



# **Visakhapatnam Port Authority**

## **Exploring Ship Building, Repair and Recycle Clusters in Duggarajapatnam (Tirupati District) and Mulapeta (Srikakulam District)**

**Report Dated: 04/04/2025**

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## **CHAPTER 1**

### **1. Introduction to shipbuilding and ship repair & recycle industry**

#### **1.1 Ship Building**

Shipbuilding is a vital manufacturing industry that involves the design, construction, and maintenance of ships and floating structures, playing a crucial role in global trade, energy exploration, and national security. Ships are primarily built using steel, along with wood and composite materials for specialized applications. The industry encompasses various vessel categories, including merchant ships such as bulk carriers, tankers, and container ships, which transport goods and raw materials across global trade routes.

India has a coastline of 7,517 km with 12 major ports and 217 notified non-major ports, facilitating extensive maritime trade. As of March 2023, India had a shipping tonnage of 13.66 million Gross Tonnage (GT) with 1,521 ships, yet Indian-owned vessels carried only 5.42% of India's overseas trade in 2021-22. To support its increasing trade, India's shipbuilding market was valued at USD 7.11 billion in 2023 and is projected to reach USD 8.76 billion by 2028 at a CAGR of 4.57%.

Beyond commercial vessels, the shipbuilding sector also includes passenger ships such as ferries and cruise liners, which cater to transportation and tourism. The offshore and industrial sectors rely on specialized vessels, including offshore support vessels (OSVs), drill ships, and Floating Production Storage and Offloading Units (FPSOs) for oil and gas exploration. The defence sector depends on warships, submarines, and aircraft carriers for maritime security. Additionally, research and fishing vessels contribute to scientific exploration and global fisheries.

India has 46 dry docks for ship repair across the public and private sectors, with nine dry docks operated by five major ports. However, several key ports, including JNPA, New Mangalore, and Chennai, lack dry-dock facilities. Expanding dry docks and ship repair facilities is essential for supporting India's growing maritime industry and reducing dependency on foreign repair yards.

Shipbuilding is a key driver of economic growth, integrating multiple industries such as steel manufacturing, electronics, and automation. With 65% of a ship's value derived from ancillary industries, the sector fosters regional development and employment, boasting an investment

multiplier of 1.82 and an employment multiplier of 6.4. Leading nations like China, Japan, and South Korea demonstrate how shipbuilding can drive industrial expansion and create substantial employment opportunities.<sup>1</sup>

As an order-driven sector, shipbuilding's sustainability relies on maintaining a robust pipeline of new orders, ensuring continuous demand across the supply chain. With India's emergence as a major economic power and increasing global trade integration, there is a significant opportunity for the expansion of the domestic shipbuilding industry. This interconnected ecosystem underscores the sector's strategic importance in advancing industrial capabilities and strengthening global connectivity.

## **1.2 Ship Repair**

Ship repair and maintenance are critical components of maritime operations, ensuring vessels remain safe, efficient, and operational throughout their lifecycle. These services include scheduled and unscheduled maintenance, covering essential ship elements such as engines, electrical systems, propulsion, and hull integrity. Common repair activities involve rust removal, repainting, structural modifications, and engine overhauls, carried out at specialized facilities like dry docks, floating docks, ship lifts, and sliding docks.

With global shipping volumes increasing, the demand for well-equipped ship repair facilities has grown, emphasizing the need for strategically located shipyards to support regional and international fleets. Recognizing this, the Ministry of Ports, Shipping, and Waterways has launched initiatives under the Maritime India Vision 2030 (MIV 2030) and Maritime Amrit Kaal Vision 2047 (MAKV 2047) to modernize shipyards, attract investment, and create employment opportunities. The MIV 2030 aims to position India among the top 10 countries globally in shipbuilding and ship repair, reinforcing its role as a key player in the global maritime industry.

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<sup>1</sup>Source: RITES Draft Demand Report

### 1.3 Ship Recycle

Ship recycling, involves dismantling decommissioned vessels to recover valuable materials, primarily steel, for reuse. This process not only supplies raw materials for various industries but also contributes to environmental sustainability by reducing the need for new resource extraction. Modern ships typically have a lifespan of 25 to 30 years, after which they are retired due to factors like corrosion and metal fatigue. The global ship recycling market was valued at \$9.2 billion in 2022 and is projected to reach \$11.5 billion by 2028, growing at a compound annual growth rate (CAGR) of 3.7% from 2023 to 2028. This growth is driven by increasing maritime trade, the need for fleet modernization, and a rising demand for scrap metal.<sup>2</sup>

Major ship recycling nations include India, Bangladesh, Pakistan, and Turkey, where the industry plays a significant role in economic development by providing employment opportunities and supporting ancillary industries. However, the sector faces challenges related to environmental and worker safety standards. To address these issues, the International Maritime Organization (IMO) has established the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, aiming to improve practices globally.

As the shipping industry evolves, particularly with technological advancements and decarbonization efforts, older, less fuel-efficient ships are increasingly being phased out, leading to a higher volume of vessels destined for recycling. This trend underscores the importance of sustainable and responsible ship recycling practices to minimize environmental impact and ensure worker safety.

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<sup>2</sup>Source: BCC Research database

## CHAPTER 2

### 2. Overview of Global Shipbuilding, Ship Repair, and Recycling Industry

#### 2.1 Ship Building

##### 2.1.1 Global Market Overview

The global shipbuilding market was valued at approximately USD 150.42 billion in 2024 and is projected to grow to USD 203.76 billion by 2033, reflecting a compound annual growth rate (CAGR) of 3.43% during the forecast period. This growth is driven by factors such as the expansion of international trade, increasing demand for cargo vessels, and the modernization of naval fleets in response to evolving geopolitical dynamics. The industry is predominantly led by China, South Korea, and Japan, which collectively account for about 90% of global shipbuilding output. China's share has notably increased, rising from 5% in 2000 to over 50% in 2023. India's shipbuilding industry, while currently holding a smaller market share, is experiencing significant growth. Valued at \$1.12 billion in 2022, it is projected to reach \$8.12 billion by 2033, indicating a remarkable CAGR of 60%. This expansion is supported by government initiatives, including a \$3 billion investment aimed at positioning India among the top 10 shipbuilding nations by 2030 and the top five by 2047. The sector's performance is influenced by various factors, including fluctuations in newbuild prices, berth availability, and evolving fuel choices amid changing economic trends. Additionally, the increasing emphasis on eco-friendly ships and the need to comply with stringent environmental regulations are shaping the future landscape of the global shipbuilding industry.

##### 2.1.2 Market Drivers

- **Technological Developments:** Ongoing technological developments, such as improvements in digital technologies, manufacturing techniques, and materials, increase the efficacy and efficiency of shipbuilding goods and services.
- **Growing Demand:** One of the main drivers of market expansion is the rising demand for shipbuilding goods and services, which is being driven by urbanization, population growth, and shifting consumer preferences.

- **Regulatory Support:** The market is stimulated by favourable government policies, rules, and incentives that support the use of shipbuilding, such as carbon pricing mechanisms and subsidies for renewable energy projects.
- **Environmental Awareness:** Rising awareness about environmental sustainability and the need to reduce carbon emissions drives the adoption of eco-friendly and renewable Shipbuilding solutions.
- **Cost Reduction:** Ongoing cost reductions in Shipbuilding production and installation, driven by economies of scale, technological advancements, and increased competition, make these solutions more affordable and accessible

### 2.1.3 Market Challenges

- **High Initial Investment:** One major obstacle to market expansion is the significant initial outlay needed to develop and implement shipbuilding solutions, especially for large-scale projects.
- **Intermittency and Reliability:** Certain shipbuilding options, like solar and wind energy, have intermittent and reliable problems, which can be problematic, particularly in areas with erratic weather patterns.
- **Infrastructure Restrictions:** To facilitate the integration of Shipbuilding technologies into current energy systems, large infrastructure investments are required, including grid upgrades and storage facilities.
- **Policy Uncertainty:** Investor instability and market growth can result from a lack of clarity regarding government policies and regulations, such as modifications to tax benefits or subsidies.
- **Competition from Alternative Technologies:** The adoption of shipbuilding solutions is hampered by competing technologies like as nuclear energy and fossil fuels, especially in areas where they are established and receive subsidies.
- **Supply Chain Disruptions:** The availability and cost of shipbuilding solutions can be impacted by supply chain disruptions, such as shortages of essential materials or components, which can hinder market expansion



#### **2.1.4 Market Players**

##### **China**

China's burgeoning dominance in the global shipbuilding industry is clear as in 2023, wherein Chinese shipyards produced 32.85 million GT of output which was roughly half of the global output of 64.7 million GT<sup>3</sup>. China houses the world's major shipyards being located along Eastern and Southern coastlines, including Jiangnan Shipyard in Shanghai and the Hudong-Zhonghua Shipbuilding in Guangzhou.<sup>3</sup>

