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## Competitiveness of Indian Ship Building Industry

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### **Abstract:**

*The maritime history of Indian shipbuilding begins right from the time of civilization in Harappa and Mohenjo-Daro. The shipbuilding industry in India was mainly carried on in the coastal territories like Cochin, Goa, Mumbai, Gujarat, Kolkata, and Andhra Pradesh. Capacity constraints in leading countries and lower shipbuilding costs (cheap labor) in emerging countries prompted a gradual shift of shipbuilding activities from Europe to Asia since the early 90s. This has thrown open opportunities for the Indian shipbuilding industry. Rising global trade and strong replacement demand boosted the prospects of the Indian shipbuilding industry. From an industry dependent on government orders till late 90s, the Indian shipbuilding industry have turned export oriented focusing on the niche offshore segment. Export orders comprise about 80 per cent of the total market and domestic orders the rest. The Indian Shipbuilding Industry, which had only about 0.1 per cent share of the world shipbuilding in 2002, expanded over tenfold accounting for 1% of the global shipbuilding industry with annual turnover of around US \$ 1.3 billion in 2011 and has been growing at a compounded annual growth rate (CAGR) of about 8 per cent. The Indian shipbuilders occupied 6th rank globally accounting for 1% of the global order book aggregating 2.4 million CGT with 257 vessels on order in year ending 2010. In view of the ageing fleet of offshore vessels globally with approximately 40% of the offshore vessels above 20 years of age, the specialization of Indian shipbuilders in the construction of offshore vessels augurs well for the Indian yards. The domestic shipbuilding industry comprise of 32 shipyards. Riding on a high growth trajectory, the shipbuilding industry has doubled its capacity from about 2.5 lakh dead weight tons (DWT) in March 2007 to five lakh DWT in 2011. This capacity was created mainly for the export market, particularly in the small ship segment. India has emerged as a major destination for the construction of offshore and oil industry ships like offshore supply vessels and anchor handling tugs. Given the inherent labor intensive nature of the shipbuilding industry, India has a natural advantage by virtue of its lower cost of labor and availability of skills. India also enjoys a long coastline of around 8,000 km long with several deep water ports serving as good locations for setting up shipyards.*

**Keywords:** Shipbuilding cost, industry competitiveness, India's shipbuilding industry

### **1. Introduction**

The ship building industry has changed supply bases to low cost destinations in the last century. New countries have gained prominence, especially during boom periods. The current order book of Korea and Europe is tilted towards complex vessels such as container ships and cruises, while that of emerging nations and China is dominated by bulk vessels.

The Indian Shipbuilding has all the resources and low labor cost to stand competitive in the World Shipbuilding. The Indian shipbuilding is mainly centered on 27 shipyards comprising of public sector under central and state Governments and Private sector shipyards.

### **2. Benefits of Shipbuilding Industry**

Shipbuilding is a labor intensive industry. Heavy engineering industry is integrated with various core sectors for its demand. Being an intermediate industry, its demand depends on end-user industries. Investment in shipbuilding can trigger additional investment in related sectors such as steel and engineering goods manufacturing and consumables. Such scale of investment also lead to significant multiplier benefits in terms of employment generation and investment in other manufacturing sectors as shown in Table 1.

Sr. No.	Industries	Number of labors
1.	Shipbuilding	97
2.	Auto – commercial Vehicles	12
3.	Heavy Engineering	33
4.	Construction – Civil	18

Table 1: Labor employed /Turnover (INR mn) for various Industries  
Source: KPMG Analysis

**3. Shipbuilding Scenario in the World**

The ship building market was dominated by Europe in the early 20<sup>th</sup> century. Slowly Japan has overtaken the position from Europe in 1950s. In the early 1970s South Korea entered the stage by offering lower wages and dominated the World market by 2000. China’s economic boom together with strategic choice to develop maritime industry activities has led to a strong increase in global market share as shown in the Figure 1.

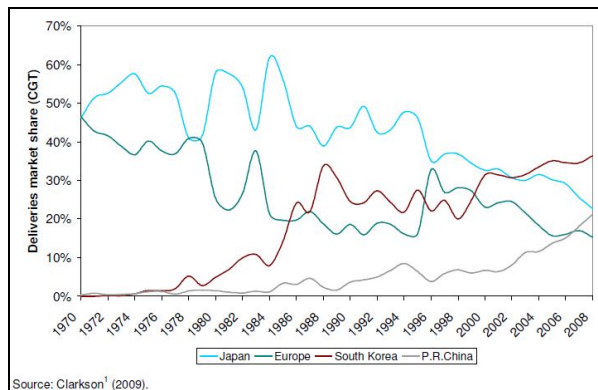


Figure 1: Market shares in CGT completed and delivered by major shipbuilding regions from 1970 to 2008.

