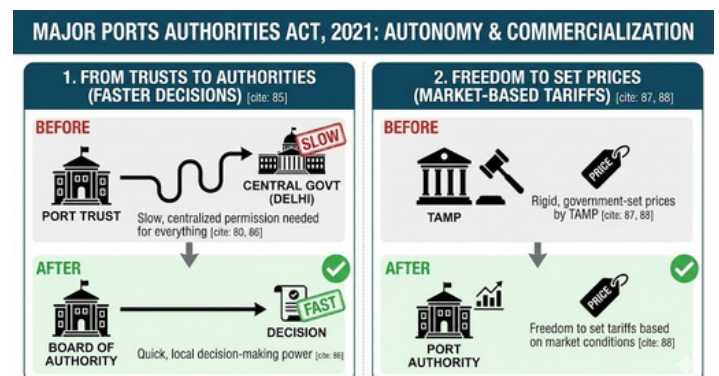
as Port Trusts, were operating under outdated rules from 1963. These Trusts were slow to make decisions because they had to seek permission from the central government for almost everything.

To fix this, the government introduced the Major Ports Authorities Act, 2021. A study in the International Journal of Innovative Research in the Multidisciplinary Field noted that this Act was the step needed to make ports function like modern businesses.

The Act implemented two major changes:

- 1. From Trusts to Authorities:** The old port trusts were converted into Boards of Authorities. These new Boards were given the power to make decisions quickly without waiting for approvals to come back from Delhi.
- 2. Freedom to Set Prices:** Previously, a separate regulator (TAMP) decided port prices, which was a rigid and slow system. The 2021 Act gave ports the freedom to set their own tariffs based on market conditions.

This law created a level playing field. It ensured that government owned major ports finally had the same operational freedom as private minor ports, such as Mundra or Pipavav.



Conclusion

India's maritime sector has undergone a significant transformation. Previously, traders like Rahul faced days of waiting just to get a simple signature. The ports suffered from slow operations, outdated machinery, and rigid rules.

However, the situation has changed due to the three key reforms discussed. The NMDP in 2005 provided the roadmap for infrastructure repair. Subsequently, the Public-Private Partnership (PPP) model introduced efficiency and operational energy into the sector. Finally, the Major Ports Authorities Act of 2021 granted ports the autonomy to operate as commercial businesses.

Today, Indian ports have evolved from being mere government departments into engines of economic growth. Although further efforts are needed to match the best global standards, the essential foundation has been established. The barriers to trade have been removed, effectively ending the long wait for traders like Rahul.

India's Trading Volume Moving by Sea



According to Ministry of Ports, Shipping and Waterways data, ports are the most critical part of the economy [cite: 21, 22].

Port & Maritime Infrastructure- Port Infrastructure

India's engagement with global trade depends heavily on what happens at its ports. Nearly 95 per cent of the country's foreign trade by volume and around 70 per cent by value moves through sea routes. This makes ports far more than just physical infrastructure. They act as India's main connection to international markets. Spread across a coastline of about 11,098Km kilometres, India's port system includes a wide range of facilities that differ not only in size but also in the way they are managed. Over time, this system has moved away from being completely government-run towards one where private firms play a larger role in daily operations.

Major Ports vs Non-Major Ports in India

Ports in India are divided into two types: Major Ports and Non-Major Ports. This is not just an administrative distinction, as it directly affects how ports function. It influences how quickly decisions are taken and how easily investment can flow into port development. Because of this, the difference between major and non-major ports is important for India's port sector.

The government is in charge of the ports. This is done by the Ministry of Ports, Shipping and Waterways. They are a part of the Central Government.

India has 12 ports that are working right now. The government is planning for the future. They are getting ready for trade. This is why they approved the Vadnavan Port project in Maharashtra.

The smaller ports are controlled by the states. They have their boards to take care of the ports. There are a lot of ports in India. More than 200 of them are official. Only some of them are actually used for shipping goods. 66-78 of the smaller ports are used for commercial cargo. The Ministry of Ports, Shipping and Waterways and the state port authorities are in charge of these ports, including the ports and the non-major ports. Some ports that are not considered major like Mundra in Gujarat actually handle more cargo than a lot of major ports. This means that just because a port is not officially a port it does not mean it is not really important for the economy. Mundra ports and other non-major ports, like it are an example of this. They show that what a port is called does not always matter. What matters is how much cargo Mundra ports and other ports can handle.

The way ports are run changed a lot when the Major Port Authorities Act was introduced in 2021. Before that major ports worked under a trust based system. This system was slow because it took time to make decisions. The new Act changed this. Now ports have a board that makes decisions. This means ports have control over what they do with their land, how they plan their infrastructure and how they handle their money. One big change was getting rid of the Tariff Authority for Major Ports also known as TAMP. The Major Port Authorities Act made this change to help ports work better. Major ports are able to set their tariffs now. This is based on what's happening in the market. It helps major ports compete with

non-major ports in a better way. Major ports can make their tariffs lower or higher depending on the market conditions. This means major ports and non-major ports can compete fairly with each other.



they also brought machines and ways of managing things, which helped the ports get modernized faster. Because of this the amount of money invested in Public-Private Partnerships at ports went up a lot between the years FY23 and FY25. Private Partnerships are clearly a good way to get things done at ports in India. At ports such as JNPA, privately operated terminals have generally performed better than publicly managed berths, particularly in terms of crane efficiency and vessel turnaround time.

East Coast vs West Coast Ports

The maritime trade of India is split into two parts, the coast and the eastern coast. India's maritime trade on the coast and India's maritime trade on the eastern coast are really different because of where they are located and the money involved.

Public-Private Partnerships and the Landlord Model

After 2021 major ports started to use the landlord port model. The port authority still owns the land. It makes sure everything runs smoothly, while private companies take care of the terminals and handle the cargo. So the government still has control over the things while private companies do the everyday work. They try to do things efficiently because they are in charge of running the port terminals and handling the cargo. The landlord port model is what major ports are using now.

Private Partnerships have really helped India increase the capacity of its ports over time. The government could not pay for port projects on its own so it made sense to get private companies involved. These private companies did not just bring money

The West Coast is really important for container traffic and liquid bulk cargo. This is because it is close to international shipping routes that connect India with Europe, the Middle East and the Americas. The West Coast plays a part in this.

JNPA is the container port in the country. It handles more than half of India's containerised trade. On the other hand, Deendayal Port is a key place for petroleum and bulk cargo. The West Coast and its ports like JNPA and Deendayal Port are very important for India's trade.

The East Coast ports are different from the others. These ports mostly deal with coal and iron ore and other minerals. The Paradip Port is very good at handling cargo. It is one of the ports in the country.

The reason for this is that there are power plants and industries on the East Coast that need a lot of cargo. These power plants and industries are situated near the sea.

The Paradip Port is doing a job because power plants and industries near the East Coast need so much cargo. The Paradip Port is really good because of the demand from these power plants and industrial areas on the East Coast. The Paradip Port is taking advantage of this demand and is doing very well.

In India there is something that really sets the two coasts apart and that is how deep the water is. The ports on the West Coast of India have water that's naturally deeper, usually between 14 and 16.5 metres. This means they can easily handle ships.

The East Coast of India is different. The water is not as deep, it is usually between 12 and 14.5 metres. This means they have to dig up the sand and mud from the bottom of the water so that ships can still come in.

Ports on rivers like the one in Kolkata have to spend a lot of money to dig up the sand and mud. The Indian ports on the West Coast do not have to do this much because the water is deeper. The draft depth of the West Coast ports is very important. The draft depth of the East Coast ports is also very important. It is not as deep as the West Coast ports.

Environmental conditions also affect how ports operate. The East Coast is more prone to cyclones and siltation, which can frequently disrupt port activities. The West Coast, although less exposed to extreme weather, faces other challenges such as congestion, limited availability of land, and pressure on nearby road and rail networks.

Table 1: East Coast vs West Coast Ports

Coast	Key Ports	Draft Depth	Cargo Profile	Key Challenges
West Coast	JNPA, Mundra, Deendayal	14m-16.5m	Containers, petroleum, liquid bulk	Congestion, land constraints
East Coast	Paradip, Visakhapatnam, Chennai	12m-14.5m	Coal, iron ore, dry bulk	Siltation, cyclones

Determinants of Port Performance

A port is a port when it can handle ships quickly. Ships need to be able to come and go from the port without waiting for a long time. We need to think about things like how it takes to turn a ship around at the port and how well the spaces where the ships dock are being used. The port needs to be able to move cargo in and out of the port without any delay. A port like this is a port that works well for ships and for cargo.

The time it takes for a ship to get in and out of a port is called vessel turnaround time. This time has gotten shorter and shorter over the ten years. Big ports can now handle ships faster than they used to. At some of the good terminals at JNPA, a ship

can get in and out in about 22 hours. The ports are also getting better at loading and unloading ships because they have machines and ways of doing things. Even with all these improvements ships are still spending too much time just sitting at the dock. This usually happens because the workers are not coordinated well or because there are problems with the equipment.

When we talk about ports, connectivity with the surrounding areas is really important. Ports that have train and road connections can move cargo more easily which helps to reduce traffic jams. The internet has also played a role in this. Things like the Port Community System, which is also known as PCS 1x and the National Logistics Portal also called Marine or Sagar Setu have been very helpful. These systems bring all the people involved in the process onto one website. This has made a difference because now we do not have to deal with so much paperwork and cargo does not get stuck for as long. The Port Community System and the National Logistics Portal have really helped to reduce the time containers have to wait.

Global Benchmarking: Mundra Port vs Port of Singapore

Looking at Mundra Port alongside the Port of Singapore helps place Indian ports in a global context. These two ports are often compared because they highlight how an Indian port like Mundra performs when measured against one of the world’s major maritime hubs.

Mundra mainly works as a gateway port, meaning that it handles cargo meant for

India’s own imports and exports. It was the first Indian port to handle more than 200 million metric tonnes of cargo in a single year, with container traffic of around 7.4 million TEUs. Singapore operates in a very different way. It is primarily a global transshipment hub, where most containers are transferred between ships instead of moving into the domestic market. In 2024, the Port of Singapore handled over 41 million TEUs.



Table 2: Mundra Port vs Port of Singapore

Coast	Through put (TEUs)	Role	Automation Level	Avg. Turnaround Time
Mundra	7.4 million	Gateway	Moderate	0.7-0.9 days
Singapore	41 million	Transshipment hub	High	1 day

Sagarmala Initiative

Introduction

The Sagarmala Initiative represents another thoughtful move launched by the Indian Government to remake and develop its marine infrastructure in India. From the early months of 2015, when it was first approved in the Indian Cabinet, the Sagarmala Initiative has been administered by the Ministry of Ports, Shipping, and Waterways.

India has a long coastline measuring 11,098 Kilometers km and 14,500 km of waterways. The goal of Sagarmala is to develop these resources and utilize them for the economic development of the country. The plan is not limited to "port development" but rather "Port-led Development" of the regions surrounding the ports.



“The Vision”: Port-Led

The overall vision of Sagarmala is to lower the Freight costs. Presently, logistics costs in India stand higher (approx. 13-14% GDP ratio) as opposed to the developed world (8-10% GDP ratio). By moving transportation of goods and people from the existing roads and railways to the waterways, the Sagarmala project hopes to:

1. **Lower Logistics Costs:** The transport charges for waterways are lower compared to road transport and rail transport.
2. **Encourage Exports:** Reduced transport costs will make Indian commodities cost-effective internationally.
3. **Job Creation:** A significant number of job opportunities will be generated for coastal communities.

The Four Pillars of Sagarmala

The Sagarmala program essentially stands on four strong pillars to make this vision of "Port-led Prosperity" a reality. These pillars cover the entire gamut of maritime development, from building ports to helping people constituting its immediate neighborhood.

Pillar 1: Modernization of Ports and Development of New Ports

This pillar is directed at increasing the capacity of our ports. At present, many of the older ports are congested and cannot handle large modern ships.

1. **Expanding Existing Ports:** Modern technology is being installed for quick loading and unloading of ships.
2. **New Ports:** Six new mega ports, including the Vadhavan Port in Maharashtra, are in the pipeline to meet the increased trade volume.

Pillar 2: Improvement of Port Connectivity

A port is only useful if goods can reach it easily. This pillar ensures that cargo can move quickly between the port and the factory.

1. **Railways:** Building dedicated freight corridors to carry heavy goods.
2. **Highway:** Setting up new roads to connect the ports directly to the highway network.
3. **Pipelines:** These are used to transport liquid cargo like oil and gas, which is safer and cheap.

Pillar 3: Port-Led Industrialization

This pillar is bringing the factories closer to the ports to reduce the cost of transporting raw materials and finished goods.

Current Status and Data Analysis

In order to gauge the magnitude of Sagarmala, it is necessary to examine the data. The project requires enormous funding with a number of projects lined up along the Indian coast. In this report, the status of the project with respect to funding will be examined.