##### **South Korea**

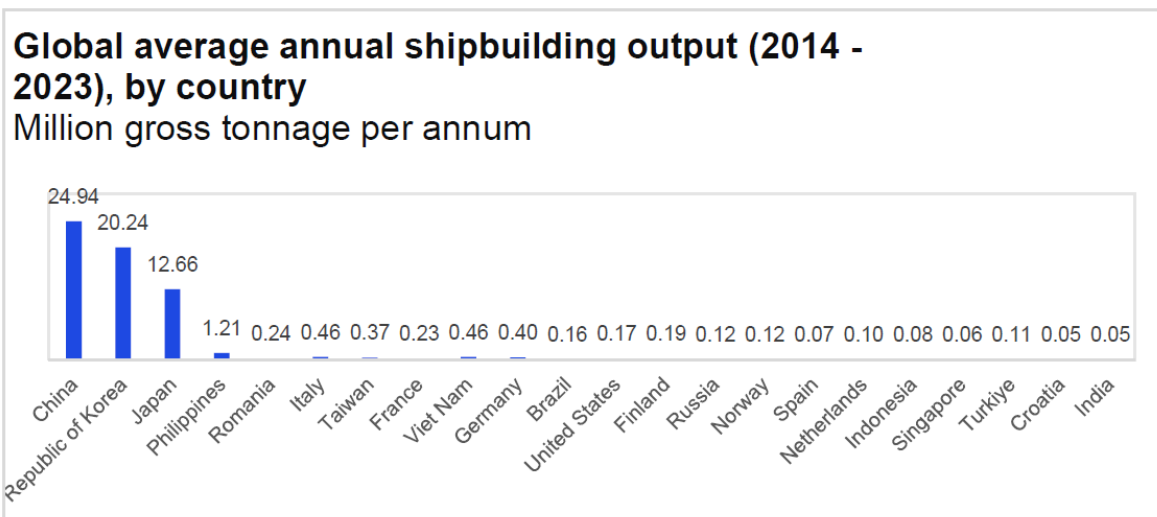
South Korea is another substantial stakeholder in the shipbuilding industry, accounting for 18.3 million GT of shipbuilding output in 2023. South Korea has a share of 37% of global orders, many of which are carried out in massive shipyards like Hyundai Heavy Industries and Daewoo Shipbuilding & Marine Engineering in places like Ulsan and Geoje Island. Notably, the Geoje Shipyard covers over 4.9 million square metres and includes 09 large-scale dry docks.<sup>3</sup>

##### **Japan**

Historically, Japan has been a global leader in shipbuilding and despite the intense competition from China and South Korea, it has managed to secure a place in top shipbuilding nations. Today, it is making headway with technologically advanced and specialised vessels, particularly eco-friendly ships. With dedicated investments in sophisticated shipbuilding methodologies, Japan forges ahead to stabilize its position competitively. In Japan, shipyards are primarily located in maritime centres like Kobe, Nagasaki, and Tokyo. Imabari Shipbuilding operates the Marugame Headquarters that boasts the world's largest shipbuilding dock, measuring 800 metres in length.<sup>3</sup>

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<sup>3</sup>Source: RITES Draft Demand Report



**Figure 1: Global Average annual shipbuilding output by country**

Globally, nations have implemented various incentives to bolster their shipbuilding industries and establish robust maritime clusters:

#### **Tax Incentives and Financial Support:**

**United States:** In March 2025, President Donald Trump announced plans to revitalize the U.S. shipbuilding industry by creating a dedicated Office of Shipbuilding and offering tax incentives. This initiative aims to reduce reliance on foreign-built vessels and enhance domestic production capabilities. Reuters

#### **Import Fees on Foreign-Built Vessels:**

**United States:** Proposals have been made to impose fees of up to \$1.5 million on Chinese-built ships entering U.S. ports. This measure is intended to encourage the use of domestically built vessels and reduce dependence on foreign shipbuilders.

#### **Free Economic Zones (FEZs):**

**South Korea:** The Korean Free Economic Zones (KFEZ) are designed to attract foreign investment by offering tax reductions, financial assistance, and deregulation benefits. These zones focus on industries such as maritime logistics and shipbuilding, providing an environment conducive to business growth.

## 2.2 Ship Repair

### 2.2.1 Global Market Overview

The global ship repair and maintenance services market is experiencing steady growth, driven by increasing global trade and the need to maintain aging fleets. Valued at USD 35.72 billion in 2023, the market is projected to reach USD 53.23 billion by 2032, reflecting a compound annual growth rate (CAGR) of 4.60% during the forecast period. This expansion is fuelled by factors such as the rising number of vessels requiring regular maintenance, advancements in repair technologies, and stringent maritime regulations necessitating compliance through timely repairs. Key segments within the market include electrical and instrumentation repairs, engine overhauls, and hull maintenance. Geographically, the Asia-Pacific region dominates the market, attributed to its extensive shipbuilding activities and busy maritime trade routes. As the industry evolves, ship repair and maintenance services remain critical to ensuring vessel safety, efficiency, and operational longevity.

### 2.2.2 Market Drivers

Using cutting-edge technology like IoT and robotics increases productivity and decreases downtime. An increasing emphasis on environmental sustainability calls for eco-friendly upgrades and maintenance methods. The growth of the maritime sector in developing nations fuels the need for maintenance and repair services. A stronger emphasis on data-driven predictive maintenance techniques that maximize efficiency and reduce expenses.

### 2.2.3 Market Challenges

There are logistical issues due to the restricted availability of dry docks and repair facilities in some areas. Strict adherence to standards and procedures is necessary due to the technical difficulties and safety hazards involved in restoring modern vessels. The economic climate and fluctuations in fuel prices have an impact on shipping businesses' repair and maintenance budgets. Reluctance to embrace digital solutions and new technologies because of compatibility and cybersecurity concerns.

### 2.2.4 Market Players

#### Italy

Fincantieri S.p.A. is one of the largest shipbuilders in the world, with extensive operations in ship repair, retrofitting, and conversion services. The company operates multiple dry docks and floating

docks across Italy and other international locations. It specializes in luxury cruise ship maintenance, naval fleet upgrades, and commercial vessel repair. With decades of expertise, Fincantieri provides solutions for structural modifications, propulsion system enhancements, and eco-friendly vessel upgrades.

### **United States**

BAE Systems is a key player in ship repair, modernization, and overhaul for both commercial and military vessels in the U.S. The company operates several shipyards, including facilities in Norfolk, San Diego, and Jacksonville, offering services for aircraft carriers, destroyers, and commercial cargo ships. BAE Systems is a trusted partner of the U.S. Navy, providing lifecycle support, structural enhancements, and weapon system integrations, ensuring fleet readiness.

### **South Korea**

Hyundai Mipo Dockyard is one of South Korea's most advanced ship repair and conversion specialists, with fully equipped dry docks and repair facilities in Ulsan. The company services large oil tankers, bulk carriers, and gas carriers, focusing on LNG retrofits, eco-friendly modifications, and structural overhauls. Hyundai Mipo is renowned for rapid turnaround repair times and high-precision engineering, making it a preferred choice for global shipping companies.

### **Netherlands**

Damen Shipyards Group is the largest shipbuilding and repair network in the Netherlands, operating 35 shipyards worldwide. It specializes in emergency vessel repairs, lifecycle extensions, and component replacement services for a variety of ships, including cargo vessels, dredgers, and naval ships. Damen offers quick turnaround times with floating repair docks at key global ports, providing maintenance services for offshore and fishing fleets as well.

## 2.3 Ship Recycle

### 2.3.1 Global Market Overview

The global ship recycling market is experiencing steady growth, driven by factors such as increased maritime trade, environmental sustainability concerns, and a rising demand for scrap metal. Valued at \$9.2 billion in 2022, the market is projected to reach \$11.5 billion by 2028, reflecting a compound annual growth rate (CAGR) of 3.7% during the forecast period. India and Bangladesh dominate the industry, collectively accounting for approximately 80% of global ship recycling activities. The market is typically segmented by vessel type (e.g., oil tankers, bulk carriers, container ships), vessel size (e.g., below 60,000 DWT, 60,000 to 125,000 DWT), and recycling methods (e.g., beaching, dry-dock). As the global fleet ages and environmental regulations tighten, the demand for efficient and eco-friendly ship recycling practices is expected to further propel market expansion.<sup>4</sup>

### 2.3.2 Market Drivers

A primary driver is the economic lifecycle of vessels; as ships age and become less efficient, they are retired and dismantled, providing a continuous supply of recyclable materials. Fluctuations in steel prices also significantly affect the industry; higher steel prices can make ship recycling more profitable due to the increased value of scrap metal. Additionally, stringent environmental regulations and international conventions, such as the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, encourage the decommissioning of older, less eco-friendly vessels, promoting recycling activities. The expansion of global trade and shipping fleets further contributes to the steady flow of ships reaching the end of their service life, bolstering the recycling sector.

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<sup>4</sup>Source: BCC Research database

### 2.3.3 Market Challenges

Conversely, the industry faces several challenges. Environmental concerns are paramount, as shipbreaking can lead to significant pollution and hazardous waste if not managed properly. Worker safety is another critical issue; inadequate safety measures in some recycling yards have resulted in accidents and health risks. Economic factors, such as fluctuating demand for recycled materials and competition from alternative materials, can impact profitability. Moreover, regulatory inconsistencies across countries create compliance complexities for ship recyclers operating internationally. The combination of labour-intensive work, limited access to medical services, inadequate housing and sanitation, and a lack of proper regulations further exacerbate these challenges.

### 2.3.4 Market Players

#### **Bangladesh**

Bangladesh holds a significant position in the ship recycling industry, with its capacity around 25% of the world's recycling capacity. The country has several shipbreaking yards along the Sitakunda coast in Chittagong, which contribute substantially to its economy.

#### **Pakistan**

Pakistan's ship recycling industry is primarily centered in Gadani, Baluchistan. The country commands approximately 9% of the world's recycling capacity. The Gadani shipbreaking yard is known for dismantling large vessels, contributing significantly to the local economy.

#### **Turkey**

Turkey is recognized for its environmentally friendly ship recycling practices, with approximately 2% of the world's recycling capacity. The country's ship recycling facilities are primarily located in the Aliaga region, adhering to EU regulations and attracting vessels from European countries.

#### **China**

China has historically been a major player in ship recycling, commanding around 30% of the world's recycling capacity. However, recent environmental regulations have led to a reduction in its shipbreaking activities. Despite this, China maintains several state-of-the-art facilities that focus on green recycling methods.