Due to globalization new players are entering the stage. The last five years, India, Vietnam, the Philippines and Brazil have acquired substantial order books and have become larger players. Partly this rise may be due to the boom in the shipbuilding industry which has now come to an end and relatively low cost labors available in these industries.

Shipbuilding is a highly cyclic industry. The average span of the cycle is about 10 years however it depends on the World trade and the economic situation of the leading countries in the World. There were several peaks and troughs in the last century which is evident from the Figure2. The present slump situation in the World shipbuilding should surpass and reach the peak position positively in next few years.

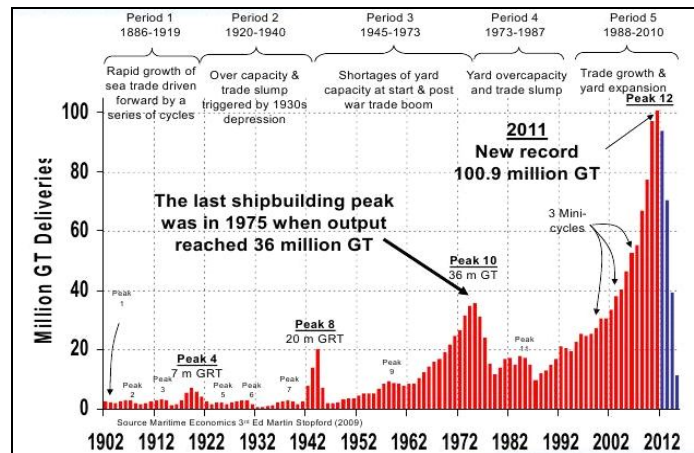


Figure 2: Cyclic nature of World Shipbuilding industry [Source: Clarkson Research services.]

**4. Shipbuilding Scenario in India**

India is an emerging country in many sectors. As of August 2007, India had the fourth largest order book of the world representing 1.2% of the total world market, thus being larger than any of the European shipbuilding countries. However, end of July 2008, they were passed by the fast growing Vietnam and Philippines and are now ranked sixth. However Indian shipbuilding capacity is limited and therefore the order book grew relatively low base level. The country’s order book consists of two third of dry bulk and one fifth of tankers.

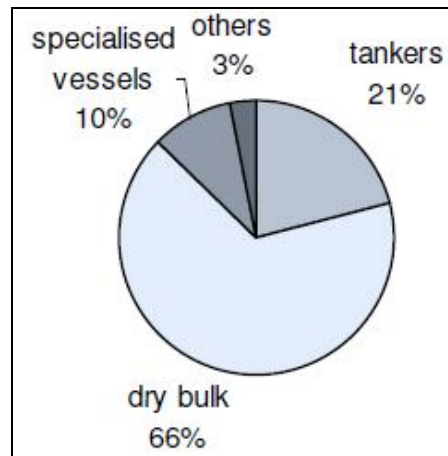


Figure 3: Order book India by vessel type in 2007(% dwt) [source: CARE Research, 2008]

There are several large players in India. Table 2 shows some of the shipyards in India and their order book in CGT. A lot of new investment are said to be made that will enlarge India’s capacity.

Rank world	Yard	Orderbook
54	ABG Shipyard	852
101	Pipavav Shipyard	407
125	Bharati Shipyard	279

Table 2: Top three shipyards in India as of December 31<sup>st</sup>, 2008 (in 1,000 CGT)  
Source: Clarkson World Shipyard Monitor January 2009

Analysis report prevails that the Indian ship building industry is emerging into export orders by exporting some large and medium size ships. A bulk export by CSL has emerged India as a major place for the construction of offshore and oil industry ships like Offshore Supply Vessels (OSVs) and Anchor Handling Tugs. Thus, from an inward looking industry dependent on government orders, the Indian shipbuilding industry is emerging as internationally competitive export led industry.