Project Overview

The Sagarmala programme is not a single project but a collection of hundreds of smaller projects (approx. 276 projects) with an estimated investment of ₹5.79 Lakh Crore.

Progress Report (Implementation Status)

These projects are being tracked by the government using the categories:

Completed, Under Implementation, and Under Development.

1. **Projects Completed:** There are approximately 262 projects that have been fully completed and are functional, adding value to the economy.

2. **Under Implementation:** Approximately 276 projects are involved in ongoing construction.
3. **Under Development:** The other projects are at different levels of planning and tendering.

Investment Distribution

The source of funding for Sagarmala is from diverse sources. The major source of funding is Public-Private Partnering. This means that it collaborates with private organizations for funding development.

1. **Port Modernization:** This industry requires the most funds for modernization efforts.
2. **Connectivity:** The budget spends considerable amounts on track development for the Ministry of Railways and road development for connectivity with ports at the Ministry of Road Transport and Highways.
3. **Coastal Community:** A special portion of the funds is allocated for the welfare and skilling of coastal communities.



Achievement & Impact

Since being launched in 2015, the Sagarmala Initiative has proven fruitful. This program has led to a shift in trade in India that has optimized the maritime segment.

Key Success Stories

The effects of the project can be seen through the efficiency of the ports of India.

- **Reduced Turnaround Time:** Turnaround time refers to the time a ship remains in the port for the loading and unloading of goods. Traditionally, ships used to remain in the port for days altogether. But this turnaround time has been significantly brought down (from an average of 4 days in 2014 to less than 2 days now) with Sagarmala.

Real-World Example: Ro-Pax

1. **Ghogha-Hazira Ferry (Gujarat):** This is a ferry that links two major economic centers. Previously, trucks and cars took around 10-12 hours to cover approx. 370 km in order to move from one point to another.
2. **The Impact:** The distance between the two points that had to be covered using the sea route was only 90 km. It took only 4 hours to do so. It has saved a lot of fuel and decreased the traffic on the roads.

Economic and Environmental Benefits

- **Improving:** The initiative is improving export capabilities and significantly reducing carbon footprints by moving cargo from road to sea.

Challenges and Future Outlook

Although Sagarmala has done many things, there are many challenges in this large project. It is important to acknowledge these challenges to have an overall perspective.

1. **Land Acquisition Challenges:** When new ports and new roads are to be constructed, they need to be built on a new site, which requires new land to be acquired. Acquiring a new site is not an easy process and can result in delays since it may entail legal issues.
2. **Private Sector Participation:** The government has to depend on private firms for funding. In some cases, private investors may hold back on funding because world trade could be unstable.
3. **Connectivity Delays:** Even while the ports are being upgraded at a very rapid pace, the connectivity by road and rail (last mile connectivity) at times tends to be slow.

The Future: Maritime Amrit Kaal Vision 2047



However, the government already has its eyes set on other ports besides Sagarmala. "The future of maritime activity in India is articulated through 'Maritime Amrit Kaal Vision 2047.'" It stands on the "agenda laid down by Sagarmala."

1. **Green Port:** Ports in the future will be fully carbon-neutral; this will be assisted by solar and wind energy.
2. **Smart Ports:** Using advanced digital technologies and automation to manage port traffic.

Conclusion



The Sagarmala Initiative is more than just a construction project. It is an economic game changer for India. By shifting focus from land to sea, India is finally utilizing its greatest natural asset, its vast coastline.

Although there are challenges like land acquisition and funding, the progress made in the last decade is undeniable. Reduced logistics costs and faster export times prove that the vision of "Port-led Prosperity" is working. As India moves towards becoming a developed nation, Sagarmala will remain the backbone of its trade and industry.

Vizhinjam Trans-shipment Port vs Colombo

The Vizhinjam International Deepwater Multipurpose Seaport is an infrastructural marvel located in Vizhinjam, a coastal town of Thiruvananthapuram, Kerala. It is handled by Adani Ports and Special Economic Zone Ltd. (APSEZ) in a Public-Private-Partnership with the Government of Kerala. This port is equipped with an AI-powered Vessel Traffic Management system. Formally regarded as the 'Port of the Future'. Vizhinjam port boasts an all-weather immunity as an international shipping line. It is located at a distance of 10 nautical miles from the Suez-Far East shipping route, facilitating a concatenation of Europe, the Gulf, and the East-West maritime corridor. It is India's first Container Transshipment Terminal having a capacity of 4.10 million TEU/annum, while the other Indian ports combined barely have a capacity of 4.61 million TEUs/annum.

Vizhinjam is strategically positioned to receive and anchor at least 50% of roughly 20,000 ships that frequent the Suez canal every year. A port's capacity is measured by the displacement (weight) it can handle for anchored ships. Vizhinjam's natural depth of 23 metres empowers it to harbour ships bearing displacements of up to 3,00,000 tons. This is a mammoth figure as existing ports in India barely handle 2,00,000 tons of displacement. According to official reports, Vizhinjam can harbour supertankers and container motherships, commonly referred to as Ultra-Large Container Vessels (ULCVs), carrying more than 24000 TEUs.

The Vizhinjam port is an economical project as India is heavily dependent on foreign ports of Colombo, Singapore and Salalah (Dubai) for 61% of its export and



import transshipment. This dependence is extortionate as it imposes additional costs of up to \$200 per TEU of cargo interests paid by Indian exporters, constituting 11.4% of cost, insurance and freight value of goods. Economists have estimated that India could save up to \$100 million which was earlier drained in maritime foreign exchange. Domestically, this project will generate 5,500 job opportunities, especially bearing an all women team for operating its crane systems. Vizhinjam port's land based transshipment feature, categorised by its storage capacity and docking piers, is expected to minimise turn-around time for vessels. This reduces the cost of importing crude oil, India's largest import.

As stated formerly, 75% of Indian origin or destination containers are transshipped at foreign ports every year, with the Colombo port alone handling 2.5 million TEU of these shipments, resulting in losses of over \$220 million per annum. It is argued that the Vizhinjam port is a strong contender to the Colombo port, the IOR's busiest transshipment port.



This claim is backed by evidence of the economic benefits derived from the Vizhinjam port compared to Colombo. The Vessel Related Charges (VRC) is much lower in Vizhinjam port as compared to that in Colombo port. For a 24 hour stay at Vizhinjam, ship owners are charged \$10000 towards VRC, as opposed to \$21000 in Colombo. Moreover, Colombo port has a shallower depth, roughly 18 metres, while Vizhinjam boasts a depth of 23 metres, making the latter more suitable for handling ULCVs. The arrival of MSC Irina, world's largest container ship by TEU capacity, at Vizhinjam Port stands as a testament to its accommodative capacity.

Over the years, the Colombo port has run out of capacity because of being increasingly congested. As a result of which, the Vizhinjam port is not only economically viable but also geopolitically empowering as it is in India's interests that our dependence reduces on the Sri Lankan ports.

This minimises India's vulnerabilities at a time when China and Sri Lanka have partnered to construct and operate the Hambantota Port, developed to off load the burden of Colombo Port. Thus, redirecting Indian shipment to Vizhinjam would be sensible to combat and prevent Chinese control on India's maritime activities.

As this project advances, there are challenges awaiting for the port. Primarily, the unpredictable torrential weather, influenced by the Arabian Sea and Bay of Bengal, can bring operations to a standstill. The absence of an Immigration Check Post makes it difficult to enforce crew changes in vessel operations. Moreover, International shipping lines with mixed nationality crews face route limitations. However, structural improvements and cooperation will redress these issues and will establish Vizhinjam as a major transshipment hub in the IOR.



Maritime Trade Geography & Strategic Corridors- 3 Ring Structure of India's Maritime Trade

Three Ring Structure of Maritime Geography

The Indian Ocean Region (IOR) is viewed through a three-ring structure which is created to maintain regional stability and protect national interests. The Inner Ring focuses on India's closest maritime neighbour and a central partner in the trilateral "Dosti" exercises which is Sri Lanka. This region acts as a vital node for northern IOR security, where India maintains the "Slinex" naval drills to ensure interoperability and counterbalance external influence. The Middle Ring is defined by the Gulf region, which serves as the world's most significant energy corridor. Trade volumes here are great, with over 25 million barrels of oil transiting the Strait of Hormuz daily to serve major importers like India, China and Japan. India has secured this ring through deep military relations with Oman, utilizing the Thumrait airbase for shipments and obtaining berthing facilities for anti-piracy patrols. Another essential security partner in this ring is Qatar collaborating on intelligence sharing and maritime security. Key commodities in the Middle Ring include crude oil and Liquefied Natural Gas (LNG), which are fundamental to the economic steadiness of the region. The Outer Ring extends to East Africa, where India is strengthening relations with energy-rich nations to diversify its hydrocarbon

sources.

The cornerstone transshipment hub for this extension is Singapore, which provides the Indian Navy with friendly berthing facilities for entrance and exit from the IOR. India also maintains substantive naval exercises like "Simbex" with Singapore and "Ind-Indo Corpat" with Indonesia to ensure chokepoint control. These rings interact operationally through the deployment of "Blue Water" naval assets that present the flag throughout the entire region to secure sea lines of communication (SLOCs). Partners such as Mauritius and the Seychelles are critical to this ring, frequently receiving Indian military apparatus and training to perambulate their Exclusive Economic Zones. Mozambique represents a strategic pillar of the Outer Ring, where the Indian Navy projects stability by patrolling sensitive straits with local consent.



Major Sea Lanes and Importance for India

The Strait of Hormuz is the world's most important energy chokepoint. It allows the movement of 11.1 percent of global seaborne trade volume. This strait is the main route for crude oil, propane, and natural gas, making it crucial for India, which imports 26 percent of its total energy consumption. The risk of disruption in this narrow passage is high due to regional instability and geopolitical tensions. These factors can lead to supply shocks and price spikes in energy. The facilities of Gandhinagar, Gujarat are asked by the Indian Navy to to keep a close watch on this critical route. India's energy security depends heavily on the stability of Hormuz. Overland pipelines have become risky because of Growing instability in Central Asia which increases our reliance on maritime transport. The Indian Ocean is connected to the South China Sea by the Strait of Malacca and is a vital trade route between East Asia, Europe, and the Middle East. It is one of the busiest waterways in the world, handling 23.7 percent of global seaborne trade and 45 percent of the world's crude oil. The Strait is a significant bottleneck, narrowing to just 1.5 nautical miles in the Phillips Channel, which causes substantial congestion. In mid-2024, rerouting vessels led to waiting times at the Port of Singapore nearly doubling to 40 hours. At the northern entrance of the Strait, India holds a strong position because the Andaman and Nicobar Islands are only 160 km from the chokepoint. This geographic advantage gives India the potential to block Chinese access to the Indian Ocean, which addresses the so-called "Malacca Dilemma." These sea lanes are crucial for Indian logistics because six percent of the nation's hydrocarbon imports pass through the South China Sea.

India's 2007 Maritime Military Strategy highlights controlling of these chokepoints as a key aspect of international power relations.



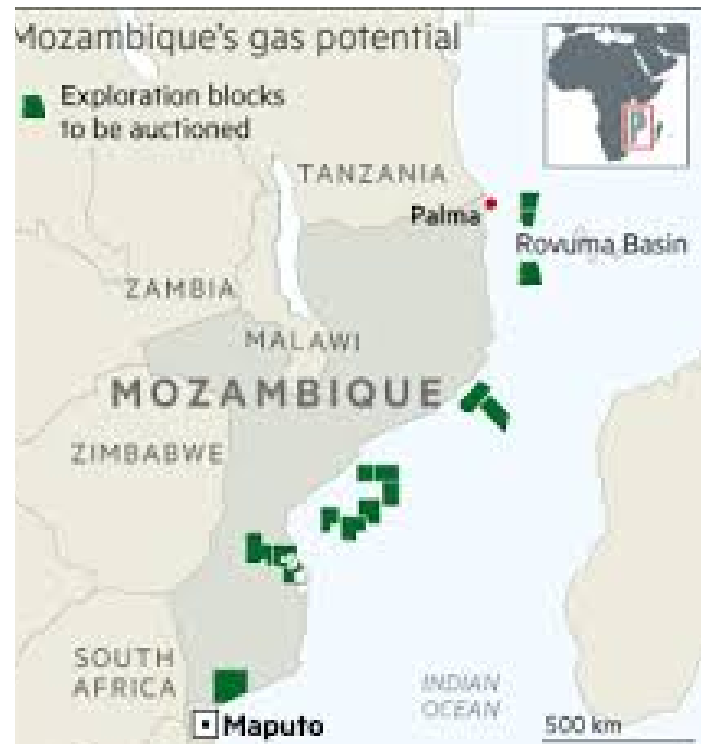
Prospects of African Oil - Mozambique

Mozambique has substantial energy potential, the region is very rich in both oil and gas fields. African oil and gas reserves are increasingly viewed as a strategic stimulation to Indian Ocean trading networks as emerging Asian powers seek to diversify their energy imports. India's oil and gas policy primarily targets Mozambique's hydrocarbon resources, which seeks to reduce reliance on the politically challenging Persian Gulf. The Mozambique Channel serves as a critical backup route for international energy trade in the event of disruptions in primary chokepoints like the Red Sea or the Suez Canal. Export logistics are significantly influenced by Mozambique's strategic ports, such as Beira, which offer deep water facilities for replenishment services. These ports are gaining relevance for Asian markets as alternative hubs, especially when congestion increases in South African ports due to rerouting around the Cape of Good Hope. India has established a long-term strategic presence in this area through bilateral security ties, including agreements for the patrolling of sensitive straits. The

Indian Navy provides military apparatus and conducts joint patrols to ensure the safety of maritime lanes in the southwestern IOR. Mozambique's strategic value is further enhanced by its role in India's broader effort to counterbalance the rising Chinese influence and the perceived "String of Pearls" strategy. While Mozambique is currently listed among the more unstable nations in the region, its continuous economic development is expected to offer further strategic growth for IOR trade networks. Mozambique is central to India's vision of being a principal maritime security provider, extending its influence across the "Outer Ring" to the African coastline.