## **CHAPTER 3**

### **3 Overview of Indian Shipbuilding, Ship Repair, and Recycling Industries**

#### **3.1 Ship Building Industry**

##### **3.1.1 Current Scenario**

India's shipbuilding industry comprises a mix of public and private sector entities, including four Defence Public Sector Undertaking (DPSU) shipyards, one Public Sector Undertaking (PSU), and approximately 20 private shipyards. Public sector shipyards primarily focus on naval shipbuilding, while private shipyards possess the capability to construct large vessels, such as those ranging from 150,000 Deadweight Tonnage (DWT) up to 400,000 DWT, including large Liquefied Natural Gas (LNG) carriers. Despite these capabilities, the output for commercial vessels remains limited due to a lack of demand.<sup>5</sup>

As of 2022-23, Cochin Shipyard Ltd. leads in shipbuilding capacity with 110,000 DWT, followed by Hindustan Shipyard Ltd. at 80,000 DWT. Other notable capacities include Shoft Shipyard Pvt. Ltd. (10,000 DWT) and several shipyards like San Marine and Mandovi Drydocks Ltd., each with 8,000 DWT. At the end of 2022-23, Indian shipyards had an order book of 433 ships totalling approximately 249,940 DWT, with public sector companies accounting for 53.8% of this tonnage. During the same period, 206 ships with a combined 32,530 DWT were delivered, predominantly by private sector companies.

Despite its strategic importance, India's share in the global shipbuilding and ship repair market remains below 0.1%. The government aims to position India among the top 10 shipbuilding and ship repair nations globally through initiatives outlined in the 'Maritime Vision 2030' document. Achieving this goal requires addressing challenges such as limited infrastructure for large cargo vessels and enhancing demand for commercial shipbuilding.

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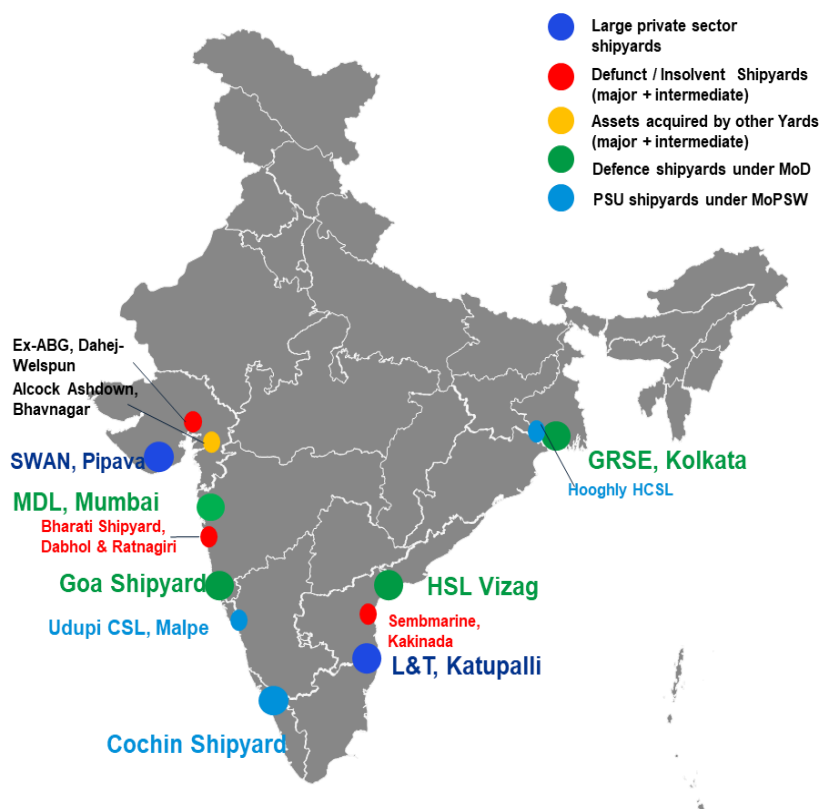
<sup>5</sup>Source: RITES Draft Demand Report

Recent developments signal a renewed focus on the sector. In February 2025, the Indian government announced the establishment of a 250 billion rupees (\$2.9 billion) Maritime Development Fund to support long-term financing for the shipbuilding and repair industry. The government will contribute 49% of the fund, with the remainder sourced from ports and the private sector. This initiative aims to enhance India's infrastructure and develop its shipping industry as part of a broader vision to become a developed nation by 2047.

Furthermore, India's shipbuilding industry is experiencing significant growth. In 2022, it was valued at \$90 million and is projected to reach \$8.12 billion by 2033, exhibiting a remarkable compound annual growth rate (CAGR) of 60%. This expansion is attributed to factors such as government support, strategic location, labour cost advantages, and a focus on niche segments like offshore support vessels and ferries.

Addressing financial constraints remains crucial for the industry's growth. Shipbuilding demands high working capital, approximately 20–25% of a ship's construction cost. In India, interest rates for these loans hover around 10–10.5%, significantly higher than the 4–8% rates in major shipbuilding nations. Implementing innovative financing solutions could alleviate this challenge and further stimulate the sector's development.

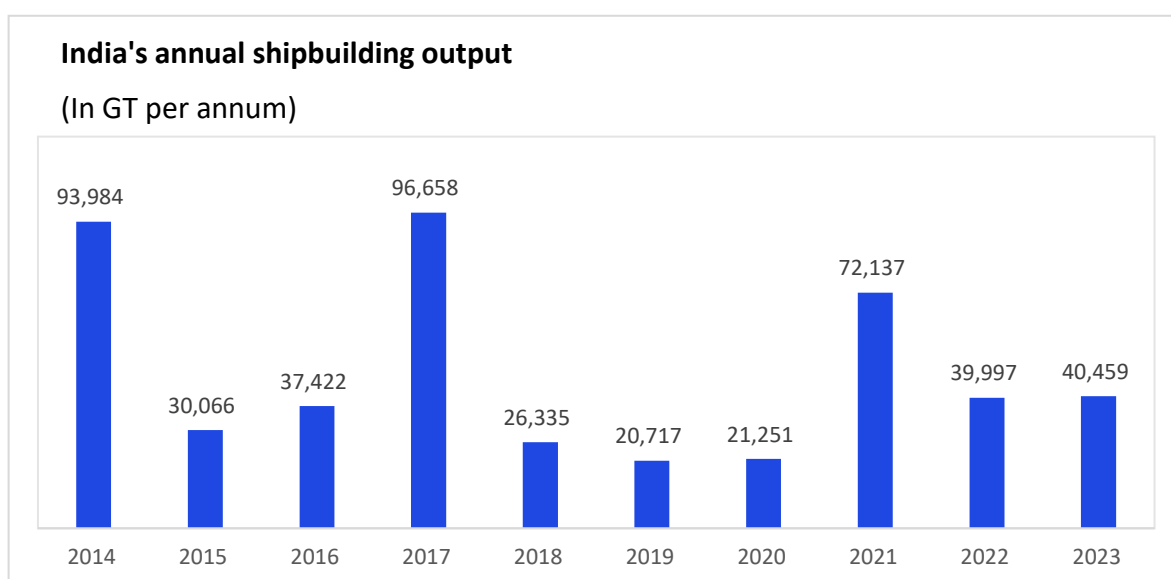




**Figure 2: Major Indian shipyards**

**Table 1: State wise list of shipyards**

S No	State	Major	Intermediate	Minor	Small repair agencies
1	Andaman and Nicobar	0	0	1	1
2	Andhra Pradesh	1	1	1	1
3	Goa	1	7	6	2
4	Gujarat	2	2	2	0
5	Karnataka	0	2	0	0
6	Kerala	1	0	4	1
7	Maharashtra	1	0	3	5
8	Tamil Nadu	1	0	0	1
9	West Bengal	1	1	2	4
	<b>Total</b>	<b>8</b>	<b>13</b>	<b>19</b>	<b>15</b>



**Figure 3: India's annual shipbuilding output**

Ship-Building Capacity (2022-2023)		
Sl.No.	Name of Company*	Capacity (in thousand DWT)
1	Cochin Shipyard Ltd	110.0
2	Hindustan Shipyard Ltd.	80.0
3	Shoft Shipyard Ltd.	10.0
4	Chowgule & Co. Pvt. Ltd.	8.0
5	Sea Blue Shipyard Ltd.	8.0

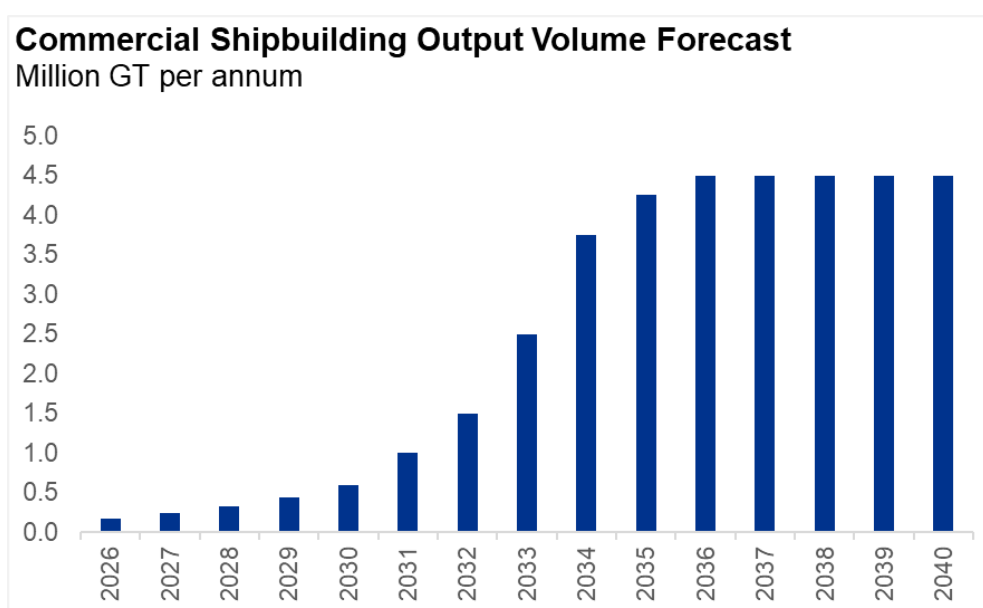
**Ship-building order book:** At the end of 2022-23 amongst reporting companies, the companies had an order book of 433 ships with gross DWT 249.94 thousand tonnes. During the period the public sector companies had orders of 125 ships of 134.55 thousand DWT. In private sector companies the order book had 308 ships of total 115.39 thousand DWT. During the period public sector and private sector accounted for a share of 53.8% (134.55 thousand DWT) and 46.2% (115.39 thousand DWT) respectively in the total tonnage (249.94 thousand DWT).