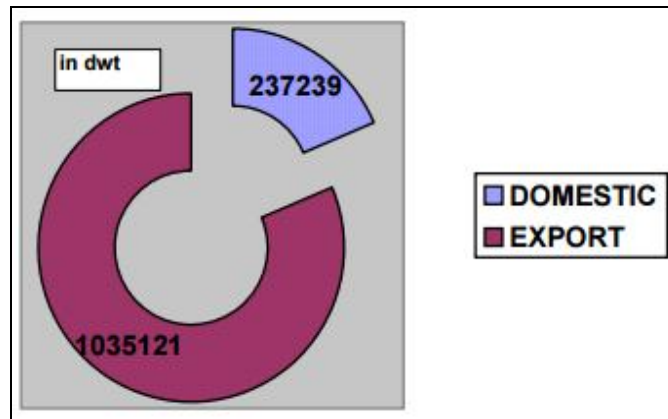


Figure 4: Domestic and export order of Indian shipbuilding Industry  
Source: Planning commission report March 2007

Though there is highly favorable climate for export, there is relatively negative climate for domestic construction of ships for Indian owners. The Indian shipbuilding industry is dependent on government support for subsidy. The main reason for this dependence is infrastructure constraints of Indian yards. While foreign shipping companies are building their medium and small merchant ships in India, Indian shipping companies are purchasing their ships from abroad both big and small. The present fiscal and statutory rules on shipbuilding in the country are heavily loaded in favor of export and discourage construction of ships by Indian yards for Indian flag. The growth of Chinese shipbuilding industry is now becoming a threat to almost all major shipbuilding nations as China is planning to become the leading shipbuilding nation with an aim to corner more than 30 % global share by 2015. One of the reason for China being number one position is mainly active in ship types that relatively labor intensive in comparison to other shipbuilding regions. India is probably the only country that will be able to match the Chinese prices with its relatively low labor costs and industrial base for manufacture of equipment. The table shown below clearly indicates the comparison of Shipbuilding in China and India.

4.1. Shipbuilding

	CHINA	INDIA
Shipbuilding & Repair Yards	492	28
Manufacture of Equipment	148	nominal
No of Employees (total Industry)	2,87,702	60,000
Order book	40 m DWT	1.3 m DWT
Global share	19 – 20 %	1%
Steel availability	High	low
Minimal Labor cost (US \$/hour) appro.	1.19	0.28

Table 3: comparison between China and India in the Shipbuilding Industry

5. Productivity in Shipbuilding

In shipbuilding, the term ‘productivity’ is differently used by stakeholders since there is no universally accepted standard unit. Ship owners, Government officials and Policy makers use productivity to compare the performance of two shipyards or shipbuilding countries. Shipyards used productivity values to assess the efficiency at which they are working. They benchmark themselves and subsequently attempt to improve their performance with respect to this benchmarked level. The numerical value of productivity such as CGT/employee, per worker production, number of ships or DWT produced per year, resource utilization such as tonnes of steel fabricated / number of employees, or annual CGT / shop area, profitability etc are used as a benchmark by a shipyard.

It can be noted that there are different approaches to measure productivity, depending upon the purpose for which productivity value is being used in Shipbuilding. It can be observed that in shipbuilding, productivity units measure output Vs input or vice-versa. Multiple productivity units do not help a customer to compare and identify the best performer.

To understand the shipbuilding scenario in India and to measure the productivity IMU Visakhapatnam campus is in the progress of visiting the Shipyards in India and are collecting various data such as 1) Vessels built from the date of establishment, 2) Type of vessels built so far, 3) Equipment and machinery list of the ship yards, 4) Manpower including permanent and contract, 5) Vessels keel laid date, vessels delivery date, 6)DWT, GT etc. Currently the output of shipbuilding and productivity has been measured as per the OECD measuring term ‘cgt’ which includes the type and size of the vessel and the complexity involved in constructing the vessels. However the term cgt may not be a correct measure when it comes to details, practically no shipyard builds a ship in the same way as its competitors. One of the major differences is the production depth, ie the amount of parts and blocks produced in the shipyard relative to the amount which is subcontracted to outside suppliers.

From the data collected from the above yards the productivity for the four yards were measured in terms of 1) Man-hour/cgt, 2) Ship yard area/cgt, 3) Expenses /cgt. The Ship Production during the period is apportioned with available Literature and collected data which follows a S-shaped pattern meaning that the production rate will be slow at the initial stage, gradually increases and slows down at the time of delivery. Using the approach production calculations were carried out and shown in the following figures.