The integration of Mozambique into Asian energy supply chains is vital for sustaining the economic engines of rising powers in the 21st century. Long-term stability in the

Mozambique Channel is therefore a prerequisite for uninterrupted energy supplies and international trade resilience.



Major Sea Lanes & Their Importance

Major Sea Lanes & their importance

India has a vast network of over 7,500 km of coastlines and several thousand km of inland waterways that make up its freight logistics network. According to a government report, it is estimated that over 95% of the freight (by volume) within India is transported by sea. The Indian Government has identified a strategy to maximize the potential of this mode of transportation through the development of a Port-led Economy and has implemented several initiatives including the Sagarmala Program. The Sagarmala Program was developed specifically to foster the growth of Coastal shipping and Inland Waterways to reduce the cost of transport and to provide capacity for the ever-increasing demand for Freight by implementing a National Perspective Plan for Sagarmala, which projects that the Port Capacity will increase from 2,600 MTPA (Million Tonnes Per Annum) today to 3,300 MTPA by 2025 in order to satisfy the future demands of Freight transport.

Major Sea Lanes

Strait of Malacca, which separates Sumatra from Malaysia/Singapore and joins the Indian and Pacific Oceans, thus making it the shortest route from one ocean to another, and almost 1/3rd of global cargo transported across global boundaries all over the globe pass from the Strait of Malacca. It alone holds the significance of carrying 16 million barrels per day from this Strait, which makes up 25% of global cargo transport of oil from all over the oceans in the globe.

It thus provides a clear insight into the level of necessity of the Strait of Malacca itself in global energy transactions between the Middle East and Asia in particular. Since it holds significance for at least 50% of Chinese and 90% of Japan's total cargo which arrives in the Strait of Malacca, it shows why global powers in India have also enhanced overall sea surveillance in transport of cargo in different oceans in the globe by building more infrastructure in the Andaman and Nicobar Islands of India itself, which lies in its periphery with defensive coalitions of a few global nations.

The Suez Canal is the quickest maritime route connecting Europe and Asia. It opened in 1869, handling "around 12% of world trade volume and 30% of world container traffic. An average of 50 vessels pass through the Suez Canal each day, carrying a total volume that currently stands over 1 billion tons per year. The canal also handles around 7-10% of world oil exports, or 1 million bbls/day, as well as 8% of world liquefied natural gas. In terms of benefitting India, the use of the Suez Canal cuts voyage times for India-Europe as well as India-East Africa voyages by around 15 days compared with the route around Africa. In 2023, 22% of world seaborne container traffic passed through the Canal. But lately, because of regional conflicts such as those within the Red Sea, ship costs surged, with many carriers skipping the canal route via the Cape of Good Hope.

India gets hit hard here, as trade with Europe, North Africa, and the Americas, around 35% of India's international trade, currently passes through the canal. The Strait of Hormuz is the chokepoint through

which a substantial portion of Persian Gulf oil exports passes. More than 20 million barrels per day of oil (approximately 20% of world petroleum demand) went through Hormuz in 2024.

It is now and has been since 1988, the world's most active international strait by a large factor. Approximately 20% of world liquefied natural gas (LNG) trade also passes through Hormuz. Of this traffic, Indian refineries depend on Hormuz imports to meet in excess of two-thirds and half their respective oil and natural gas liquid needs. The absolute level of Indian oil flows through Hormuz in Q1-25 was approximately 1.5 m barrels per day. By far, the main destination of Gulf oil and gas exports through Hormuz is Asia. The main customers there include China, India, Japan, and South Korea. Hence, Indian and international strategic stability depend on Hormuz. A blockade on Hormuz in situations such as war would present a problem in terms of alternative routes and costs. For example, there is now in operation a Saudi-East-West Pipeline.

The route that goes around the southern part of Africa, known as the Cape of Good Hope. It is not only a strategic chokepoint but also the alternate route via Suez or Malacca is blocked. It increases voyages by thousands of miles. Indian carriers prefer not to use the route around the cape, as it's longer, but since the 2023 crisis involving Red-Sea area security, many have routed their container ships around the cape. The route increases voyage times, as for Europe, it's another 15 days, as well as boosting shipping costs, but it ensures maritime security. Due to the current flare up of violence, the number of TEUs traversing the Suez Canal decreased by about 82% as more routes were taken via the route

around the cape. Over 600 main size container ships have changed routes up until February 2024 that traverse routes that circle around the cape instead of the canal.



Strategic Importance to India

India's plans for its economy and military purpose are focused, in part, on these sea lanes. 95% of India's trade flows through ocean shipping, therefore, every exporter and importer in India depends on getting their goods from one country to another via the oceans without interruption. Accessing the Suez Canal makes trade between Europe/America and India easier. Accessing the Malacca Strait allows India to participate in the explosive growth of East Asia. Disruptions to shipping in the Hormuz or Malacca Straits lead to increased freight and insurance charges and market research shows that any disruption in the Hormuz or Malacca Strait leads to increased inflation (due to higher product prices) and reduced GDP. With regard to escaping the threat of disruption to the flow of energy resources from the Middle East, approximately two-thirds of India's oil supply comes through the Hormuz Strait. The Malacca Strait is equally important in delivering oil and LNG necessary for the

development of India's industrial and transportation sectors. To mitigate the possible risks of interruption of this flow of energy resources from the Middle East and Asia, To mitigate the possible risks of interruption of this flow of energy resources from the Middle East and Asia, India has invested in building strategic reserves and alternative energy sources. However, despite such an effort, the shipping routes remain and shall continuously be the main shipping routes in obtaining energy resources.

Naval plans: India has established itself in the area considerably. The Andaman & Nicobar Command (the only tri-services military command in the country) is taking care of the Malacca Straits gateway. It has set up bases (for instance, INS Baaz at the entrance to Malacca, a new one in Lakshadweep) to keep a watchful eye on SLOCs. The presence of Indian warships and Coast Guard patrols takes place on a regular basis in the Indian Ocean and the Straits of Malacca, often jointly with partner countries (Singapore, Indonesia, the U.S., Japan) to dissuade piracy and ensure that seaborne routes remain free. It has also deployed its ships to escort their country's ships through the Strait of Hormuz during periods of tension.

Regional Security: India believes that any incident restricting international shipping routes increases the overall cost of maritime trade. Piracy along the Eastern coast of Africa forced many vessels to reroute around the Cape of Good Hope, highlighting risks linked to the Suez Canal. At the same time, growing competition among major powers in the Indo-Pacific has increased strategic focus on the region, creating opportunities for India to promote freedom of navigation through the IMO and UN, while supporting anti-piracy and

maritime training initiatives under its SAGAR vision-“Security and Growth for All in the Region.

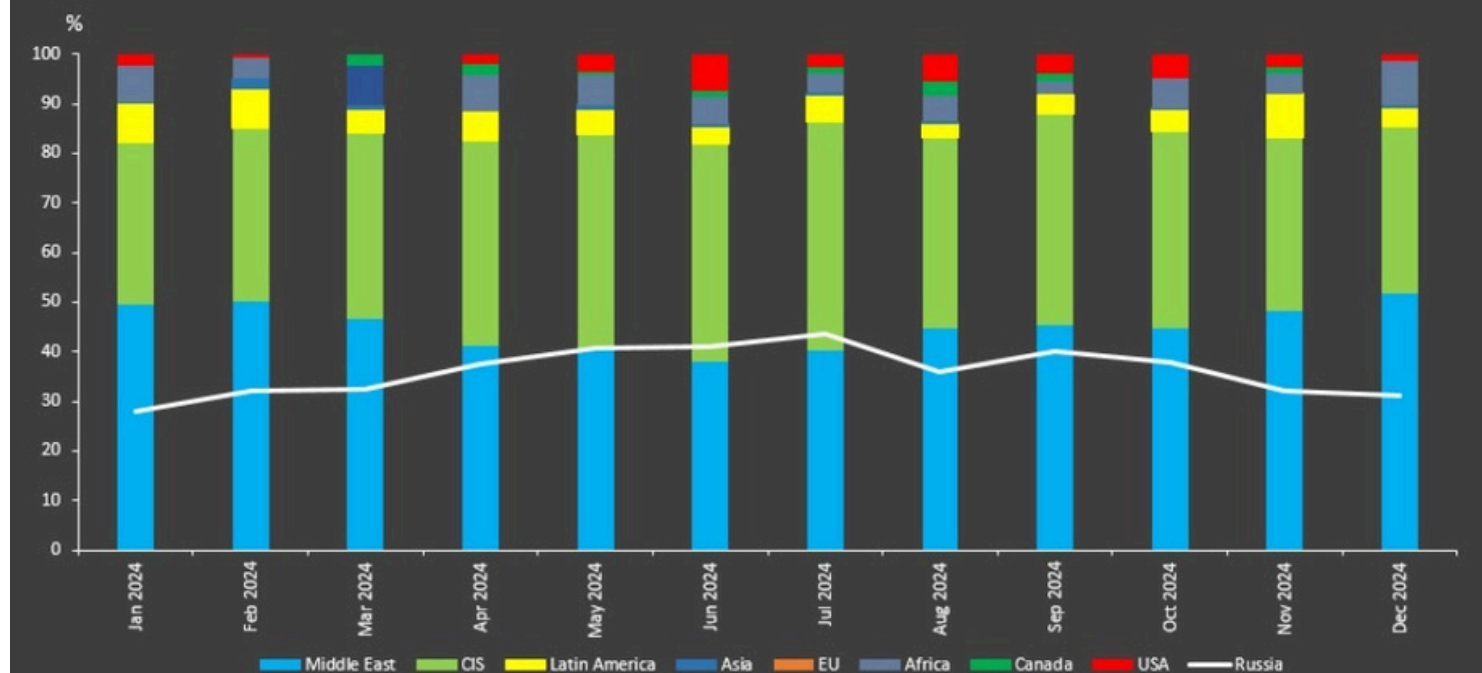
Data and Analysis

To assess these routes, consider the traffic and trade volumes they handle. The table below highlights approximate oil transit volumes:-

Sea Lane	Oil Transit (million barrels/day)	Portion of Global Trade
Malacca Strait	16	33% of world trade flows and 1/3 of maritime trade
Hormuz Strait	20	20% of global oil and 25% of seaborne oil trade
Suez Canal	1	12% of global trade and 30% of container shipments

Share of various regions in India's oil imports

...Middle East's share in India's Dec crude mix rose to a 22-mth high on lower Russian imports



The Energy Analysis highlights the concentration risk as well. 5.5 million barrel per day oil consumption in India includes approximately 1.5 million barrels per day that comes from Hormuz (which is approximately 27%). On the other hand, only a small portion of oil from the Middle East can reach India by way of alternate pipelines (with a capacity of around 2.6 mill barrels per day from Gulf Pipeline). When looking at Trade, when disruptions occur there is a cost associated with it, after 2023.

Conclusion

India's economy and energy supply are largely dependent on the main global sea lanes that act as lifelines. The Strait of Malacca, Suez Canal, Hormuz and routes around the Cape of Good Hope facilitate a major part of world trade, especially oil and products bound for India. 30% of global seaborne trade is routed through Malacca.

The canal handles approximately 12% of the total trade, and the Hormuz strait accounts for one fifth of the global oil supply. On the other hand, these are stretches of waters which also face the strategic risk of war or blockade, any one of which may lead to a drastic disruption in India's import. Apart from developing naval capacities and securing regional partnerships for the security of these lanes, India has also been actively pursuing trade and infrastructure related measures for risk pooling. Updating maritime traffic data on a regular basis (through organizations such as IMO and UNCTAD) and adoption of flexible policy, for example, the use of renewables resulting in less dependence on fossil fuels will be extremely crucial. The supply and security of these sea lanes have thus always been, and continue to be, the key pillars of India's maritime strategy and commercial success.