**Ships delivered:** At the end of 2022-23 amongst reporting companies, both the public and private sector companies delivered 206 ships with 32.53 thousand DWT. Public sector companies delivered

27 ships with 3.13 thousand DWT and private sector companies delivered 179 ships with 29.40 thousand DWT.

### 3.1.2 Major Players in Ship Building Industry

India's commercial shipbuilding industry remains a minor player in the global market, with a 0.06% share and a 22nd rank in global shipbuilding as of 2022. The country's maximum annual shipbuilding output in the last decade has been 0.1 million GT, indicating a significant gap in production capacity compared to leading nations. Furthermore, the share of India's EXIM cargo carried by Indian-owned ships has declined from 8.5% in 2014 to 5.4% in 2022, increasing reliance on foreign vessels. Consequently, the country paid approximately USD 75 billion in sea freight charges to foreign companies in FY 2019-20, contributing to a cumulative USD 637 billion in freight payments from 2008 to 2021. This highlights the urgent need for domestic shipbuilding expansion to reduce foreign exchange outflows and improve self-sufficiency.



**Figure 4: India's annual shipbuilding output**

Market projections suggest that India's annual commercial shipbuilding output will rise from 0.18 million GT in 2026 to 4.5 million GT by 2040. This rapid growth will drive the market size from USD 181 million (INR 153.5 million) in 2026 to USD 4,574 million (INR 388.77 billion) in 2040, with a cumulative market value of USD 37,899 million by 2040. The government's focus on green

Company	Location	Revenue (₹ Cr.) 2022-23	Key Customers
<b>Mazagon Dock Shipbuilders Ltd.</b>	Mumbai	7,827	Indian Navy, Indian Coast Guard
<b>Cochin Shipyard Limited (CSL)</b>	Kochi (HQ), Mumbai, Kolkata, Port Blair, Howrah	2,330	Indian Navy, Shipping Corporation of India, Lakshadweep Administration, IWA
<b>Goa Shipyard Limited (GSL)</b>	Goa	1,045	Indian Navy, Indian Coast Guard
<b>Hindustan Shipyard Limited (HSL)</b>	Visakhapatnam	1,118	Indian Navy, Good Earth Maritime Limited, Vishakhapatnam Port Authority, Shipping Corporation of India

shipbuilding technologies, financial assistance, and skill development programs will play a crucial role in sustaining this growth trajectory.

India's shipbuilding industry is led by several public and private sector players who contribute significantly to the sector's development. Cochin Shipyard Limited (CSL) is the largest shipyard in the country, handling both commercial and naval shipbuilding, with a shipbuilding capacity of 110,000 DWT. Hindustan Shipyard Ltd. (HSL), located in Visakhapatnam, specializes in both shipbuilding and ship repair, with a capacity of 80,000 DWT. Other notable players include Mazagon Dock Shipbuilders Limited (MDL) in Mumbai, primarily engaged in naval shipbuilding, and Garden Reach Shipbuilders & Engineers Ltd. (GRSE), which focuses on warships and commercial vessels. Additional players such as Goa Shipyard Limited, Hooghly Cochin Shipyard Limited, and Shalimar Works Limited contribute to the industry by constructing both defence and commercial ships.

The shipbuilding sector in India is capital-intensive, with major shipyards handling projects worth several thousand crores. Mazagon Dock Shipbuilders Limited has an extensive order book of ₹380 billion, making it one of the most loaded shipyards in the country. Hindustan Shipyard Limited recorded its highest-ever Value of Production (VoP) of ₹10.1 billion in FY 2022-23, marking a 38% year-on-year growth.

### **Impact on Ancillary Industry and Investment Multiplier**

Shipbuilding has a high investment multiplier of 1.82, meaning that for every unit of investment, it generates 1.82 times the economic output. Approximately 65% of a ship's value is derived from ancillary industries such as steel manufacturing, electronics, engineering, electrical equipment, port infrastructure, and maritime services. This implies that a strong shipbuilding sector will drive significant growth in supporting industries, boosting the overall manufacturing economy and attracting further industrial investments.

Ancillary industries play a critical role in the shipbuilding and ship repair industry, contributing to the production of essential components such as marine engines, propulsion systems, electrical equipment, navigation systems, and hull materials. Currently, a significant portion of these critical components is imported, increasing costs, leading to dependency on foreign suppliers, and exposing the sector to global supply chain disruptions. To establish a self-reliant and globally competitive shipbuilding industry, India must focus on reducing import dependency and enhancing domestic manufacturing capabilities. A realistic yet ambitious target should be set to achieve 50% indigenization in shipbuilding components over the next decade.

One effective strategy to achieve this goal is to promote Joint Ventures (JVs) with leading global maritime manufacturers for setting up domestic production facilities. Successful global examples include China's collaboration with Wärtsilä (Finland), Rolls-Royce (UK), and MAN Energy Solutions (Germany) to establish marine engine manufacturing plants. Similarly, South Korea has partnered with global marine technology firms to enhance local expertise and reduce reliance on imports. India can replicate such models by facilitating partnerships between leading global suppliers of shipbuilding components and domestic manufacturers, encouraging technology transfer and skill development.

Additionally, the introduction of a Production Linked Incentive (PLI) scheme specifically for shipbuilding and marine equipment manufacturing can provide financial incentives based on production output. This initiative would encourage domestic and foreign companies to set up manufacturing units in India, reducing costs for Indian shipyards and enhancing their global competitiveness. The PLI scheme has been successfully implemented in the Indian automotive, electronics, and renewable energy sectors, leading to increased domestic production and investment inflows. A similar approach in the maritime sector will create thousands of jobs, stimulate research and development in marine technology, and position India as a leader in sustainable shipbuilding.

With the right policy interventions, India can significantly reduce import dependency, develop a robust domestic supply chain, and emerge as a major player in the global shipbuilding industry.

### **Job Creation Potential**

The shipbuilding industry has one of the highest employment multipliers (6.4) among manufacturing sectors, meaning that it creates 6.4 jobs per unit of investment. Given the labour-intensive nature of shipbuilding, it offers extensive employment opportunities for both skilled and unskilled workers. Furthermore, considering that 65% of value addition comes from ancillary industries, shipbuilding has the potential to generate significant indirect and induced employment opportunities in supporting industries, associated services, and supply chain networks. The presence of a productive shipyard can boost local and regional economies, providing avenues for upward social mobility and community development.

### **Symbiotic Growth with Defence Shipbuilding**

India's 7,516 km coastline, 1,197 offshore islands, and 2.01 million sq. km Exclusive Economic Zone (EEZ) make maritime security a national priority. A significant portion of India's economic and industrial infrastructure, including nuclear power stations, is located within 200 km of the coastline. Developing a strong commercial shipbuilding sector will complement defence shipbuilding initiatives, ensuring strategic self-sufficiency, technological innovation, and reduced dependency on foreign suppliers for military and commercial vessels. A robust shipbuilding ecosystem will enhance India's naval capabilities, fortify coastal security, and support the country's long-term maritime defence strategy.<sup>6</sup>

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<sup>6</sup>Source: RITES Draft Demand Report

## 3.2. Ship Repairing Industry

### 3.2.1 Current scenario

India's ship repair industry benefits from a strong labour force but remains underutilized due to competition from international yards, high capital costs, and delays caused by limited ship spare availability. To address these challenges, the Government of India is implementing initiatives under the Aatma Nirbhar Bharat Policy, improving infrastructure, easing financial access, and promoting free trade depots and maritime clusters to enhance domestic capacity and drive industry growth.

Ship-Repairing Capacity (2022-2023)		
S.No.	Name of Company*	Capacity (in thousand DWT)
1	Cochin Shipyard Ltd	125.0
2	Hindustan Shipyard Ltd.	80.0
3	Waterways Shipyard Pvt. Ltd.	8.0
4	San Marine	7.8
5	Modest Infrastructure Pvt. Ltd.	6.0

**Ships Repaired:** During the year 2022-23 amongst reporting public and private sector companies, total number of ships repaired were 439 out of which 259 ships were repaired by private sector companies and 180 ships were repaired by public sector companies.

### 3.2.2 Major Players in Ship Repair Industry

The Indian ship repair industry is driven by a mix of public and private sector players. Cochin Shipyard Limited (CSL) has the highest ship repair capacity of 125,000 DWT and handles a large portion of India's ship repair market. Other public sector players include Hindustan Shipyard Limited (80,000 DWT capacity) and Goa Shipyard Limited (4,500 DWT capacity). On the private sector side, Waterways Shipyard Pvt. Ltd. (8,000 DWT), San Marine (7,800 DWT), and Modest Infrastructure Pvt. Ltd. (6,000 DWT) play significant roles. The ship repair market in India is projected to grow significantly, reaching ₹120 billion by 2030 from ₹190 billion in 2023-24. Factors contributing to this growth include government support, India's strategic maritime location, and the expansion of niche ship repair services.