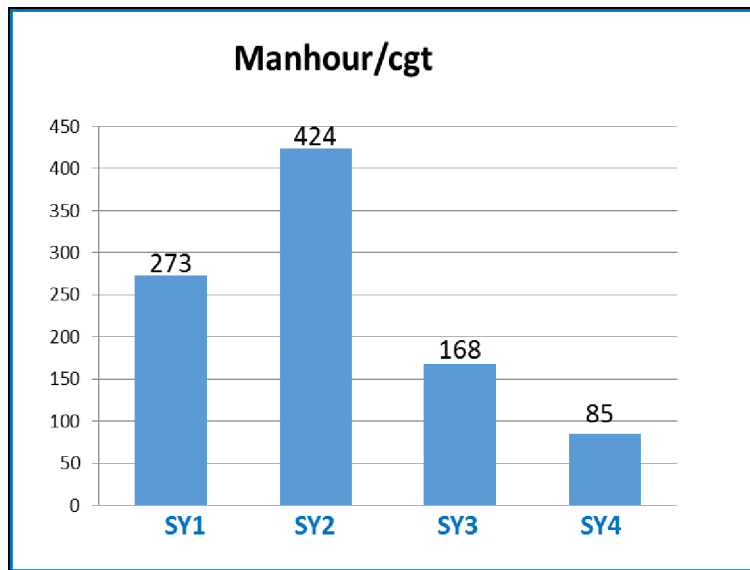


Figure 5: Averaged manhour/cgt for four Indian Shipyards

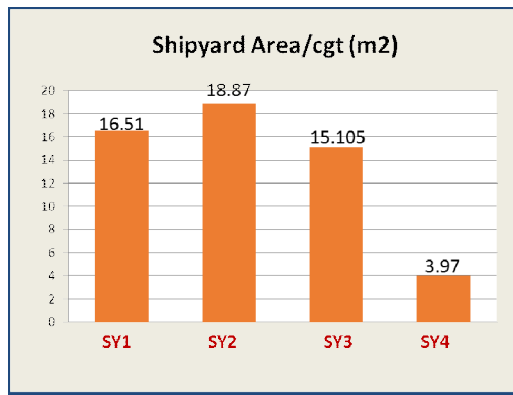


Figure 6: Shipyard area/cgt for four Indian shipyard

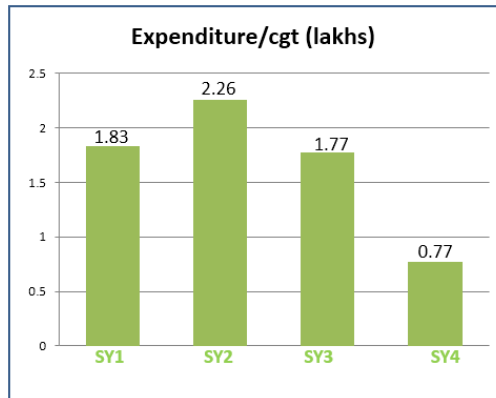


Figure 7: Averaged expenses /cgt for four Indian Shipyards

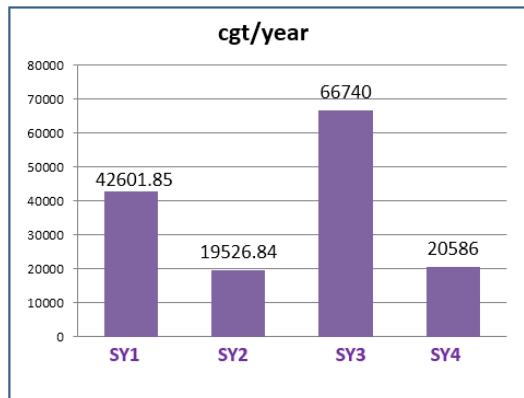


Figure 8: Averaged cgt /year for four Indian Shipyards

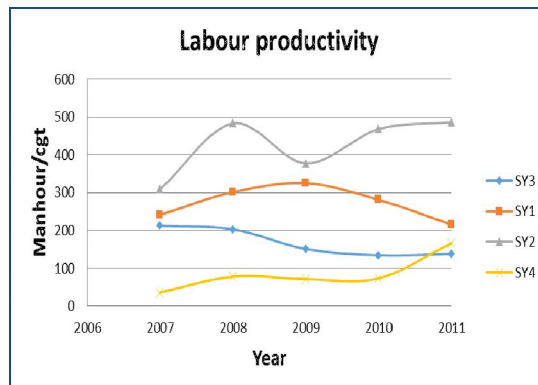


Figure 9: Man-hour /cgt for four Indian shipyards

From the Figure 5 and 6 it is seen that the average Indian four shipyards productivity in terms of man-hr / cgt is found to be around 238 and land area/cgt found around 14m<sup>2</sup>. Indian shipbuilding labor costs are estimated at 8 – 10% of the total shipbuilding costs. The above results of productivity and profitability are low when compared to the leading shipbuilding nations. The variation in value may be due to the order book. Being India in the competition of low cost labors still it need improvement in facilities, systems and labor productivity. Automation is important, but improved organization systems and product development will play a major role.