Strategic Corridors

The Indian Ocean has never been just a vast stretch of water. It has long served as the world's commercial crossroads. Today, it carries a large share of global maritime traffic and remains central to international trade. By connecting Asia, Africa, the Middle East and Europe, it brings together some of the busiest and most strategically important trade routes in the world.

Every year, huge volumes of goods and energy supplies move across its waters, linking producers and consumers across continents. Because of this constant flow, the Indian Ocean has become a vital artery for containerised trade, energy transportation, and global supply chains that support and sustain modern economies.

They contain chokepoints that are essential for transit of goods and their security affects both global economic conditions and security.

Strait of Malacca Corridor

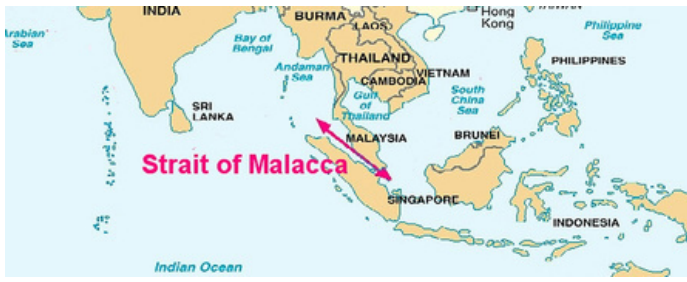
The Strait of Malacca is the shortest maritime route that connects the Indian Ocean and Pacific Oceans. Approximately 82,000 vessels transit through the Strait of Malacca every year, carrying approximately 40% of the total global traded goods. The strait is particularly important as a transit point for energy supplies, as approximately 80% of China's crude oil imports and a significant percentage of the energy needs of Japan, South Korea and Taiwan transits through the strait. Thus, the strait connects the Middle East, which contains a large part of the world's oil reserves, with major manufacturing bases in East Asia and is therefore a critical node in the global supply chain. Although the Strait of Malacca is the second busiest maritime chokepoint in the world after the English Channel, it has significantly greater strategic importance due to its role in securing global energy and trade.

INDIA'S THREE STRATEGIC TRANSPORT CORRIDORS



Strategic maritime corridors are a network of vital sea routes in the Indian Ocean that facilitate trade, energy supplies, military movements, and global connectivity. The corridors are strategic in that they handle vast amounts of global trade and petroleum and are traversed by the largest number of commercial vessels.

The Strait of Malacca is the most important maritime trade route in the Indian Ocean Region. Approximately 90,000 vessels transit through the strait each year, carrying approximately 25% of the total amount of goods that are traded globally, with a total value equivalent to trillions of United States dollars. As a result, the Malacca Straits Corridor is unrivalled in its scale and significance at the global level.



The Malacca Strait is a critical trade route for China, which depends on it for oil and raw materials. Likewise, Japan and South Korea use this route to meet their energy requirements and keep their industries productive. The various ports in Southeast Asia and, in particular, Singapore serve as important logistics centres within the strait. For example, India relies on this trade route because a large percentage of its sea-bound trade, such as crude oil, LNG, pharmaceuticals, textiles, and petroleum, moves through Malacca.

This corridor carries various types of cargo such as oil, gas, electronics, automobiles, palm oil, and grains, facilitating the economies of many countries worldwide. Any disruptions in supply chains caused by congestion, piracy, or weather-related events could severely impact global manufacturing facilities located in Asia, Europe, and elsewhere.

Three key trends are transforming trade through the Malacca Strait. First, global production is becoming increasingly fragmented with an increased emphasis on containerised cargo and intermediate goods, thus, the Malacca Strait is not just relevant for finished goods, but also for the movement of components across production facilities in Asia.

Second, China's One Belt One Road Initiative has enhanced trade between the region and the Malacca Strait by expanding ports, railways, and inland logistics networks throughout the region.

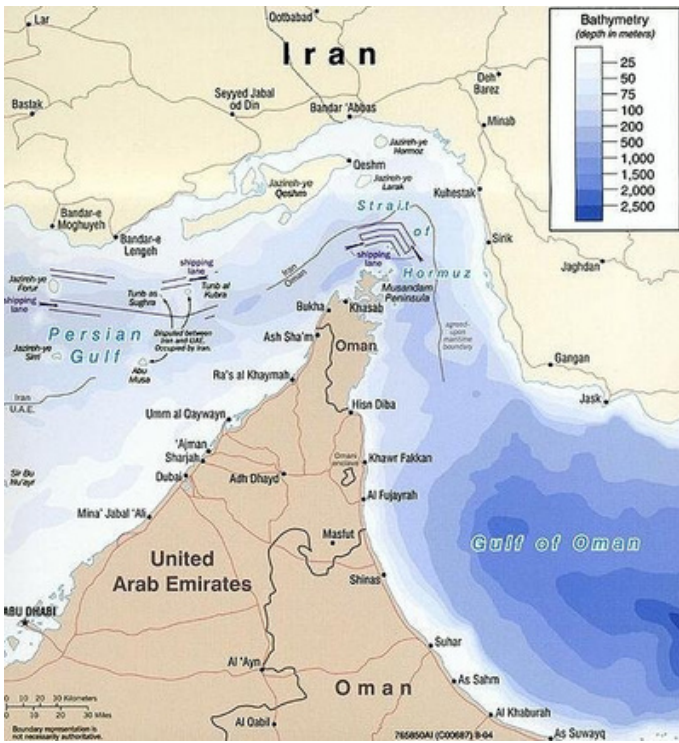
Instead of reducing reliance on the Malacca Strait as a result of these investments, they have increased reliance on this vital shipping route.

Third, the global push toward clean energy has increased trade in critical minerals such as lithium, cobalt, and rare earths. Southeast Asia has emerged as a major processing and transit hub, with the Malacca Strait playing a key role in transporting both traditional fuels and new strategic materials. Even today, the strait carries over 20 million barrels of oil per day, highlighting its continued importance for global energy security.

Strait of Hormuz Corridor

The Strait of Hormuz is one of the world's most critical waterways for trade. It connects the oil-rich Gulf region with the rest of the world. Approximately one-fifth of the world's crude oil exports are transported via the Strait of Hormuz, therefore, the Strait of Hormuz has been and will remain to be one of the most important choke points in the world for energy supply. Over the past several years, increasing tensions between the United States and Iran have generated a major political crisis in the region and have made the Strait of Hormuz an increasingly important geopolitical battleground.

A blockage in the Strait of Hormuz can create immediate repercussions for the worldwide energy supply and geopolitical stability of the region, and the world economy. This paper examines the Strait of Hormuz's historical, economic, and geopolitical importance, and discusses the various risks associated with it and various other possible future sea routes that might compete with the Strait of Hormuz for shipping traffic.



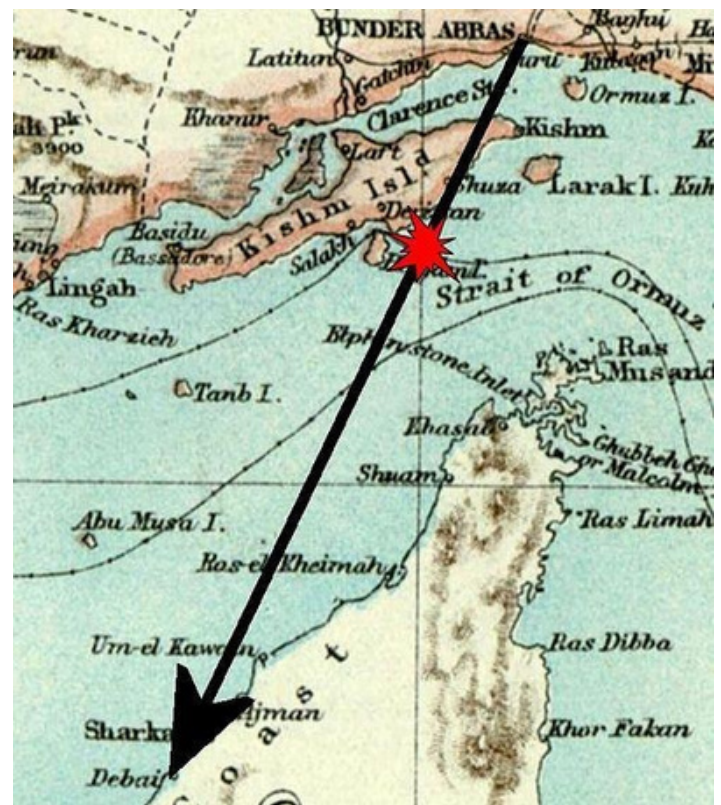
This limited space creates a significant military chokepoint and is vulnerable to disruption. Any blockage or attack on this strait would severely limit the flow of oil and other critical goods, creating possible consequences for global shipping and energy availability.

Iran has repeatedly threatened to close the Strait of Hormuz in response to regional incidents or to protect its national interests, particularly during periods of diplomatic or economic sanctions. In the past, attacks on oil tankers and the seizure of vessels linked to Iran have heightened global tensions. At the same time, these actions have also been used by Iran as a means to project power and assert its influence within the region.

More than 20 million barrels of oil are moved through the Strait of Hormuz daily, making it one of the world's largest marine trade routes. The Persian Gulf's total trade is valued at approximately USD 1.25 trillion, accounting for nearly 20% of global container shipping, 19% of the global natural gas market and 15% of the worldwide petroleum product market.

Continuous trade flow through the region has created immense economic development for the Persian Gulf states, resulting in rapid economic development, large scale infrastructure development, and increasing influence on the global stage.

The only maritime route from the open ocean to the Persian Gulf is the Strait of Hormuz, making it one of the most important maritime chokepoints in the world. Its importance is also heightened by its relatively narrow shape, with navigable shipping lanes averaging only 3 kilometers in width in both directions and a 2 kilometer buffer zone separating them.



As of now, the UAE is utilizing a method of pipeline construction which avoids the Strait of Hormuz. This allows them to alleviate some of the risk associated with possible attacks or disturbances that could affect shipping activity in the strait. However, many surrounding countries do not have similar alternatives. Several regional governments, as well as international oil and gas companies, have advocated for public investment to build oil and liquefied natural gas (LNG) pipelines that run through non-Strait routes, thereby reducing the risk of this geopolitical choke point.

Pipelines are a more economical and efficient method for moving energy products for many nations. Pipelines which traverse many nations also provide opportunities for dialogue, cooperation and increased bilateral relations that are of mutual benefit to all parties in each pipeline project with respect to economic and strategic gain.

Nevertheless, pipelines cannot by themselves meet world-wide demand for energy, nor will transitioning to pipeline transport of large quantities of crude oil and natural gas to the extent necessary to meet world-wide demand occur overnight. Additionally, pipelines traversing through countries prone to civil turmoil increase the likelihood of being targeted for attack, and as such, all countries utilizing these pipelines would be susceptible to significant environmental and public health risks resulting from potential pipeline leaks.

Therefore, challenges related to pipelines have the potential to include substantial economic impacts and increase price volatility anywhere in the world where oil and natural gas are traded.

Bab el-Mandeb Strait

The Bab el-Mandeb Strait connects the Red Sea to the Gulf of Aden, thereby linking these bodies of water with the Indian Ocean. Located between the Arabian Peninsula and the Horn of Africa, this waterway is one of the world's most strategic and sensitive maritime passages. The impact of any single incident occurring within the strait can be felt across large areas well outside the region due to disruptions having potential impacts internationally on global marketplace, particularly throughout several key industries via interrupting supply chains, increasing both shipping & logistics expenses as well as potentially sparking broader geopolitical tensions much further away than just the immediate area.

Each year, roughly 10-12% of the world's offshore merchandise trade passes through the Bab el-Mandeb Strait with thousands of vessels transporting vital products. The width of this Strait at its narrowest point is about 30 kilometers, very narrow by maritime standards, making navigation through this area especially sensitive, especially when there are existing high levels of regional conflict.

There are a number of different forms of oil being shipped to Europe and the United States, such as crude oil and liquefied natural gas (LNG) from the Persian Gulf. There are also finished products being exported from Asia like electronics, clothing and cars to Europe, as well as food and agricultural products like wheat, rice and sugar that are traded across the Middle East, Southeast Asia and Africa and products that can be used in global supply chains like non-automotive automotive parts and technology products.



Sources of risk in the Bab el-Mandeb Strait:

The Bab el-Mandeb Strait is not only a heavily trafficked shipping channel but also serves as an area with significant intersection of political instability, armed conflict, crime and geostrategic tensions. Because of all these factors coming together, it has become one of the most dangerous areas for international maritime transport.

The factors creating uncertainty and danger here are real and recurring, and could create large scale consequences. The problems arising from these factors impact commercial vessels and their crew members as well as add disruption to global supply chain operations. The danger created by these factors falls into three general categories, and contributes to the vulnerability of the strait.

1. Armed conflicts in the region

The main source of risk within the Bab el-Mandeb Strait is the Civil War in Yemen that has been going on since 2014. The conflict is between Houthi Rebels, who are supported by Iran and a coalition led by Saudi Arabia.