**Table 2: Public Sector Players in Ship Repair**

<b>Company</b>	<b>Capacity (‘000 DWT)</b>	<b>Ships repaire d</b>	<b>Earning s (INR CR)</b>	<b>Share (Public/ Private)</b>	<b>Share overall</b>	<b>Geographica l Presence</b>
<b>Cochin Shipyards Limited</b>	125	105	550	58.3%	23.9%	Kerala, Maharashtra, West Bengal, Andaman & Nicobar
<b>Hindustan Shipyards Limited</b>	80	7	282	3.9%	1.6%	Andhra Pradesh
<b>Mazagon Dock Shipbuilders Ltd</b>	N/A	2	168	1.1%	0.5%	Maharashtra
<b>Shalimar Works Limited</b>	N/A	7	2.2	3.9%	1.6%	West Bengal
<b>Goa Shipyards Limited</b>	5	44	310	24.4%	10.0%	Goa



**Table 3: Private Sector Players in Ship Repair**

Company	Capacity ('000 DWT)	Ships repaired	Earnings (INR CR)	Share (Public/Private)	Share overall	Geographical Presence
<b>Chowgule Lavgan Ship care Pvt. Ltd.</b>	N/A	49	159.9	N/A	N/A	Maharashtra
<b>Chidambaram Ship care Pvt. Ltd.</b>	N/A	75	579.8	N/A	N/A	Tamil Nadu
<b>Dempo Shipbuilding &amp; Engineering Pvt. Ltd.</b>	N/A	24	509.5	N/A	N/A	Goa
<b>Sembmarine Kakinada Ltd.</b>	N/A	26	710.4	N/A	N/A	Andhra Pradesh
<b>SeaBlue Shipyard Ltd.</b>	N/A	19	247.6	N/A	N/A	Kerala

### 3.3. Ship Recycle Industry

#### 3.3.1 Current scenario

India's ship recycling industry is a significant component of the global shipbreaking sector, particularly concentrated in regions like Alang-Sosiya in Gujarat. As of 2023, India accounted for approximately 33% of the global gross tonnage dismantled, second only to Bangladesh. The industry is projected to recycle between 3.8 and 4.2 million gross tonnages (GT) of ships annually by 2025, up from an estimated 2.3 to 2.6 million GT in 2024. This growth trajectory is expected to continue with a compound annual growth rate (CAGR) of around 10% from 2026 to 2028. The sector not only contributes significantly to the economy by generating substantial quantities of re-rollable steel but also provides employment to approximately 60,000 people. Despite these advancements, challenges

such as compliance with international environmental standards and the need for improved infrastructure remain pertinent.

### 3.4. Financial Framework and Incentives

To promote investment in shipbuilding, the Government of India offers several fiscal incentives:

**Shipbuilding Financial Assistance Policy (SBFAP 2.0):** Provides a 25% subsidy to shipyards for vessels constructed in India. Offers a 30% subsidy for green vessels, including green conversions of existing ships. Extends financial assistance for contracts secured between April 1, 2016, and March 31, 2026.

**Interest Subvention for Brownfield Expansion:** Offers an interest rate reduction by a maximum of 7%, bringing the interest rate to 5% for loans aimed at brownfield expansion of shipyards or reviving defunct shipbuilding assets. Supports capital dredging activities to enhance port infrastructure.

**Shipbreaking Credit Note:** Issues a credit note of 40% of the ship's scrap value to the shipowner when the vessel is scrapped in an Indian yard. The credit note is reimbursable against the cost of constructing a new vessel at an Indian shipyard.

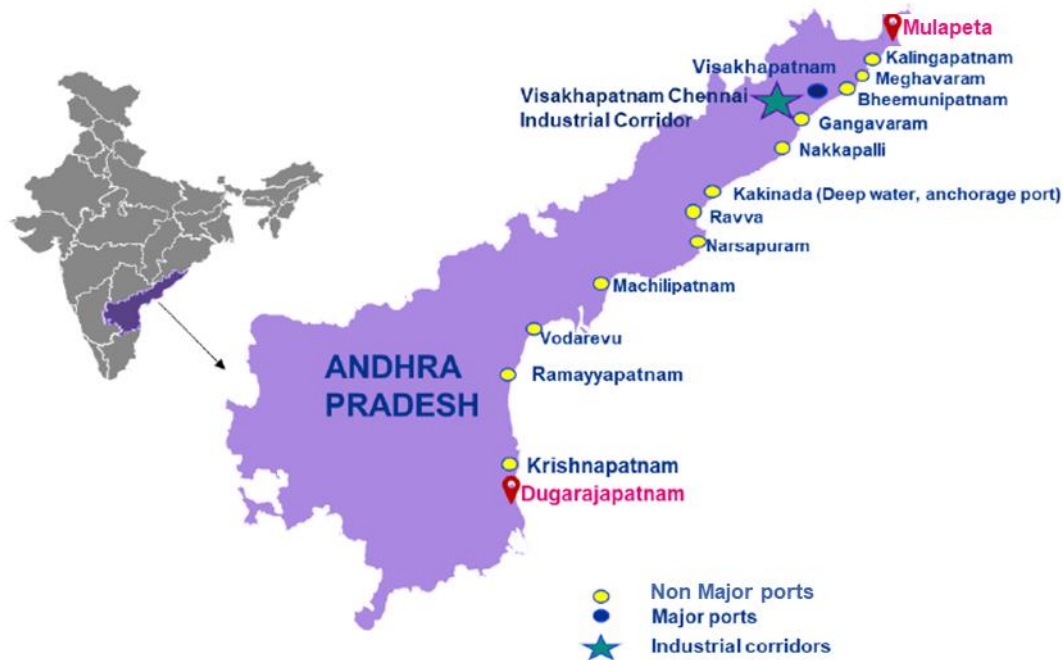
**Taxation and Customs Incentives:** GST on shipbuilding is set at 5%, but input materials like raw materials and components face higher tax rates (12-28%), causing inverted tax structures. Basic Customs Duty on shipbuilding raw materials and shipbreaking components has been waived for 10 years from April 2025, reducing material costs.

**Maritime Development Fund (MDF):** ₹250 billion fund allocated under Union Budget 2025 to support shipbuilding and repair. 49% government-funded, 51% private and port investments. Offers long-term, low-interest financing to address high financing costs (currently 10-10.5% in India vs. 4-8% in China and South Korea).

**Investment and Employment Subsidies:** The government provides Viability Gap Funding (VGF) to encourage private sector investment in shipbuilding infrastructure. Employment-linked incentives for skill development and workforce training in shipbuilding and repair.

## CHAPTER 4

### 4 Rationale for Establishing a Shipbuilding, Repair, and Recycling Cluster in Andhra Pradesh



*Figure 5: Andhra Pradesh map with Major and Non-major ports*

#### 4.1 Strategic Advantages of Andhra Pradesh as a Shipbuilding, Repair and Recycle Hub

Andhra Pradesh is an ideal location for establishing a shipbuilding, ship repair, and recycling cluster due to its strategic coastal position, strong industrial base, and robust infrastructure. With a 975 km coastline, the state is home to major ports like Visakhapatnam, Kakinada, and Krishnapatnam, serving as key import-export gateways. Its well-developed logistics network, including 7,087 km of national highways, 14,714 km of state highways, and 3,703 km of rail routes, ensures seamless cargo movement.

The state is further strengthened by three major industrial corridors—Visakhapatnam-Chennai (VCIC), Chennai-Bengaluru (CBIC), and Hyderabad-Bengaluru (HBIC)—which provide industrial synergy and supply chain support. Andhra Pradesh contributes ~14% to India's national income, with a GSDP of INR 143.9 billion (USD 173.87 billion) for FY2023-24, and hosts 1,066 large and mega enterprises along with 9 lakh registered MSMEs, fostering industrial growth. The state's power surplus status, with 27 GW installed capacity (40% from renewables) and low transmission losses, makes it an energy-efficient destination for shipbuilding operations.<sup>7</sup>

Additionally, the availability of 50,000+ skilled workers ensure a ready workforce for the maritime industry. With its strategic location, government support, industrial ecosystem, and infrastructure, Andhra Pradesh is well-positioned to become a global hub for shipbuilding, repair, and recycling, driving economic growth, employment generation, and maritime sector expansion.

## **4.2. Analysis of Duggarajapatnam and Mulapeta as Ideal Locations**

### **Location and Strategic Advantages**

Both Duggarajapatnam, in Tirupati district, and Mulapeta, in Srikakulam district, are positioned along Andhra Pradesh's extensive coastline, providing access to major shipping lanes. This strategic placement enhances connectivity for maritime activities, with Duggarajapatnam located between Krishnapatnam and Ennore ports, and Mulapeta part of North Andhra's development focus.

Dugarajapatnam, situated in the Tirupati district of Andhra Pradesh, lies strategically between the Krishnapatnam and Ennore ports, enhancing regional maritime connectivity. Initially, a major port was proposed here under the Andhra Pradesh Reorganisation Act, with construction anticipated to commence in 2020 and conclude by 2023. The project was to be developed under India's Companies Act 1956, featuring equity participation from the Government of Andhra Pradesh alongside the Union government. However, the plan faced challenges due to environmental concerns associated with the proximity to Pulicat Lake, a sensitive ecosystem, and the Satish Dhawan Space Centre at Sriharikota. These factors led to the project's revaluation and eventual shelving.

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<sup>7</sup>Source: RITES Draft Demand Report

Despite these setbacks, Dugarajapatnam's advantageous location and existing infrastructure present a compelling case for its development into a hub for shipbuilding, ship repair, and ancillary industries. The area benefits from robust road connectivity to National Highway 16 via Naidupeta and strong rail links, with Gudur, a major railway junction, located approximately 40.5 km away. These attributes make it suitable for establishing dry docking facilities and fostering related maritime industries.