## **6. Need to Improve Global Competitiveness of Indian Shipyards**

The shipbuilding industry in India has not succeeded in building competitiveness primarily due to inadequate policy support, lack of private participation and firm level inefficiencies. A comparative assessment of Indian shipbuilding industry vis-à-vis that of competing countries points out to the following key points.

### *6.1. Supportive Government Policies: Major Factor in Establishing Global Competitiveness*

The governments in all major shipbuilding countries have laid a thrust on development of the sector through formulation of supportive policies and measures such as subsidies, financial aid, easy finance, tax benefits, preferential orders, etc., Japanese and South Korean shipbuilding industries received substantial government support during the 1970s and 80s, which helped them to emerge as top players in the world. Over the last decade, the Chinese government has also taken several measures to foster the growth of its industry; measures include direct aid, loss reimbursements, tax subsidies etc. Indian government too has provided various support measures to the shipbuilding industry, but these have been largely directed towards the public sector.

### *6.2. Foreign Investments Have Helped In Building Global Competitiveness of Competing Nations*

The South Korean government has taken active measures to stimulate FDI in the sector such as cutting corporate taxes, providing tax incentive packages and reducing the trademark evaluation period. The Korean government has also established eight different Foreign-Exclusive Industrial Complexes (FEICs) inside national industrial complexes across the country can enjoy a 50 year rent free lease in these complexes based on the level of investments. The foreign investment in ship building and shipping machinery sector has helped the Korean ship building industry in receiving world class technology, which puts it at almost par with the Japanese counterparts and way ahead of China and others. Singapore government also provides incentives schemes such as Approved International Shipping Enterprise (AIS) scheme to attract shipping companies to reside in Singapore. There are currently more than 100 international shipping companies in Singapore, forming an important anchor for the International Maritime Centre. In India though, present requirement to obtain multiple clearances covering land acquisition, environmental clearance, power and water etc., from various departments for new projects in shipbuilding acts as a deterrent to attracting investment into this sector.

### *6.3. Focus on Skill Development and R&D Is a Key Factor for Maintaining Competitiveness*

The major shipbuilding countries viz. Japan and South Korea have taken special efforts towards skill development and R&D of the shipbuilding industry. Japan established Shipbuilding Skill Development Centre in 2004, to develop training material and prepare necessary equipment to support training efforts. With respect to R&D and innovation, Japan's key measures include creating replacement demand by developing environmentally friendly and safer ships. During the 1980s, the South Korean government promoted University-Industry R&D activities which resulted in several collaborative initiatives. Recently, the Ministry of Knowledge Economy of South Korea has initiated convergence of shipbuilding and IT sectors to support the Smart Ships agenda. However, in India there is limited investment in R&D in ship designing and innovation. For overall growth of the industry, there is a need to create an R&D base along with developing in-house design capability, infusing new technology, developing skilled workforce, adopting appropriate fiscal measures and industry-friendly regulations, so that Indian shipbuilding can achieve credibility for delivering quality ships on time.

### *6.4. Support to Ancillary Industries Enhances Competitiveness*

Development of ancillary industries is critical for increasing cost competitiveness of shipbuilding and repairs. Both Japan and South Korea have formulated suitable industrial policy for the shipbuilding and ship repair ancillary industry. The South Korean government provides support to the ancillary industry by way of incentives, R&D support, and business to business network to increase the indigenous contents of equipment in ships built by Korean yards.

### *6.5. Cost and Availability of Critical Input Material- Raw Material, Manpower and Technology*

India has the lowest labor costs amongst the competing countries like China, Japan & Korea. The labor cost per worker in India is estimated at \$1,192 per year, against \$10,743 and \$21,317 per worker in leading shipbuilding countries like South Korea and Singapore. However, this advantage is not translated into cost effectiveness because of factors like: reliance on imports of critical raw-materials and higher financing costs etc. From raw material perspective, India relies on imports for most of the inputs consumed in shipbuilding which puts cost pressures on Indian shipbuilding firms. On the other hand, China is one the cheapest steel manufacturer in the world which helps its yards to reduce costs and lower their shipbuilding prices in the global market. Further, India has a disadvantage with respect to financing costs. In China, the government provides sovereign refund guarantees for certain class of vessels, thus removing any related burden on the shipyard. In Korea, shipyard financing has matured and the evolved mechanisms drive the cost lower.