As the War has progressed, the fighting has moved from land into the waters surrounding Yemen. Armed groups have targeted vessels for commercial use with drone strikes, mines and missile strikes, creating a Battlespace of the Sea.

2. Piracy and maritime crime

The strait is also bordered by areas known for maritime piracy, particularly Somalia. While attacks have decreased since their peak in the 2010s, armed groups remain active. This criminal activity puts crews at risk of kidnappings, violent robberies, and sometimes even improvised naval battles.

3. Major geopolitical stakes

Bab el-Mandeb is a globally coveted strategic point. French, American, Chinese and Emirati military bases are all concentrated in the area around Djibouti. The region has become a stage for rivalries between global powers, where commercial vessels may become collateral damage.



Western Indian Ocean Corridor

As global trade shifts toward emerging economies, the western arc of the Indian Ocean from the Gulf to the African coast and India's western seaboard has emerged as one of the most dynamic trade corridors of the 21st century.

This maritime route links key cities like Dubai, Muscat, Mumbai, Mombasa and Dar es Salaam, connecting three fast-growing regions: the Middle East, South Asia, and East Africa. Over the past decade, trade along this corridor has grown significantly, fueled by the movement of energy, construction materials, agricultural products, and consumer goods.

India has become a major trading partner for both Africa and the Gulf. In FY 2024-25, trade between India and Africa surpassed US \$100 billion, up from around US \$56 billion in 2019-20. India is also one of the top five investors in Africa, with cumulative investments exceeding US \$75 billion between 1996 and 2024. At the same time, the Gulf states continue to supply the energy that powers Indian industries, while Indian exports such as pharmaceuticals, textiles and food products flow westward. This exchange has created a corridor of mutual growth and growing interdependence between the regions.



Ports along this corridor serve as more than transit points, they are engines of regional integration. Dubai's Jebel Ali remains the Gulf's premier logistics hub and a global leader in container connectivity. Mumbai and Mundra anchor India's western seaboard, handling a significant share of national exports. On the African coast, Mombasa and Dar es Salaam are gateways for landlocked economies such as Uganda, Rwanda and Zambia.

These ports, supported by expanding free trade zones and modern terminals, are reshaping trade geography. Enhanced connectivity through new shipping lines, regional agreements and digital logistics networks is making the corridor more efficient and resilient.

As this trade corridor expands, it also faces increasing complexities. Fluctuations in freight rates, currency swings, and differing regulations across markets can slow down the movement of goods. On top of that, the region is exposed to climate and security challenges, from coastal erosion to piracy near the Horn of Africa.

To keep growth on track, governments and businesses are investing in green ports, secure logistics networks, and digital trade systems. Regional initiatives like the India-Middle East-Europe Economic Corridor (IMEC) and the African Continental Free Trade Area (ACFTA) are expected to further strengthen the corridor and boost its economic impact.

The IMEC, announced in 2023, has already seen early infrastructure development, promising to enhance connectivity between Asia, the Middle East, and Europe over the next decade.

The Role of Finance and Digitalisation:

While physical infrastructure provides the backbone of this trade corridor, finance acts as its lifeblood. Gaps in trade finance, especially in African and South Asian markets, often limit the growth of small businesses and exporters. Digital solutions are helping to close this gap by making funding easier to access, reducing paperwork delays and improving transparency.

Fintech platforms and collaborative networks now allow exporters and importers to connect more efficiently with global financial institutions. By digitising processes like letter of credit (LC) handling, providing better visibility across transactions, and enabling faster decision making, these solutions are making trade more resilient.

In this transformation, initiatives from hubs such as the UAE, including platforms like 360TF are playing an important role.

By supporting cross-border collaboration between businesses and banks, they are helping the corridor reach its full potential in trade finance through greater digitisation and accessibility.

Chennai-Vladivostok Maritime Corridor

On November 18, India's Minister of Ports, Shipping, and Waterways, Sarbananda Sonowal, announced that the Chennai-Vladivostok Maritime Corridor (CVMC) is now operational. This landmark initiative is expected to strengthen strategic and economic ties between India and Russia, while significantly enhancing maritime connectivity across the Indo-Pacific region.

The corridor stretches across 5,600 nautical miles and cuts cargo transport time between Indian ports and Russia's Far East from 40 days to just 24, providing major time and cost savings for exporters. The CVMC supports India's Act Far East Policy and Russia's Greater Eurasia vision, linking the Atlantic and Pacific regions. It also strengthens India's presence in the Indo-Pacific while offering a strategic counterbalance to China's influence in areas such as the South China Sea and the Arctic.



The corridor gives India direct access to the resource-rich Russian Far East, helping reduce reliance on the often volatile West Asian markets. This includes energy supplies and potential coal imports from Russia and Mongolia. Future plans to connect ports like Vizag and Paradip on India's east coast are expected to further expand trade opportunities. Additionally, Russia's proposal to include Thailand, Vietnam and Indonesia as intermediate stops adds a layer of regional integration, strengthening economic ties across the Indo-Pacific.

For India, the CVMC is a key instrument to strengthen its presence in the Indo-Pacific.

By bringing Russia into its vision of inclusive regional connectivity, New Delhi signals its commitment to balancing interests in the region while subtly challenging China's Maritime Silk Route ambitions.

The Chennai-Vladivostok Maritime Corridor is more than just a trade route, but a cornerstone of India's geostrategic strategy, marking a new era of collaboration with Russia and strengthening India's influence across the Indo-Pacific region.

Shipping, Logistics & Blue Economy- An Overview of Merchant Shipping & Logistics

Three Pillars of Oceanic Ambition

India's maritime capabilities are kept intact by three crucial factors, merchant shipping, fleet capacity and enabling policy reforms. Merchant shipping is hypernym including the utilisation of merchant ships and vessels to consign goods for hire. It is an integral component for the maritime trade landscape and it drives a whole industry in itself. Fleet capacity refers to the cargo carrying capacity of a shipping vessel. It also includes merchant fleet shipping. Lastly, we emphasise the significance of policy reforms which act as grease in the maritime machinery.

The objective of this section is to assess the robustness of these pillars and highlight the key challenges weakening them.

India's first merchant shipping vessel, SS LOYALTY, owned by the Scindia Steam Navigation Company, undertook its maiden voyage from Mumbai to London on 5th April, 1919. From then on, the National Maritime Day began to be observed on this date. This voyage was historic as it inspired the entirety of the Indian merchant shipping landscape to come of age and embark their expeditions to prosperity. Subsequently, many private players have emerged, boasting their own capabilities and differentiators.



Shipping Companies

In this high potential market, the Great Eastern Shipping Company has established itself as a leviathan. Incorporated in 1948, it was the first Indian shipping company to purchase coastal cargo ships from Mitsubishi Shipbuilding Company, Japan. As of 2025, the company is valued at USD 2 Billion, boasting 38 vessels, 26 tankers and 12 dry bulk carriers. Other major players include Essar Shipping Limited, incorporated 16 years ago, it owns a diversified fleet of 26 vessels like VLCCs, Capesizes, bulk carriers and tugs.

In the public sector, the Shipping Corporation of India (SCI), plays a strategic role as the largest shipping company. The SCI was conceived out of the amalgamation of Eastern and Western Shipping Corporation in 1961. Annually, it transports 40 MMT of cargo and 8 MMT of dry bulk cargoes like coal, urea, grain, and mineral ore. It also supplies liner services, through 34 vessels, across the Gulf, Eastern and European region. Liner services is a type of shipping that transports goods and cargo between two destinations regularly, via a fixed route. Currently, the SCI, India's principal commercial maritime asset, is undergoing a divestment.

These shipping companies are responsible for large volume consignments which ebbs and flows in India, hence, their understanding is crucial in our study.



The Great Eastern
Shipping Co. Ltd.

Indian Merchant Fleet Size

Fleet capacity relates to a country's ability to carry its trade cargo and subsequently earn freight revenue. A poor fleet capacity jeopardises the commercial security of a nation at the time of a maritime crisis. Indian merchant fleet capacity is just 1% of the world merchant fleet tonnage (DWT), granting it the 17th rank. Ship-owning economies like Greece, Japan, China, Germany, and South Korea, together control 57.9% of the global fleet capacity. This weak link manifests itself in the fact that roughly 36% of Indian owned vessels are flagged beyond the Indian borders. This exacerbates the lack of control on shipping assets.

The dearth of adequate fleet capacity decapacitates a nation, both strategically and economically. India has lesser bargaining power for negotiations at the global trade forums as it cannot offer to handle large volumes of cargo carriage. During national predicaments, our nation cannot access shipping vessels for the carriage of large volumes of energy and food supplies without exposing itself to heavy overheads, like freight and insurance. Dependence on foreign flagged ships also drains India's foreign exchange reserves. It also facilitates hand holding with the foreign shipping companies, while our domestic companies are strangled at the global front.

Drawing comparisons from Japan and China, which have aggressively expanded their merchant fleets via protracted cargo contracts and strong insurance and finance systems, India lags behind not just economically but strategically too.

According to reports, the silver lining lies in

a recommended annual investment of \$5.2 Billion in building India's merchant fleet capacity. Notably, this value is merely 10% of the expenditures drained in the form of freight. Enabling policies, such as mandating 10% of food and energy imports to be carried via Indian-flagged vessels, foster optimism.

The Coastal Shipping Act, 2025

The act was passed on August 7, 2025 and it remains a strong policy intervention against this challenging backdrop. The act seeks to resolve the issue of foreign flagged fleets in India by promoting Indian owned fleet vessels. It strives to generate an assured demand for domestic shipping by licensing foreign fleet vessels and giving domestic vessels a center stage. Under this legislation, Indian flagged vessels do not require licenses for engaging in coastal trade.

A National Coastal and Inland Shipping Strategic Plan will be formulated to guide route planning, infrastructure development, and fleet promotion. In order to promote transparency, a National Database of Coastal Shipping is to be maintained and hauled up regularly. This constitutes details of registered vessels, voyage data, licenses, and regulatory clearances. It has also introduced a mandatory digital reporting system using a single window digital portal.

The scope of this act extends up to 12 nautical miles into India's territorial waters, along with an additional 200 nautical miles to nearby maritime zones. This act aligns with the Maritime Amrit Kaal Vision 2047 of India and also supports wider objectives under the Sagarmala initiative.

Economic Importance & Trade Linkages of Blue Economies

The Blue Economy Paradigm: A Structural Shift

The idea of the Blue Economy in the context of India is a paradigm shift in the country's approach to the creation of national wealth itself, moving away from the more conventional usage of the maritime sectors in a broader perception of the national resource itself that is oceanic in nature. The Blue Economy is described as follows by the Ministry of Earth Sciences: 'It aims at a social rate of return in addition to the rate of return on investment (ROI).' Such a shift is essential given the fact that the maritime logistics system sustains the country's international trade of some 95% by volume and 70% by value.

At present, the sector is contributing approximately 4% of India's GDP, which is set for development using blue bonds. The ecosystem includes Living Resources (supporting 2.8 crores of fishers), Non-Living Resources (energy and minerals), and Logistics, which are being governed by new Ocean Accounting Principles.

Strategic Governance and Policy Architecture

The maritime strategy of India has been guided by its 'Maritime India Vision 2030' and 'Amrit Kaal Vision 2047', which have made it their goal to position India as a 'global maritime powerhouse'.

- **MIV 2030:** A blueprint consisting of more than 150 initiatives aimed at improving infrastructure, efficiency and sustainability. The emphasis in this strategy has led to an increase in the average annual cargo handling capacity of major ports by 87.01% over the period of 2014-15 to 2023-24.
- **Sagarmala Programme:** With a focus on "port-led development," the Sagarmala project has a total of 839 projects collectively valuing ₹5.79 Lakh Crore. It has also managed to achieve a successful increase of 118% in the growth of coastal shipping in the past ten years to shift the burden of cargo from the saturated road/rail transport system to energy efficient coastal routes.



The Logistics Backbone: Infrastructure Dynamics

The Indian ports are a lifeline between the hinterland and global markets.

1. The Challenge of Renaissance at Port

The 12 major ports handled cargoes amounting to around 855 million tons in the FY 2024-25, because of the rise in the number of containers (up 10%) as well as fertilizer cargo. Efficiency wise, there has been considerable progress as the waiting time is only 22.57 hours in the year 2023-24, surpassing the targets set by the US (1.5 days) & Singapore (1day).

- **Financial Performance:** Paradip Port has handled the highest cargo amongst major ports (145.38 MT), and their net outcome has reached ₹1,570 crore in FY 24. The country's leading container port, JN Port Authority, marked a surplus of ₹1,263.94 crore.

2. Vadhavan Port and Inland Water Waterways

While considering the Ultra-Large Ships, the government approved the Vadhavan Port Project for the state of Maharashtra with an investment of ₹76,220 crores in June 2024. On the contrary, the inland water transportation sector is witnessing a “modal shift” because of the growing cargo capacity, which is expected to reach 145.5 million tons in FY 2024-25, recording a 700% increase in the previous decade under the “JalVahak” initiative.