By focusing on shipbuilding and ancillary services, Dugarajapatnam can leverage its strategic position and infrastructure to contribute significantly to India's maritime sector, while mitigating the environmental concerns that hindered the original port development plans.

**Mulapeta:** Situated in Srikakulam district, it is part of North Andhra, with an under-construction deep sea port that will have a depth of 18 meters, accommodating panamax and capsize vessels, and is estimated to cost over ₹43 billion. Its role in fostering regional development, with a foundation laid in April 2023, and a cargo handling capacity of 23 million tonnes in the first phase.

### **Infrastructure and Facilities**

Mulapeta's under-construction deep-sea port will feature an 18-meter depth, suitable for Panamax and Capesize vessels, facilitating substantial cargo operations.

To support these operations, establishing efficient and environmentally responsible bunkering services is essential. Providing dedicated bunkering facilities and deploying bunkering barges will ensure timely and safe refuelling of vessels, enhancing port competitiveness and attracting more maritime traffic.

In conclusion, Dugarajapatnam and Mulapeta are both notable sites along the Andhra Pradesh coastline that support India's marine aspirations by utilizing unique locational benefits. Ideally situated between the ports of Krishnapatnam and Ennore, Dugarajapatnam provides excellent connectivity because to its close proximity to National Highway 16 and the Gudur railway junction, making it a prime location for shipbuilding, ship repair, and related businesses.

In case of Mulapeta, the deep draft allows for the construction and servicing of large vessels, while the ongoing development, backed by over ₹43 billion in investment, ensures access to modern amenities and a skilled workforce. Additionally, the port's strategic coastal location enhances connectivity to global shipping lanes, facilitating the import of raw materials and deliver finished ships. Efficient bunkering services further support shipbuilding operations by ensuring vessels can be

fueled and tested on-site, attracting maritime industries and positioning Mulapeta as a potential hub for ship construction, repair, and ancillary services in Andhra Pradesh.

## 4.3. Feasibility Analysis

### 4.3.1 Economic Feasibility

Andhra Pradesh's economic strength is a significant driver for these locations. The state's GDP is projected to reach 210 billion by FY 2028, with a 12.5% growth over FY 2024, positioning it as the 7th largest economy in India. This growth creates an instant advantage for maritime sector development. The state is second in Ease of Doing Business and is the only state with three industrial corridors, providing an extensive logistics network. The Andhra Pradesh Maritime Policy 2024, states allocating Rs 4 billion in FY 2025-26 for greenfield ports, including Mulapeta, with a combined cost of Rs 177 billion, targeting 145 MTPA capacity by 2030 and over 75,000 jobs.

### 4.3.2 Technical Feasibility

**Strategic Location:** Andhra Pradesh's extensive coastline of approximately 1,053 km provides direct access to major international maritime routes, positioning it ideally for global shipping activities. Duggarajapatnam and Mulapeta are well-connected to Visakhapatnam, Krishnapatnam, Gangavaram, and Chennai ports, ensuring seamless logistics for shipbuilding activities.

**Industrial Synergy:** Duggarajapatnam and Mulapeta, strategically positioned along the Visakhapatnam–Chennai Industrial Corridor (VCIC), present significant opportunities for developing a comprehensive maritime ecosystem supported by existing steel, mechanical, and electrical industries. Allocating approximately 100–150 acres at each site would facilitate the establishment of essential ancillary industries. In Duggarajapatnam, with its robust NH16 and rail connectivity but limited deep-sea capabilities due to environmental constraints, the focus could be on dry docks, component manufacturing (e.g., steel plates, marine engines, electronics), and logistics hubs to enhance repair services and reduce import reliance. Conversely, Mulapeta's under-construction deep-sea port, featuring an 18-meter draft suitable for Panamax and Capesize vessels, is ideal for bunkering services, marine equipment fabrication, warehousing, and advanced retrofitting facilities. This approach aligns with the Andhra Pradesh Maritime Policy 2024, which offers land allocations within port areas or designated clusters at subsidized rates for anchor units meeting specific

investment criteria, ensuring efficient resource utilization and fostering a robust maritime infrastructure in the region.

**Infrastructure Readiness:** The coastline and depth of the proposed sites can support large shipyards and dry docks, necessary for handling both new builds and repair projects. Connectivity improvements such as rail links to Gudur Junction (41 km) and Naidupeta (31 km) are required to ensure smooth logistics.

### 4.3.3 Financial Viability

The demand for shipbuilding, repair, and recycling in India is robust, driven by national goals to increase domestic ship ownership and modernize the fleet. Currently, only about 5% of India's EXIM cargo is carried on Indian-flagged ships, resulting in substantial foreign exchange outflows (USD 75 billion annually).

**Shipbuilding:** India's Maritime Amrit Kaal Vision 2047 targets an annual shipbuilding output of 4.5 million GT by 2047, requiring an additional capacity of 3.9 million GT per annum. Duggarajapatnam is planned to host one of three large shipbuilding clusters, each with a capacity of 1.2-1.3 million GT per annum, capable of delivering 6 to 7 vessels annually, each around 200,000 GT. Mulapeta, while not detailed in the attachments for shipbuilding, is part of the state's plan for greenfield ports, suggesting potential for similar development.

**Ship Repair:** The Indian Navy's ship repair market is small (INR 1500-2500 million annually), but commercial demand is expected to grow. Both locations, with planned dry docks and berths, can support repair activities.

**Ship Recycling:** While not explicitly detailed for these locations, India's ship recycling sector, primarily based at Alang in Gujarat, processes around one-third of the world's decommissioned ships, with potential for expansion given the extensive coastline. Mulapeta could potentially develop recycling facilities, aligning with the Union Budget 2025's credit note scheme for shipbreaking to promote a circular economy.

#### 4.3.4 Environmental and Regulatory Feasibility

**Compliance & Sustainability:** Adoption of eco-friendly ship recycling and green shipping initiatives will ensure compliance with global environmental norms. Coastal Regulation Zone (CRZ) clearances will be required before full-scale operations.

**Government Initiatives:** The state government has issued an Expression of Interest (EoI) for developing the shipbuilding and repair cluster, emphasizing its commitment to supporting infrastructure development, expedited clearances, fiscal incentives, and logistical assistance.

### 4.4. Incentives for Shipyard and Cluster Development under APMP 2024.

	Incentives	APMP 2024
1	Pre-feasibility study for location identification	<ul style="list-style-type: none"> <li>GoAP will carry out a study for the identification of suitable locations or potential areas for the establishment of infrastructure for shipyards (shipbuilding/ship repair).</li> <li>The land will be identified under the following categories showcased in the order of priority for land allotment: <ul style="list-style-type: none"> <li>Identified maritime clusters.</li> <li>Additional land available in ports under APMB.</li> <li>Standalone greenfield projects in identified and viable land parcels.</li> </ul> </li> </ul>
2	Centralized land aggregation, development and allocation	<ul style="list-style-type: none"> <li>GoAP will facilitate coordination between suitable agencies in carrying out land aggregation, land allocation and facilitate provision of trunk infrastructure.</li> <li>Land will be allocated in any of the following ways: <ul style="list-style-type: none"> <li>Land in port area or identified cluster area to be provided at tailor-made subsidized rate for the anchor units with need of &gt;500 acres and &gt;INR 4000 crores of overall investment.</li> <li>Land may be provided on a long-term lease (30 – 60 years) at nominal rate.</li> </ul> </li> <li>Government will strive to reduce the various hurdles in procurement of the allotted land such as issues related to Right of Way (RoW), Change of Land Use (CLU) permissions etc.</li> </ul>
2	Tax Benefits	<ul style="list-style-type: none"> <li>Exemptions for customs duties on raw materials.</li> <li>Tax credits on R&amp;D investments in green technologies and eco-friendly vessels.</li> </ul>
3	Subsidies and Financial Support	<ul style="list-style-type: none"> <li>Subsidies on shipbuilding costs for indigenous ships.</li> <li>Interest rate subventions on loans for new shipbuilding projects.</li> <li>Subsidy of 2-5% on goods and services procured from MSMEs registered in AP.</li> <li>Provision of access to water and electricity @50% subsidized rate for a period of 10 years and an increase @10% on Y-o-Y basis for the subsequent 5 years.</li> </ul>



4	Exemption of WFR	Up to 10% cargo charge exemption for shipbuilding raw materials.
5	Reimbursement of Stamp Duty and Registration Fee	<ul style="list-style-type: none"> <li>▪ One-time reimbursement of @100% of Stamp Duty and Registration Fee for establishment of new shipbuilding, shiprepair and ancillary units.</li> </ul>
6	SGST Exemptions	<ul style="list-style-type: none"> <li>▪ SGST exemption on Shipyard construction inputs.</li> <li>▪ SGST waiver on Shipyard-made ships and vessels for 7 years.</li> </ul>
7	Exemption from Electricity Duty	For the first 10 years of operations for Shipyards as well as ancillary industries in the identified clusters.

## CHAPTER 5

### 5 Implementation Mode: Public-Private Partnership (PPP) Models in Shipbuilding and Ship Repair

The Government of Andhra Pradesh (GoAP) is committed to developing shipbuilding and ship repair clusters at Dugarajapatnam and Mulapeta through a Public-Private Partnership (PPP) model. The initiative is part of Andhra Pradesh Maritime Policy 2024 (APMP - 2024) and aligns with Maritime India Vision 2030 and the Sagarmala Programme.

This strategy aims to create a globally competitive shipbuilding ecosystem while leveraging private sector investments. The government has adopted a cluster-based approach to developing shipbuilding and repair industries in collaboration with the Andhra Pradesh Maritime Board (APMB) and Andhra Pradesh Industrial Infrastructure Corporation (APIIC).