### 6.6. Lower Interest Rates

A shipyard typically requires a working capital of around 25-35% of the cost of the ship during the entire construction period. The interest rates on working capital in India are in the average range of 10-10.5%. In contrast, the interest rates presently offered to shipbuilding yards overseas are significantly lower. They stand at 5-6% in Korea and around 4-8% in China.

### 6.7. Labor Productivity

Labor productivity for India's shipbuilding sector is less than one-tenth of Japan & Korea. India had labor productivity of 11,134 US\$/Employee in 2007, while Japan and Korea had labor productivity of 151,487 US\$/Employee and 122,994 US\$/Employee respectively. This gap in labor productivity has been due to several reasons like acute shortage of basic skills required for the industry in India, small scale of operations etc. Workers working as welders, fitters, etc. are uneducated, in many cases even illiterate. The technology used at the shipyard has to be friendly for them to use. There is lack of manpower with techno-economic specialization in shipbuilding. Further, manufacturers in India also suffer from the disadvantages accruing from small scale of operations. The shipbuilding sector in China and South Korea has received government fiscal and policy support, enabling them to develop scale as well as a cluster of ancillaries. These advantages of scale are not available to Indian shipbuilding industry, and hence dent the overall labor productivity.

### 6.8. Technological Processes and Innovation

India is lagging behind competitors in all the aspects of technology and innovation. India has disadvantage in terms of poor infrastructure, innovation and less investments in Research & Development as compared to Korea, Japan and China. It may be noted that leading East Asian shipyards in Japan and Korea who had invested heavily in skilled manpower such as naval architects & engineers and innovations are reaping the benefits now. In India though, there are less than a dozen firms that have basic design expertise. Some of these are standalone design units that do not have manufacturing facilities but team up with shipyards to form consortiums that leverage each other's competencies. Indian players need to work hard to meet the international players in ship automation and technology. Indian yards lack the capability to build large and modern ships. Presently, the Cochin shipyard is the only one that has the capability to build large and modern ships.

## 7. Conclusion

Based on analysis of the current status and international norms & standards, the gaps & issues in the Indian shipbuilding industry can be summarized in the table 4

The analysis of various facets of the global and the Indian shipbuilding industry clearly shows that India needs to look at multiple interventions including in the areas of Regulatory framework, Investment policies, Trade policies, Fiscal policies, Infrastructure, R&D, Skill, Financing, Process, Collaboration and Technology.

Given that the share of Indian ships in the carriage of India's overseas cargo has fallen sharply and Indian ships are ageing, there is urgent need to replace our ageing ships with new ones. While the time is opportune for increasing our shipping fleet, with prices falling on account of global slowdown, a special financing mechanism needs to be developed. This also brings to focus the importance of India's shipbuilding industry which has the capacity and expertise but is functioning below capacity. Many shipyards are facing problems like declining orders. With the need to replace many of our old ships and a growing ship repairs business, special attention can be given to utilizing India's shipbuilding and repairs yards and further enhancing their capacity

S. No.	Areas	Gaps & Issues
1.	Scalability	High dependence of ship owners in old ships due to constraints of investment capacity to buy new ship.
		Present requirement to obtain multiple clearances covering land acquisition, environmental clearance, power and water etc., from various departments for new projects in shipbuilding acts as a deterrent to attracting investment into this sector.
2.	Cost Efficiency	High interest rates on working capital in India as compared to competing countries (difference as high as 5-6% as compared to competing countries)
		Customs duty of the order of about 35% is imposed on all capital equipment required for shipbuilding.
3.	Productivity Optimization	Limited investment in R&D in ship designing and innovation.
		Non-availability of organized component and service supply manufacturers.
		Dependence on imports for critical raw- materials like high quality steel plates and other structural items.
4.	Quality Excellence	Lack of basic skills like welding and fitting
		Inadequate skills and infrastructure availability for conducting research in the areas of ship designing, ship building technology and equipment design etc
		Inability of smaller suppliers to keep abreast with the rising quality issues.
5.	Sustainability	Absence of a strong ancillary industry
		Inverted duty structure. All ships including dredgers imported by Indian owners from abroad are fully exempted from customs duty. However, customs duty of the order of about 35% is imposed on all capital equipment required for shipbuilding.
		Lack of synergy between public and private yards.

Table 4: Gaps and issues in the Shipbuilding Industry

**8. Acknowledgment**

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