Port	Cargo Volume (MMT)	Financial Surplus (₹ Cr)	Key Status
Paradip	145.38	1,570	Largest Major Port by volume
JNPA	99.17	1,263.94	Highest container throughput
Deendayal	132.3	1442	Major energy hub (Kandla).

Economics of Logistics: Competitiveness and Costs

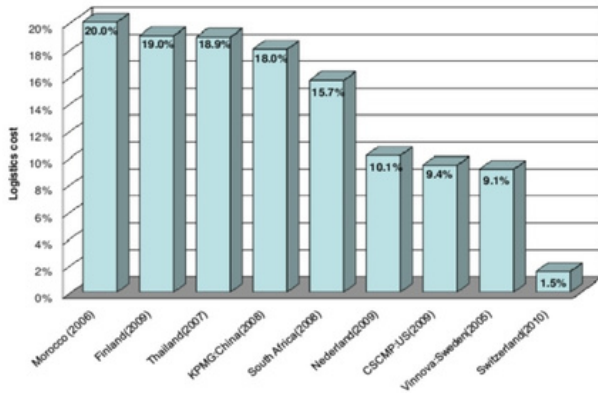
Moreover, a landmark study done by NCAER and DPIIT has scaled down India's cost of logistics to 7.97% of GDP for FY 2023-24. Such a number groups India with developed countries such as South Korea and the USA, which are well below China at 14.4%.

Drivers of Efficiency:

- **Digitalization:** The Unified Logistics Interface Platform (ULIP) and Logistics Data Bank (LDB) now monitor more than 75 million EXIM containers, which helps in resolving bottlenecks in real time.

- **PM Gati Shakti:** This National Master Plan harmonizes infrastructure development across ministries to remove any last mile gaps.
- **GST Reform:** The removal of state border checkpoints has resulted in a drastic improvement in fleet utilization rates.

Although the cost of railways is still efficient (₹1.96 per tonne km, the difference with air transport (₹72 per tonne km) emphasizes the necessity to achieve even more modal shift to railways and water



Geostrategic Trade Corridors

India is trying to build an unbreakable route and is also trying to overcome the geopolitical hurdles.

International North-South Transport Corridor (INSTC)

INSTC is connecting India to Russia via Iran, and it reduces travel time by 40% when compared to traveling via Iran to the Suez Canal. For the Eastern Route, in 2023, when the full operationalization of the year happened in 2024, it handled 26.9 million tons of cargo. This is one of the most important routes for importing Russian oil and coal to India because of the sanctions applied to Iran.



2.Chennai-Vladivostok Maritime Corridor (CVMC)

This started operation in November 2024 and connects the East Coast of India with the Far East of Russia. The longest distance of 8,675 nautical miles, which was 5,600 nautical miles shorter than the distance of Suez Canal, was traversed in a record 24 days of transshipment. There was an increase of 87% of coal and 48% of oil.



3.Kaladan Multi-Modal Transit Transport Project (KMMTTP)

Designed to avoid the Chicken's Neck corridor, this project will connect Kolkata with the state of Mizoram through the Sittwe Port of Myanmar.

Although the latter has been operational since May of this year (2023), the extension of the road from Paletwa to Zorinpui has been postponed until 2027 due to the instability in Myanmar.



4. BIMSTEC Integration

The Maritime Transport Cooperation Agreement, signed in April 2025, provides for the establishment of a single coastal shipping market for the littorals of the Bay of Bengal.

New direct shipping routes, for example from the Ranong Port in Thailand and the ports of India, are adding to these developments.

Coastal Economic Zones (CEZs): Industrial Engines

Accordingly, the Sagarmala project selects and plans for 14 CEZs, where large ports are integrated with industrial clusters in order to lower the cost of logistics.

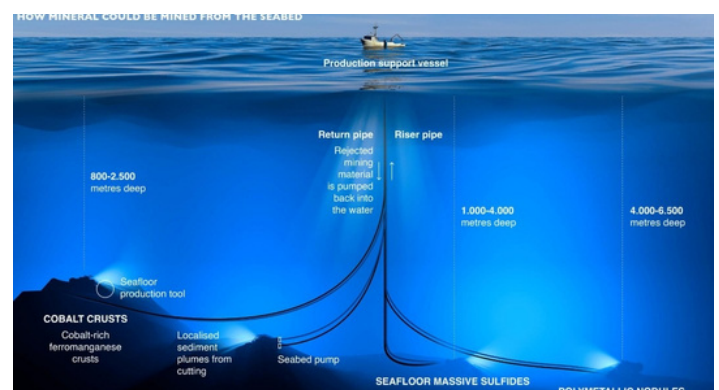
- **JNPA SEZ, Maharashtra:** This is a classic example, which registered ₹15,000 crore of EXIM business in FY 2023-24. The plug and play side of this SEZ fetches record land prices of ₹8.5 crore per acre.
- **Paradip SIPC (Odisha):** This is where resource dependent sectors primarily exist, with land allotted to construct a pellet plant by Thriveni Earthmovers and a refinery by Numaligarh Refinery.

Andhra Pradesh CEZ: As a crucial component of the Vizag-Chennai Industrial Corridor, it leverages the dominant export of pharmaceuticals by the state, which is responsible for 35% of exports.

The Deep Ocean Mission: New Frontiers

The other goal of DOM relates to energy security.

- **Samudraayan & Matsya 6000:** The first Indian manned submersible, consisting of a titanium capsule fabricated by ISRO, had completed its wet trials in early 2025. Historic deep dives (5,000 m) were achieved by Indian aquanauts in the Atlantic in August 2025.
- **Resource Extraction:** India has exclusive rights over 75,000 sq. km in the Central Indian Ocean Basin that contains immense amounts of Polymetallic Nodules, rich in Mn, Ni, and Co. A mere 10% of such resources can address India's energy demand for a full century. The mission also encompasses biotechnology in the sea, wherein startups like Sea6 Energy are leading in bio-products in the sea.



Sustainability: The Green Transition

The maritime system in India has been strategized to meet global targets for climate change action by the year 2050, according to the IMO.

Renewable Energy Source: All of the major ports are compelled to meet 60% of their energy needs from a renewable energy source by 2030.

The New Mangalore Port is a pioneer with 100% Solar Integration of their port, and V.O. Chidambaranar Port is soon going to turn into a Green Hydrogen Hub.

Shore Power: Common Shore to Ship Power (SPS) Systems have been developed by the Directorate General of Shipping in order to reduce emissions. Such measures have been implemented on a staggered date and will incorporate all Foreign Shipping Vessels by the end of the year 2030.

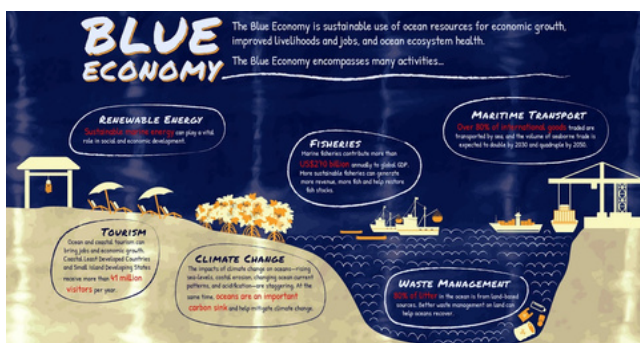
Conclusion

The Blue Economy of India is transforming from a segment approach to a macroeconomic driver. Logistics cost reduced to 7.97% of the country's GDP and the establishment of strategic routes such as the CVMC indicate that the country is moving past its traditional infrastructure weakness. With projects such as the COVID-19 Deep Ocean Mission and the green shipping policies in place, India is moving away from its state as a maritime nation to that of a maritime power.

Future Trends in Blue Economies

As a result of the increasing development of global trade and the increased public awareness of environmental issues, the Blue Economy is becoming an invaluable resource for commerce and economic development due to the importance of the seas and oceans globally. India has one of the longest coastlines and has a long-standing tradition of using and developing marine resources. Thus, the Blue Economy is of extreme importance for India as it reflects an overall change in the perception of marine resources to one of responsible use, rather than the uncontrolled use of these resources.

The term "**Blue Economy**" was created by the United Nations at the conclusion of the Conference on Sustainable Development in Rio de Janeiro, Brazil, in 2012. The term describes a new and more environmentally responsible method of utilising the oceans and marine resources. While many countries around the world have traditionally "ripped" the oceans and marine environments for the sole purpose of generating profit, the Blue Economy will utilise these areas for both economic development, environmental protection, and the well-being of the general public and their future generations. Unlike traditional forms of marine industry, the Blue Economy will generate employment and income while also conserving the oceans and marine ecosystems long into the future.



Traditional sectors including fisheries, shipping and ports and newer, rapidly growing sectors such as marine renewable energy, marine biotechnology and coastal tourism will be used as part of the ocean economy initiative. All of these operations can take place within the framework for sustainable use of ocean resources, providing for sustainable employment, generation of income, and overall Economic Development through the upkeep of healthy oceans.

Significance of Blue Economy :

Because the majority of the Earth's surface is in oceans, ocean resource management is a vital cultural survival issue for mankind. Marine biodiversity is critical to the maintenance of Life on earth, the functioning of the planet and individual and collective prosperity. The United Nations via Sustainable Development Goal 14 (SDG-14), has included goals relating to the conservation and sustainable use of oceans and marine resources.

A summary of the key features of the framework, as associated with each of the SDG-14 goals, is provided below:

1. Minimise and address the impacts of ocean acidification.
2. Effectively regulate harvesting and end overfishing.
3. By 2030, help small islands and least developed countries gain more from oceans through sustainable fishing, aquaculture, and tourism.
4. Improve scientific knowledge, develop research capacity and transfer marine technology.

5. Prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution.
6. Protect and use ocean resources sustainably by following international laws like UNCLOS.
7. Sustainably manage and protect marine and coastal ecosystems.

There are a variety of activities that occur in the world's oceans, including the catch of living resources as well as the extraction of non-living resources and activities associated with tourism and shipping. In addition to the direct use of oceans for these activities, there are also a number of indirect functions provided by the oceans, including the following: carbon sequestration, habitat protection, and protection of endangered species and more generally, the ability of the ocean to absorb and neutralize waste materials produced by humans.

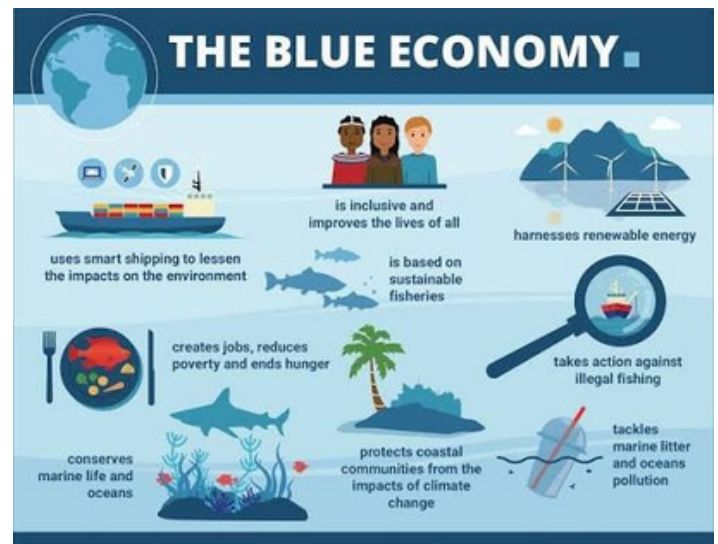
Challenges:

In spite of the many opportunities for India to develop its Ocean Economy, the country faces a number of challenges related to both the development and management of its Blue Economy. These challenges are not isolated and need to be considered as a whole, putting together considerations for the environment, technology, as well as adherence to regulations.

The oceans of India's Blue Economy face significant environmental degradation due to pollution from industrial activity and the introduction of pollutants into the oceans. Pollution in the ocean represents a public problem that not only has a significant negative effect on marine life and also negatively affects the livelihood of thousands of people who depend on the

ocean for their livelihoods, including those who are involved in the fishing industry. Climate change adds to the growing concerns for the health of the world's oceans. Rising sea levels, increasing acidity, and increasing intensity of storms, along with the rapid decrease of coral reefs off the coasts of India.

Fishing industry development is ongoing, but it has not yet reached its maximum potential. Many fishermen cannot operate in deeper waters due to lack of modern boats, which prevents them from increasing their catch and income. Also, poor infrastructure has a negative impact on marine tourism and trade, both of which are essential for maximizing growth in these areas. To tap into these industries, India must invest in modern fishing boats, better coastal facilities, and new technologies, such as satellite monitoring or artificial intelligence, to better manage resources.