#### 5.1 Objectives of Shipyard & Cluster Development in Andhra Pradesh

- Increase Andhra Pradesh's share in India's shipbuilding sector to 25% by 2047.
- Attract private investment in shipbuilding and ship repair.
- Establish world-class shipyards and maintenance facilities.
- Ensure environmentally sustainable shipbuilding and recycling practices.
- Boost socio-economic development and employment opportunities in coastal regions.
- Develop an industrial value chain, linking shipyards with ancillary industries.
- Encourage defence shipbuilding projects through partnerships.

#### 5.2. Shipyard Development at Landlord Ports Model

In this prevalent model, the public port authority retains ownership of the port infrastructure, while private entities lease terminals to handle cargo operations. This model targets **Greenfield ports**—newly constructed ports like Dugarajapatnam, Mulapeta, Ramayapatnam, and Machilipatnam (under construction). without existing infrastructure. This approach encourages private investment in superstructure and equipment, enhancing operational efficiency. The Jawaharlal Nehru Port

Authority (JNPA) exemplifies the success of this model, where private sector participation has ensured profitability and efficiency in port operations.

### 5.3. Exploring relevant PPP Contracts: Build-Operate-Transfer (BOT), Build-Own-Operate (BOO), and Operations & Maintenance (O&M)

#### **Build-Operate-Transfer (BOT) Model**

In a BOT arrangement, a private entity is granted a concession to finance, design, construct, and operate a facility for a specified period. After this concession period, ownership of the facility is transferred back to the public authority. This model enables the public sector to leverage private capital and expertise for infrastructure development without immediate expenditure

#### **Case Study:**

##### **Mundra Port, Gujarat**

- **Background:** Mundra Port, located on the northwest coast of India, was developed to enhance trade and alleviate congestion at existing ports.
- **Project Structure:** Developed under a BOT agreement, the private developer was responsible for financing, constructing, and operating the port for a concession period, after which the port's ownership would transfer back to the government.
- **Financials:** The project was funded through a mix of private equity and debt, with the private entity recouping its investment through port service charges and cargo handling fees.
- **Outcomes:** Since its inception, Mundra Port has become one of India's largest commercial ports, significantly boosting trade and contributing to regional economic growth.

**Revenue Model:** The private entity recovers its investment through user fees, including cargo handling charges and other port services, during the concession period.

#### **Stakeholder Stakes:**

- **Public Authority:** Gains a developed port infrastructure without upfront investment and assumes ownership after the concession period.
- **Private Entity:** Assumes the risks associated with construction and operation, with potential returns from operational revenues during the concession period.

## **Build-Own-Operate (BOO) Model**

### **Structure:**

Under the BOO model, a private entity finances, constructs, owns, and operates a facility indefinitely, with no obligation to transfer ownership back to the public sector. This model is less common in Indian port development due to regulatory and strategic considerations.

### **Case Study:**

#### **Gujarat Pipavav Port**

- **Background:** Gujarat Pipavav Port was developed to increase India's port capacity and facilitate international trade.
- **Project Structure:** Established as a BOO project, the private developer financed, constructed, owns, and operates the port, with no transfer of ownership envisaged.
- **Financials:** The project was financed through private investment, with revenues generated from port operations, including cargo handling and related services.
- **Outcomes:** The port has successfully enhanced trade operations and contributed to regional economic development.

**Revenue Model:** The private entity generates income through service charges levied on port users, including shipping lines and cargo owners.

### **Stakeholder Stakes:**

- **Public Authority:** Benefits from enhanced port infrastructure and services without direct investment but has limited control over operations and pricing.
- **Private Entity:** Holds ownership and operational control, assuming market and operational risks, with revenue dependent on service demand and pricing strategies.

## **Operations and Maintenance (O&M) Model**

### **Structure:**

In the O&M model, the public authority retains ownership of the infrastructure but contracts a private entity to operate and maintain the facility for a specified period. This approach leverages private sector efficiency while maintaining public ownership.

### **Case Study:**

#### **Jawaharlal Nehru Port Authority (JNPA) Terminal Operations**

- **Background:** JNPA, situated in Maharashtra, is one of India's largest container ports and operates as a 100% landlord port. To enhance efficiency and service quality, it has partnered with private operators to manage select terminals.
- **Project Structure:** Through O&M contracts, private entities were appointed to operate and maintain specific terminals within the port, while JNPA retained ownership.
- **Financials:** The private operators receive fees based on performance metrics and revenue-sharing arrangements, incentivizing efficiency and service improvements.
- **Outcomes:** The involvement of private operators has led to enhanced operational efficiency, reduced turnaround times, and improved customer satisfaction.
- **Revenue Model:** The private entity earns revenue through a combination of fixed fees and performance-based incentives, often linked to metrics such as cargo throughput and service quality.

#### Stakeholder Stakes:

- **Public Authority:** Maintains ownership and strategic oversight of the port infrastructure while benefiting from improved operations and services.
- **Private Entity:** Assumes operational responsibilities and risks, with compensation tied to performance, aligning incentives with service quality and efficiency.

**Table 4: Comparative Analysis of PPP Models**

Aspect	BOT Model	BOO Model	O&M Model
<b>Ownership</b>	Public after concession period	Private	Public
<b>Financing</b>	Private during construction; recouped over concession	Entirely private	Public
<b>Operational Control</b>	Private during concession	Private	Private
<b>Risk Allocation</b>	Construction and operational risks borne by private entity; demand risk shared	Market and operational risks primarily on private entity	Operational risks on private entity; financial risk on public authority

<b>Revenue Source</b>	Tolls, user fees, or availability payments	Service sales (e.g., tolls or user fees)	Fixed or performance-based fees from public authority
<b>Contract Duration</b>	Fixed term (e.g., 20-30 years)	Indefinite	Short to medium term (e.g., 5-10 years)

## 6 Projected Demand and Growth Forecast

The Indian shipbuilding and ship repair market is set for significant growth due to increasing trade volumes, government initiatives, and the rising demand for ship maintenance services.

### Shipbuilding Growth Forecast

- India's commercial cargo fleet is expected to expand from 13.5 million GT in 2024 to 36 million GT by 2030 and 100 million GT by 2047. A large portion of this demand will be met through domestic shipbuilding.
- With the government's focus on enhancing domestic connectivity, inland waterways are emerging as a crucial component of the overall transport network. Specialized vessels designed for river and canal transport will support efficient cargo movement inland, reduce congestion at coastal ports, and further stimulate domestic shipbuilding, complementing the growth in traditional maritime segments.
- The cumulative demand for domestically built ships between 2024 and 2047 is projected at 69 million GT, with an estimated market value of INR 5.96 trillion.
- Annual shipbuilding output is expected to reach 4.5 million GT per annum, generating INR 368 billion annually.
- Demand is highest for bulk carriers, tankers, container ships, and roll-on-roll-off vessels, aligning with increased cargo and energy transport requirements.
- The Duggarajapatnam and Mulapeta cluster is expected to contribute 1.2–1.3 million GT per annum, delivering approximately 6–7 vessels annually, each around 200,000 GT.

### Ship Repair Growth Forecast

- The total number of ships requiring repairs is projected to increase due to India's expanding fleet and aging global vessels.
- The global ship repair market is projected to grow at a CAGR of 4.6%, driven by environmental regulations and increasing maritime trade.
- Establishing dry-dock facilities at Duggarajapatnam and Mulapeta will help capture India's increasing demand for repair services, reducing reliance on foreign shipyards.

## 7 Investment and Financial Viability

The development of a shipbuilding and repair cluster at Duggarajapatnam and Mulapeta is financially viable due to government incentives, demand growth, and PPP investments.

### Capital Investment & Financing Sources

- The project requires an estimated investment of INR 300-400 billion, sourced from PPP, government initiatives, and foreign investments.
- Union Budget 2025 has allocated ₹2500 million for the Maritime Development Fund, with 49% government contribution and 51% private and port entities.
- Shipbuilding Financial Assistance Policy (SBFAP 2.0) offers 25–30% financial support depending on the type of vessel.
- Basic Customs Duty exemption on raw materials for shipbuilding and shipbreaking extended for 10 years to enhance competitiveness.
- Single window clearance system needed for faster project financing, easy sanctions, and swift settlements.
- Establishment of a Maritime Finance Corporation recommended to exclusively cater to maritime projects.
- Blue Bonds and IRFC tax-free bonds (10–15 years duration) should be issued to raise capital for capacity expansion and other maritime projects.

### Additional Financial and Insurance Considerations

- India lacks a domestic Protection & Indemnity (P&I) Club, leaving domestic seafarers vulnerable to international price volatility and higher insurance costs.
- A domestic P&I Club should be established to provide localized insurance solutions, cost stability, and tailored services for the Indian maritime sector.

### Revenue Streams & Return on Investment

- Revenue sources will include ship construction contracts, ship repair services, and port operations.
- The shipbuilding sector is expected to generate INR 368 billion annually once peak production is reached.



- The ship repair segment is anticipated to benefit from India's expanding fleet and regulatory-driven maintenance requirements, ensuring long-term sustainable revenues.

### Economic Impact & Job Creation

- Shipbuilding has an investment multiplier of 1.82, meaning that every ₹1 invested generates ₹1.82 in economic output.
- The employment multiplier is 6.4, indicating high job creation potential in shipbuilding, ancillary industries, and logistics.