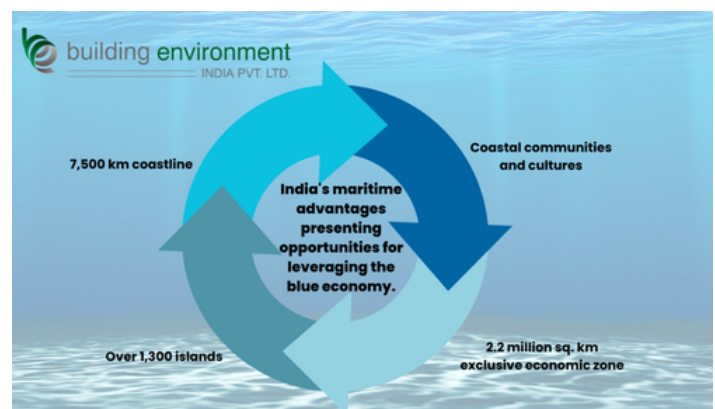
Future Trends:

To maximize India's Blue Economy, it is essential to have a clear investment strategy, supported by effective governance and integrated coordination among institutions. The private sector and government can provide investment resources for developing these essential sectors through public funds, such as blue bonds and partnering. Additionally, having a simplified and coordinated approach, such as an inter-ministerial organization will enhance policy planning and the efficient use of resources.

Also, developing training programs would promote modern and sustainable methods within India's Blue Economy, thereby contributing to its long-term stability. Investing in upgraded fishing facilities, improved port facilities, renewable energy support, eco-tourism promotion and the promotion of innovative thinking regarding marine science will lead to greater job growth and business opportunities for all while protecting the oceans of our great country. These investments can especially make a difference for coastal communities, including those that are most disadvantaged, through better access to skills, resources and markets for their participation in and contribution towards the country's economy. This inclusive approach to economic growth will reduce regional variations.

With these strategic investments, India will increase the viability of its Blue Economy thereby enhancing its ability to become a greater player on the world stage and to achieve the Viksit Bharat vision and global commitments such as Sustainable Development Goals 14 (SDG-14), etc. Indian competitiveness in a globalised economy depends on being a technology

leader specifically for Research and Development (R&D) in the Maritime Sector. The establishment of the India Ship Technology Centre at the Indian Maritime University (IMU) is an important move towards this goal and should commence operations as soon as possible. The centre's specialties include: green materials, autonomous ships and advanced ship engines. Additionally, extensive training programs need to be implemented throughout India so that the almost 30 lakh jobs projected for the maritime sector can be fulfilled with qualified personnel. Training programs should include: Modern shipbuilding, Logistics and Maintaining Green Ships Energy Projects. By nurturing skilled workers with cutting-edge technologies, India can provide an efficient port operation and become a leader in the world maritime community.

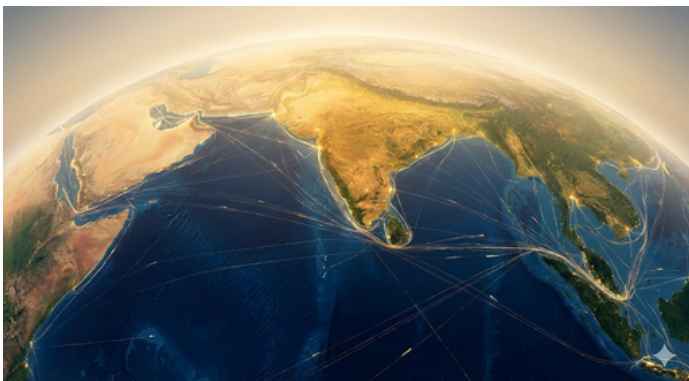


From a geopolitical perspective, the Blue Economy is crucial for national, energy, and food security. Strengthening Indian shipbuilding ensures more reliable supply chains, reduces dependence on foreign nations, and enhances strategic autonomy. By leveraging its technological capabilities and regional influence, India can lead in maritime security and promote effective ocean governance across the Indian Ocean Region, better utilising platforms such as the Indian Ocean Rim Association (IORA).

Maritime Diplomacy & Regional Partnerships- India's Maritime Partnerships

Introduction

The Indian Ocean Region (IOR), in the contemporary world, is the center of the world's maritime commerce and strategic competition. The Indian Ocean, to the nation, has not simply been an area but a vital lifeline to power economically. This, the authors in the article will discuss, relying exclusively on strategic reports, delineating the institutional mechanisms and bilateral partnerships in Indian commerce, based on government documents.



Regional Frameworks for Cooperation

1. The IORA-BIMSTEC Synergy

As per the report of the National Maritime Foundation, in its May 2025 edition, the regional cooperation in the IOR's new international order has received a major boost due to the "Operationalising the IORA-BIMSTEC MoU" initiative.

As per this historic MoU signed between the two regional organizations, namely the Indian Ocean Rim Association and the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation, regional cooperation is sought to be harmonized.

2. Blue Economy and Connectivity:

The National Maritime Foundation explains the significance of MoU. The MoU emphasizes achieving new synergies in the blue economy so that regional safety and security are not considered in isolation.

3. Strategic Alignment:

Keeping in view the above analysis, it can be concluded that the above framework provides the opportunity to India to bridge its policy of "Neighborhood First" with its policy of "SAGAR" (Security and Growth for All in the Region) by suitably aligning the specific interests of the Bay of Bengal states with the larger Indian Ocean community.



Bilateral Trade and Maritime Partnerships

1. India-Mauritius: Gateway to the African Corridor

As suggested in the Ministry of External Affairs (MEA) 'Joint Vision Document' (March 2025), the relations between India and Mauritius have moved into the realm of "Comprehensive Strategic Partnership."

1. **Economic Integration:** The CECPA has continued to be integral to the partnership in line with the assertions of the MEA. This is noted in relation to being India's first free trade agreement signed with an African country and setting the stage for the free flow of services and commodities.

2. **Maritime Infrastructure:** According to the principles laid down by the Joint Vision, the contribution that India can make, along with the Mauritian state, towards maintaining stability within the region, with regard to port infrastructure or even the supervision of the high seas, assumes tremendous importance. Firstly, the document emphasizes that both nations are committed to the cause of sustainable ocean management along with the strengthening of the security of sea lanes of communication.

2. India-Oman: Strengthening the Gulf

The India-Oman Comprehensive Economic Partnership Agreement has reshaped Gulf economic relations. According to information provided by the Centre for Public Policy Research (CPPR) in January 2026.

1. **Trade Liberalization:** In accordance with the CPPR analysis, in the wake of the recently signed CEPA in late 2025, duties on over 99 percent of Indian export products to Oman were eliminated, and this is stated to have brought about a transformative step for Indian manufacturing and maritime logistic sectors.

2. **Strategic Access:** According to the report, the 'Joint Vision Document on Maritime Cooperation' provides Indian access to the Port of Duqm, which is crucial from the strategic point of view. According to the CPPR, this would help the Indian Navy maintain a constant presence in the Western Indian Ocean, both helping to protect trade and provide humanitarian assistance.

3. India-Sri Lanka: Security and Proximity

Maritime cooperation between the two countries and Sri Lanka, according to the Ganean Impacts: An opportunity for foreign policy, A New Asian Age, and History Incognito, by the IMPRI Impact and Policy Research Institute (November 2025):

1. **Infrastructure Development:** As mentioned in the IMPRI report, development of Kankesanthurai port is an instance which portrays India's commitment with regards to development in Sri Lankan maritime.

2. Defense and Surveillance: According to the institute, the five-year Defence MoU that needs to be renewed in 2025 formalizes the practice of joint patrols by the marine forces of both countries. These patrols, the report claims, are critical in the effort to combat non-traditional security issues like illegal fishing and smuggling in the Palk Strait.

4. India and Indonesia: Safeguarding the Malacca Straits

The IMPRI Impact and Policy Research Institute, furthermore, highlights India's geographical reach extends far into the East via its association with Indonesia.

1. Coordinated Patrols (CORPAT): It has been clearly articulated in the publication of the India Institute, IMPRI, that the India-Indonesia Coordinated Patrol in the Malacca Straits is an important factor in the safety of one of the world's busiest maritime chokepoints.

2. Strategic Deepening: In the analysis by the Surveillance and Cooperation attributed to the IMPRI, the relationship can be said to have graduated from naval drills to entrenched technological and surveillance collaboration to establish the vision of a free and open Indo-Pacific.

Conclusion

India's naval strategy is a complex model that encompasses comprehensive regional arrangements such as IORA and BIMSTEC, as well as laser-like bilateral agreements. According to the articles provided, the agreements ranging from the duty free trade arrangements with Oman, the strategic port accords in the island countries of Mauritius and Sri Lanka, ensure that India is a 'preferred security partner', a pre-eminent regional economic powerhouse in the Indian Ocean region.



India's Maritime Strategies

Chinese Influence in the Indian Oceanic Region

Moving forward from the strategic maritime partnerships, this section discusses the potential threats to the Indian Maritime landscape, citing the example of the advent of Chinese maritime expansion. This angle serves as a crucial understanding of how Asia's two great superpowers dominate the maritime activities in the IOR, while also indicating how these nations are competing with one another to emerge as a maritime super power. Such ambitions are manifested by two core concepts, "String of Pearls" and the "Golden Necklace." The term "String of Pearls" was first conceptualised by American defense analysts in 2000s as a moniker to iterate China's development of ports and logistics infrastructure in the Indian Ocean Region. These pearls constitute strategically situated ports and access points that assists China to optimize Sea Lines of Communication (SLOCs) which are crucial for the import of energy resources and which facilitate commercial trade.

Under this strategic programme, China has developed infrastructure for trade and military presence in the Indian Ocean. It is expanding its maritime access to locations such as Gwadar Port in Pakistan, Hambantota in Sri Lanka, Kyaukpyu in Myanmar, Djibouti in Africa, and Chattogram port in Bangladesh. With these developments, the country aims to not only expand its merchant trade but also to ensure military security for itself. Further, it is to be noted that a major portion of China's oil imports is routed through the Strait of Malacca and the

Strait of Hormuz in the IOR. Therefore, it is said that with this strategy, China aims to overcome its "Malacca Dilemma." The "Golden Necklace" is a revised edition of this strategy which gives more importance to the multidimensionality of maritime capacities. It focuses on sea trade investments, building strong naval bases, enhancing digital connectivity in the marine landscape and managing diplomacy. The underlying plan here is to dominate over other maritime nations through port facilities, SEZs, networks, etc., to emerge as a soft power or hybrid power.



Trade Corridor Implications

These strategies derive their strength from various highly important ports which are near the major chokepoints and trade corridors of the IOR.

Gwadar Port (Pakistan)- This port is located close to the Strait of Hormuz in the IOR. The Gwadar Port enables China to access the waters of Arabian Sea for its shipping vessels. Most importantly, this port serves in the China-Pakistan Economic Corridor (CPEC). This port provides an alternate route for energy

imports to China, which earlier depended on the Strait of Malacca. The proximity of Gwadar port to India's western sea border flags security, economic, and geopolitical concerns for India.

Hambantota Port (Sri Lanka)- This port is located along the world's busiest east-west shipping lanes. The Hambantota Port is being operated under a long term lease with China Merchants Port Holdings Company, subsequently raising concerns about the Chinese influence over this major transshipment hub. This port's development assists the Colombo port in volume management. As discussed earlier, the Colombo Port directly competes with India's ambitious Vizhinjam Port project.

Other ports under this project include **Kyaukpyu Port** in Myanmar and the **Port of Djibouti** in East Africa.

Implications for India's Strategic Outlook

While these drivers are positive for Chinese glory, they bring sour consequences for India's maritime landscape. Increasing Chinese influence over key transshipment hubs, like those in Sri Lanka, posts a question mark on India's overt dependence on foreign ports for cargo transshipments. It is during these times, when initiatives like the Vizhinjam port become all the more important. Chinese aided ports surrounding India's maritime neighbourhood increases China's subsurface external presence around the Indian territory. This alters India's ability to lead in the drafting of regional maritime norms and trade frameworks. While India's sovereignty remains guarded, this influence increases competitive pressures on the economic front. The presence of Chinese fleets, vessels, and logistics facilities in the IOR necessitates improved regional partnerships to emerge as the "net-security provider" in the region.

Technological Expansion & Future Vision- Customs Reforms and Digitalisation

Port efficiency is no longer determined only by physical capacity. It also depends on how quickly customs paperwork is processed. This section looks at how India has moved away from manual and fragmented customs procedures towards a more integrated digital system. The implementation of PCS 1x and SWIFT indicates that stronger digital integration has played a role in reducing cargo dwell time at Indian ports. However, this progress has been uneven. Major ports have adapted more quickly than non-major ports, pointing to a digital gap that must be narrowed to create a more standardized maritime trade system.

The Bottleneck: Procedural vs. Physical Capacity

It is a common misconception that Indian ports lagged solely due to a lack of physical space. In reality, the "productivity ceiling" was often hit because of procedural friction. Before the recent digital push, heavy paperwork and a lack of coordination between departments meant that cargo sat idle even when the berths were empty. With rising trade volumes, it became increasingly evident that port performance could not improve without parallel digital modernisation.

Why Reform Was Non-Negotiable

For decades, customs clearance in India remained heavily dependent on paper-

based procedures. Traders were forced to run between offices with physical stacks of invoices and bills of lading. The problem was made worse by "regulatory silos", where bodies like FSSAI (for food) or pharmaceutical regulators operated independently of one another.

The costs of this fragmentation were real and immediate:

- **Demurrage Fees:** Shippers paid extra because containers were stuck waiting for a single signature.
- **Opacity:** Traders had almost no way to track their consignments in real time.
- **Bureaucratic "Touchpoints":** High physical interface increased the likelihood of delays and inconsistency.

The Digital Backbone

Port Community System (PCS 1x)

Launched by the Indian Ports Association, the PCS 1x (upgraded in 2018) is effectively the "operating system" for Indian ports. Unlike its 2008 predecessor, this version is cloud based, allowing terminal operators, shipping lines, and banks to talk to each other on one platform.

The shift is visible in daily operations. Instead of manual reporting, digital applications now handle everything from vessel arrival notifications to gate moves and payments. This has directly contributed to quicker vessel turnarounds and a noticeable drop in container dwell times.



SWIFT & e-Sanchit: Cutting the Red Tape

While PCS 1x connects port services, SWIFT (Single Window Interface for Facilitating Trade) handles the regulatory hurdle. Launched in 2016, the reform replaced the earlier system of multiple applications with a single electronic declaration routed through the ICEGATE portal.

This process is supported by e-Sanchit, which allows all supporting documents to be uploaded digitally. Since applications are automatically routed to the relevant agencies, traders no longer need to visit multiple government offices in person.



Outcomes of Digitalisation

The available data indicates that these reforms have had a measurable impact on port performance. Over the past decade, key operational indicators have shown consistent improvement.

One of the most visible changes has been the reduction in container dwell time. On average, containers now spend close to three days at Indian ports, compared to more than a week earlier.

Another important development is the shift towards risk-based inspections. Customs authorities increasingly rely on the Risk Management System (RMS) to identify high-risk consignments, instead of subjecting every shipment to physical checks. Instead of checking every single box, they use data to target high-risk shipments. This keeps the majority of trade moving without interruption.

The Road Ahead: Addressing the Digital Divide

The progress has not been uniform across all ports. While major ports have adopted PCS 1x and SWIFT more extensively, several non-major ports continue to lag behind in digital implementation. As a result, cargo that moves efficiently through major ports may still experience delays when routed through smaller ports with limited digital systems. For India to reach international standards, the digital grid must be expanded to include every node in the maritime network, regardless of its size or state jurisdiction.

Technological Disruptions

Autonomous Operations and Advanced Robotics

The maritime sector is currently undergoing drastic change from traditional, crew heavy navigation to an era of algorithm driven vessel management. This disruption is best characterized by the rise of "ghost ships-fleets". The maritime industry is quietly preparing for unmanned vehicles to become a reality at sea. While self driving cars dominate the headlines, regulators have already identified four distinct levels of autonomy, ranging from ships that are partially automated but still have seafarers on board, to fully autonomous vessels that make independent navigation decisions without any human intervention. In this future vision, the next generation of vessels will be commanded not from the bridge, but from shore based operating centres.

The human argument for this technology is compelling safety. Accidents at sea, including collisions, groundings, fires and cargo mishaps are distressingly common, and the vast majority can be traced back to human error. Major factors for these mishaps are fatigue, defect in judgement and sometimes carelessness. AI driven systems which are precise mitigate these risks consistent, and tireless. Unlike a human crew, an automated system does not suffer from exhaustion. It can continuously monitor for risks like hazardous weather or traffic and execute avoidance manoeuvres with a speed and accuracy that humans often cannot match.



Robots and Drones: Taking the Risk Out of Work

Beyond the ship itself, robotics are changing how we handle dangerous tasks. The industry is deploying robots to inspect and maintain environments that are unsafe for humans, effectively removing crew members from harm's way. A prime illustration of this "human-safe" engineering is the Shipboard Autonomous Fire Fighting Robot, or SAFFiR, which was designed to navigate through smoke and extinguish fires without human intervention.

Similarly, drones have expanded their role from simple photography to becoming essential tools for surveillance and delivery.. This not only cuts costs but significantly reduces the physical risks involved in manual inspections.

The Hurdles of Adoption

However, the path to full autonomy is not straightforward. Because these technologies are still in their infancy, there is a high degree of uncertainty regarding their long term impact and reliability. The initial cost of implementing autonomous fleets is Capex heavy and the return on investment is not always immediately clear. Another hurdle which arises is that it is hard to

integrate these futuristic technologies with legacy infrastructure. Many existing vessels were built to last decades and are not easily compatible with modern autonomous technology.

Data-Driven Digitalisation: AI, IoT and Blockchain

The second major disruption is the move away from isolated, paper-heavy processes toward a fully connected, transparent digital ecosystem. This transformation relies on the convergence of Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain to create a smart maritime network.

The Cognitive Engine: AI and Analytics

Artificial Intelligence is acting as the brain of modern shipping operations. It helps companies by moving from reactive to predictive work. This helps ships to avoid bad weather and traffic bottlenecks, saving fuel and more importantly time. AI is revolutionising safety through predictive maintenance. By analysing data from incident reports and crew performance, predictive models can spot potential safety risks before they turn into accidents. This is crucial for vessel owners who are facing stricter rating criteria and need deeper insights than traditional manual methods can provide.

The Nervous System: IoT and Sensors

If AI is the brain, the Internet of Things (IoT) is the nervous system. IoT connects everyday objects on a ship, from engine components to lights and doors to the cloud. This connectivity allows for incredible control, a ship's master or a shore based operator can remotely control electrical systems, lock doors, and adjust

machinery with the touch of a button.



Sensor technology makes this possible by replacing manual checks. The sensors keep monitoring machinery to detect heat changes or faults at an early stage. This process creates real time data that is vital for operators because ocean conditions can change drastically in a matter of hours.

Trust and transparency are being transformed by blockchain technology

While AI and the Internet of Things (IoT) handle the physical aspects of shipping, blockchain is revolutionizing the commercial side of things. This technology offers an immutable transaction ledger, a crucial asset in an industry where trust and documentation are paramount. It fosters a transparent supply chain, allowing all stakeholders to verify the movement and handling of cargo. This, in turn, minimizes the risk of fraud, cuts down on excessive paperwork, and accelerates payment processes by linking parties directly. However, a few obstacles remain, hindering or slowing down widespread adoption.

The Cyber Risk

There is a catch to this connectivity: cybersecurity. As ships become smarter and more connected, they become more vulnerable to cyberattacks. Protecting sensitive data is now as important as

protecting the hull. The International Maritime Organization (IMO) has introduced guidelines to prioritise cyber risk management.

Sustainability and Green Engineering

The final disruption is driven not just by efficiency, but by necessity. The maritime industry is constantly forced by the regulators to move toward green energies, the industry is constantly facing criticism due to their fuel consumption and carbon emission too.

Decarbonisation and New Fuels

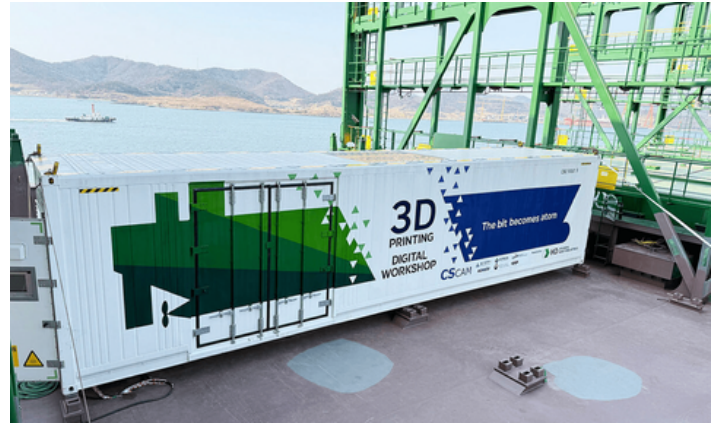
The most visible aspect of this shift is the race to decarbonisation. To reduce this heavy reliance on carbon fuels, the industry has started looking for alternatives. This is not a minor tweak, it requires a fundamental redesign of propulsion systems, leading to the development of fuel cell boats and zero-emission ships.

We are also seeing the emergence of "megaships" constructed from sustainable, lighter materials like fibre reinforced plastic. These innovations aim to lower the carbon footprint of every voyage while maintaining the structural integrity required for global trade.

3D Printing: A Logistic Revolution

3D printing is less obvious but highly effective. Traditionally, if a ship required a spare part, that part had to be manufactured and shipped to the vessel.

This process caused high carbon emission. 3D printing allows for on-demand manufacturing of spare parts directly onboard the ship. It creates physical objects from digital designs at the point of use, which reduces the need for long distance transportation.



Balancing Ecology and Economy

The push for sustainability also includes financial innovations, such as environmental insurance policies designed to protect natural assets and marine ecosystems. However, the transition is difficult. Corporate sustainability requires balancing economic success with environmental responsibility.

The green technologies require high capital expenditure but the financial returns can be uncertain. The industry being in the trading business already tackles the thin margin adding such huge costs can cause margin drop downs and weak performance in the short run. Despite these challenges, the shift is inevitable. Companies must adapt to these green technologies or risk being left behind by competitors and regulators alike.

Conclusion

The Indian maritime community is gradually but irreversibly moving from the periphery to the mainstream of the country's economic and strategic thinking. With more than 7,500 km of coastline and a considerable portion of international trade actually passing through the Indian Ocean, maritime activities have always had the latent potential to make a game-changing contribution to the development of the country. It is just that this potential was unrealized for quite a long time because of historical disruptions, policy neglect, and a very strong landmass focus in the country's infrastructure development. This report underlines the fact that the government of India has now begun to fill these gaps.

Historically, India had good maritime transportation connections in the past in the Indian Ocean system. Nevertheless, due to the influence of colonialism, India's transportation networks with respect to maritime trade developed in a manner with no proper reaction against colonialist trade. This led to difficulties, even for the Indians themselves as soon as they gained independence because of inadequate investment in maritime transportation development. This led to inflexibility in its regulations, its governance system, as well as its lack of port or hinterland connectivity. Due to the development in international trade with respect to maritime transport, this reality of India's transportation network revealed its problems in more ways than before.

However, it must be noted that recent developments reflect a clear shift in the paradigm.

The recent developments in port management practices, including the shift from trust port management to landlord ports with the increasing role of the private sector, have certainly contributed to enhancing the efficiency of investment. An augmentation of physical facilities in major ports as well as in non-major ports certainly reflects the development of physical infrastructure in India's maritime sector. Measures like Vizhinjam and Vadhavan suggest India's attempt to break away from foreign transshipment ports like Colombo and Singapore. This also reflects economic as well as strategic implications for India. If this business continues to stay in India's ports, this also implies cheaper exports for India.

Moreover, it has not been found that any changes were required in the infrastructure. Rather, it has often not been found that delays in processes and administrative issues were not more inhibiting factors than infrastructure. Digital initiatives like PCS 1x, SWIFT and e-Sanchit were very important in that context. These factors have considerably helped in overcoming the hindrance of delays in processing. Nevertheless, in terms of implementing the digital initiatives, not all ports, including minor ports, are at par with major ports in terms of efficiency.

It is also important to look at the larger geographical and strategic backdrop in relation to maritime development in India. As far as the Indian Ocean Region is concerned, this continues to occupy centre stage in matters pertaining to international trade as well as energy security concerns.

It is absolutely essential to ensure the security of this critical naval route in order to facilitate uninterrupted access to international markets. It must also be noted that as far as the engagement of India with its neighboring regions is concerned, there is an increasing recognition of maritime diplomacy as a tool for economic engagement as well.

Reforms in shipping and logistics are also a point of concern. India is a large trading country, but its presence in the international shipping fleet is very small. This hampers its ability to control the cost of freight. Measures that help in improving coastal shipping, multimodal transport, and logistics are thus very important. Reducing logistics costs is important not only for exports but also for making the country's manufacturing sector strong.

In general, the results of this report indicate that India is in a state of maritime

transition rather than completion. Much has been achieved in governance reform, development in ports, digitalization and the vision itself. Still, areas where there are disparities in digitalization and development in smaller ports and the absence of shipping capabilities remain. They would be addressed through the intervention of both the central and state governments.

The Maritime Vision 2030 and the Maritime Amrit Kaal Vision 2047 build a broad framework for integrating the development strategy of India with ports, shipping, logistics and maritime security. If these policies are genuinely implemented, then these can convert the Indian coastline into an economic strength rather than a boundary. Basically, the ability of India to integrate the development of infrastructure with institutional development will finally determine the future of India in the emerging maritime and trade order.

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