### Risk Factors & Mitigation

Risk Factor	Potential Impact	Mitigation Strategy
<b>Regulatory Hurdles</b>	Environmental clearances could delay the project	Early engagement with authorities and sustainable design measures
<b>Infrastructure Bottlenecks</b>	Lack of dry docks may slow growth	Investment in dedicated dry docks at Duggarajapatnam & Mulapeta
<b>Global Competition</b>	Competing with China, South Korea, and Japan	Leverage government subsidies and lower labour costs
<b>Financing Constraints</b>	High initial investment required	Utilize PPP models and financial incentives

## 8 Challenges and Risks

### Regulatory and Bureaucratic Delays

- **Complex Approval Process:** Establishing a shipyard requires multiple approvals, including environmental clearances, coastal regulation zone (CRZ) approvals, industrial licenses, and pollution control board permissions. The bureaucratic delays in obtaining these clearances can significantly extend project timelines.
- **Customs and Taxation Issues:** Importing critical components, such as ship-grade steel and machinery, involves customs clearance delays and high duties, increasing costs and impacting delivery schedules.
- **Inconsistent Policy Implementation:** While the government has launched initiatives like the Shipbuilding Financial Assistance Policy (SBFAP), their effectiveness is often hindered by inconsistent implementation and lack of clarity in execution.

### Infrastructure and Connectivity Challenges

- **Port and Transport Connectivity:** The success of shipbuilding clusters depends on efficient transport networks. Inadequate road, rail, and port connectivity can hinder logistics, making material procurement and delivery of finished vessels inefficient.
- **Limited Dry Dock Facilities:** The absence of sufficient dry docks and maintenance infrastructure in the region limits ship repair activities, making it necessary to construct new facilities at high capital costs. India's existing dry docks—spread across both public (e.g., Cochin Shipyard, Hindustan Shipyard) and private facilities (e.g., L&T Shipbuilding, Adani Ports)—often operate at or near full capacity. These dry docks vary in size and can handle vessels up to different tonnages (ranging from small coastal ships to large ocean-going vessels), but many are already overbooked due to rising demand for repairs, retrofits, and conversions. As a result, new shipbuilding and repair projects face scheduling delays or are forced to seek overseas facilities, increasing costs and turnaround times.

### Financial Constraints

- **High Capital Investment:** Developing a shipbuilding and repair cluster requires substantial investment in land acquisition, construction, and procurement of machinery. Financial constraints could slow down project execution.

- **High Cost of Financing:** Indian shipyards face higher financing costs compared to global competitors. Interest rates in India for working capital loans range around 10.5%, significantly higher than those in countries like China, Japan, and South Korea, where financing costs are nearly half.
- **Limited Public-Private Partnership (PPP) Models:** The lack of structured PPP models for shipbuilding and repair projects limits private sector participation and international investments.
- **Financial Mismanagement:** ABG Shipyard Ltd., once a leading private shipbuilding company in India, experienced a significant decline due to internal mismanagement and external market challenges. The 2008 global financial crisis led to a downturn in the shipping industry, causing reduced demand and order cancellations that adversely affected the company's operations. Fund diversion and falsification of financial statements, further weakened its financial health. Attempts at debt restructuring failed, and governance lapses, such as inadequate oversight from auditors and directors, exacerbated the situation. Lessons from this case include the need for robust financial oversight, effective corporate governance, prudent debt management, market diversification, and adaptive business strategies.

#### **Workforce and Skill Development**

- **Shortage of Skilled Labor:** The shipbuilding industry requires specialized skills in marine engineering, welding, and advanced manufacturing. The lack of shipbuilding training centres in the region leads to dependency on external labour sources.
- **Need for Ship Design Centres:** Unlike global shipbuilding hubs, India has limited design expertise. Setting up ship design centres in the cluster is essential to reduce dependency on foreign designs and improve domestic capabilities.

#### **Market and Competitive Challenges**

- **Limited Domestic Demand:** The Indian shipbuilding market is primarily driven by defence projects, with limited demand from commercial shipowners. This makes it difficult for shipyards to achieve economies of scale.

- **Global Competition:** Indian shipbuilders face stiff competition from global players like China, South Korea, and Japan, which have established shipbuilding ecosystems, lower costs, and better technological capabilities.
- **Lack of Standardization and Economies of Scale:** Indian shipyards produce a limited number of ships, often customized, preventing the adoption of standardized designs and bulk production that could reduce costs.

#### **Environmental and Sustainability Concerns**

- **Environmental Impact Assessments (EIA) Delays:** Obtaining environmental clearances is time-consuming, and compliance with environmental regulations adds to the cost and complexity of shipbuilding projects.
- The proximity of Duggarajapatnam to Pulicat Lake, an ecologically sensitive zone, necessitates strict environmental safeguards.
- **Ship Recycling and Pollution Control:** While ship recycling is a promising sector, ensuring compliance with green recycling practices and international regulations like the Hong Kong Convention adds additional operational challenges.

## 9 Conclusion and Recommendations

The establishment of the Duggarajapatnam and Mulapeta shipbuilding cluster represents a transformative step for India's maritime sector. By enhancing shipbuilding, repair, and recycling capabilities, this initiative will drive economic growth, generate employment, and elevate India's position in the global maritime industry. A structured approach focusing on phased development, strategic partnerships, and robust government support will be essential for ensuring the long-term success of the project.

To achieve the successful implementation of this initiative, the following best practices are recommended:

- **Streamline Regulatory Approvals:** Expedite environmental clearances, customs processes, and policy implementation to minimize bureaucratic delays that can impact project timelines. Introduce timeline-based activities for environmental clearances, ensuring a structured and predictable approval process to accelerate project execution and attract investments.
- **Startup and Innovation Scheme for Ancillary Industry:** All ports should allocate 2-3% of their budgets for R&D and innovation to support startups and drive advancements in ancillary industries. This investment will foster technological innovation, enhance local production capabilities, and reduce dependency on imports, thereby contributing to the overall competitiveness and sustainability of the shipbuilding and repair ecosystem.
- **Develop Specialized Facilities:** Construct shipyards tailored to specific vessel types, such as cargo ships and passenger vessels, to enhance operational efficiency and cater to growing domestic and international demand.
- **Investment in Dry Dock Facilities:** Establishing new dry dock facilities with varying size capabilities sufficient for both mid-size and large vessels will alleviate current congestion. By ensuring these docks are equipped with modern infrastructure, including heavy-lift cranes, automation, and specialized repair equipment, India can boost its capacity to service diverse vessel categories.
- **Capacity Planning & Collaborative Use:** Encourage public-private partnerships to share dock space efficiently, balance occupancy rates, and maintain quick turnaround times. Offering incentives for upgrading existing dry docks can also help expand overall capacity and attract larger repair or retrofit projects.

- **Focus on Specialized Segments:** In addition to traditional cargo and tanker vessels, allocate dock space for specialized vessels such as offshore support ships, cruise liners, and high-value retrofits. This strategic segmentation ensures optimum utilization and diversifies India's ship repair market.
- **Establish Integrated Maritime Clusters:** Create a holistic maritime ecosystem by integrating ship repair facilities, spare parts manufacturing, equipment suppliers, and testing facilities to support shipbuilding and maintenance.
- **Strengthen Supply Chain Networks:** Reduce dependency on imports by fostering local manufacturing and establishing reliable domestic supply chain networks for ship components and raw materials.
- **Establish Skill Development Centres:** Skill Development Centres should be set up to train a workforce across multiple industries, including shipbuilding, repair, and recycling. These centres will offer specialized training in shipbuilding techniques, automation, welding, control systems, and sustainable design, while also covering broader industrial skills like precision engineering and electrical systems. Emphasis will be placed on eco-friendly shipbuilding and recycling in line with global standards, ensuring a skilled workforce to support India's maritime and manufacturing sectors.
- **Encourage Public-Private Partnerships (PPP):** Develop well-structured PPP models that attract both domestic and international investors, ensuring financial sustainability and risk-sharing in infrastructure development.
- **Promote Research and Development (R&D) in Ship Design:** A proposed Ship Design and Research Institute in Visakhapatnam would leverage the city's strategic maritime infrastructure to advance indigenous ship design. The institute would focus on research in hydrodynamics, advanced materials, eco-friendly propulsion, and digital vessel modelling, fostering collaboration among the Indian Navy, academic institutions, and global experts. This initiative would reduce reliance on foreign technology, support the "Make in India" drive, and provide specialized training and consultancy to enhance the competitiveness of both public and private shipyards.
- **Improve Infrastructure Connectivity:** Enhance road, rail, and port linkages to streamline logistics and ensure efficient movement of raw materials and finished products.

- **Development of Luxury Yachts and Commercial Boats:** Infrastructure should also support the construction of luxury yachts and other commercial boats to cater to high-end maritime markets and the tourism industry, which can open up new revenue streams and employment opportunities.
- **Enhancement of Inland Vessel Capabilities:** Investing in specialized facilities for inland water transport such as terminals, maintenance hubs, and customized vessels for rivers and canals will improve domestic logistics and alleviate congestion at coastal ports.

In conclusion, Duggarajapatnam and Mulapeta can be significant maritime hubs that have the potential to improve economic development, generate employment opportunities and enhance Andhra Pradesh's profile in the Indian shipbuilding and repair industry.

Duggarajapatnam's location is ideal for a thriving shipbuilding and repair cluster since it offers abundant availability of land and easy access to natural resources. This could support the growth of ancillary industries and also can rely on the marine electronics sector in Sri City, which is about 80 kilometers away from Duggarajapatnam. Because of its strategic location between the ports of Krishnapatnam and Ennore, as well as its easy access to National Highway 16 and the Gudur railway junction, it is a desirable place for dry docks and related enterprises.

Mulapeta is poised to become a major hub for shipbuilding and repair facility. Mulapeta's potential as a Special Economic Zone (SEZ), along with its 23 million-ton first-phase cargo capacity port development and encouraging government incentives, enhances its ability to spur economic expansion and maritime innovation.

Furthermore, Visakhapatnam is the ideal site for a ship design and research centre and also for exclusive research and development wings establishment due to its close proximity to major ports, rail and road networks, and an international airport. Additionally, the area's accessibility to port administrative centre and ENC head quarter situated in Vizag will allow for the establishment of a research and development centre, which will advance innovations in a variety of shipbuilding, ship repair, and recycling-related sectors.