

Evaluation of Global and Local Shipbuilding Market

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Abstract: The global shipbuilding market is commonly classified based on the primary ship type, end use, and regional demand. Notably, there is a consistent and strong demand for tankers, bulkers, gas carriers, containers, and cruise ships, which is expected to persist in the foreseeable future. It is projected that the global shipbuilding market will approach a value of approximately USD 200 billion within the next decade. This presents a noteworthy opportunity for small shipbuilding nations like Bangladesh, particularly in the niche market for small and medium-sized containers, tankers, multipurpose vessels, cargo ships, and specialized ship types ranging from 3000 to 10000 DWT. In addition, there has been a recent surge in foreign direct investment (FDI) within the shipbuilding sector, as countries such as China, Turkey, and the Netherlands have expressed keen interest in this industry. This development further enhances the prospects for growth and expansion. Consequently, this study provides a comprehensive analysis of the global and local shipbuilding markets, with the objective of identifying the suitable market segments for future development in the local shipbuilding industry.

Keywords: Global Market, Local Market, Over-Capacity, Supply-Imbalance

1. Introduction

Marine transport is considered as backbone of global trade and the industrial supply chain. Around 80% of the world goods and products trade by volume is carried out through the marine route [1]. Global trade volume and size has increased with a growth rate of around 10% since the last decade. Consumer demand mainly in developing countries are increasing and that increasing the imports volume as well as demand of commercial ships are also increasing. As a result, shipbuilding is always an attractive industry for developing nations. Actually shipbuilding encompasses the shipyards, the marine equipment manufacturers, technical workforce, related knowledge, services providers and related stake-holders [2].

Conventional shipbuilding was labor intensive and low-tech industry [2]. Early welded steel ships used steels with insufficient fracture toughness, which resulted in some ships suffering catastrophic brittle fracture structural cracks. Since roughly 1950, specialized steels such as high tensile strength and tough steel with good physical and chemical properties for ship construction have been used. Although it is

commonly accepted that modern steel has eliminated brittle fracture in ships [3]. Distinct beautification and work fineness found in modern shipbuilding. Today's shipbuilding needs lot of automation and is a line production manufacturing process, where skilled workforce is must. Modern shipbuilding makes considerable use of prefabricated blocks or modules, where entire multi-deck segments of the hull will be built elsewhere in the yard, transported to the building dock/slipway, and then lifted into place and fabrication process get completed. This is known as "block or module construction" [2].

The most modern shipyards pre-install equipment, pipes, electrical cables, and all other components within the blocks, to minimize the effort needed to assemble or install components within the hull, once it is welded together. Ship design work, also called naval architecture, usually be conducted using a ship model tank or basin. Again, 4IR or Industry 4.0 will definitely influence the whole maritime sector and new transformation will come in the shipbuilding industry and that will be very crucial [4]. The main goal of shipbuilding 4.0 is intelligent shipyard which is characterized not only by adaptability, resource efficiency and ergonomic but also close integration among ship owner, shipbuilder,

suppliers, the partners and other stake-holder in the business and value processes.

This is a analytical study of global and local shipbuilding market and depict the suitable market for local shipbuilding. The study has conducted on the basis of primary and secondary data including useful inputs from key stakeholders of the industry from home and abroad. The research has followed the mixture of qualitative and quantitative method by co-relating the study and data collection technique. The primary and secondary information about the global and local shipbuilding have been collected from available sources, like books, publications, web sites, journals, reports, financial reviews, interview of resource personal from home and abroad. The research has been carried out by focusing on the global shipbuilding market and trend analysis to find out suitable type and size of ships for local shipbuilding industry and suggestion has been derived so that, we can capture that targeted portion of global market share for Bangladesh.

2. Global Shipbuilding History

After World War II, during 1950s to 1960s, Japan has used shipbuilding as to rebuild her industrial structure. After that South Korea started to make shipbuilding a strategic industry in the 1970s and 1980s. Interestingly, China also follows the same path and repeating these same policy and strategy with large state-supported investments in shipbuilding in 2010s [5, 6]. But few nations, like Philippine, Vietnam, India, etc are privatizing its local shipbuilding. Today global shipbuilding market was valued at USD 132.52 billion in 2021 and is anticipated to reach USD 175.98 billion by 2027, with considering average growth rate of 4.84% [7]. Usually shipbuilding is a slow-moving industry experiencing challenges from unsteady market growth as well as economic and environmental changes. Again, recent COVID-19 pandemic and present geopolitical situation make shipbuilding more uncertain [8].

Nowadays global shipbuilding market is suffering from inflation, over-capacities, depressed prices, low profit margins, trade distortions, widespread subsidization, financial and pandemic crisis, volatile global politics, imbalance trade and many more. If we evaluate the trend of global shipbuilding, we found ups and down growth curve and history. United Kingdom (UK) was the market leader of global shipbuilding before WWII. After that, Japan become the dominant ship building nation from the 1960s up to the end of 1990s and slowly lost its competitive advantage to the promising industrial nation South Korea, as they had the advantages of much cheaper wages, suitable shipbuilding strategy, strong government support and a cheaper currency. South Korean shipbuilding overtook Japan's in 2003 [1]. Again, from 2010, during and after global financial crisis China become global shipbuilding leader leaving behind South Korea and Japan by using the same strategy and technique of those two shipbuilding giant [9]. China utilize global financial crisis to develop their local shipbuilding and

they initially target the medium and small global market of containers, tankers and cargo ships.

High labor cost countries always have lost its global market share, during removal of state subsidies, where strong domestic industrial policies failed to provide enough support. The British shipbuilding industry is a prime example of this. Even it has been proved for USA and European Countries [3]. The market share of USA and European ship builders began to decline in the 1960s and their production is now primarily on military, and few special ships like, cruise liners or pleasure Yacht. Today China is global shipbuilding leader with around 40% of global share. Their shipbuilding quality and technology has improved significantly and they earn the confident of global customer. South Korea and Japan is following china securing second and third position with a global market share around 25% and 20% respectively [10, 11].

3. Global Shipbuilding Market

Usually shipbuilding market of merchant-ship has divided into few categories like, oil tankers, bulk carriers, container ships, general cargo ships, and passenger ships. Global shipbuilding market share by main ships types in 2020 has been shown in figure 1 below. In 2020, the Bulk carrier sector dominated the shipbuilding market with the largest market share. Bulk carriers are the merchant ships mainly developed to transport bulk amounts of unpacked cargo, like coal, ore, cement, steel coils, food grains, etc. These ships are usually rough and dense. These kinds of ships are designed to increase capacity, durability and efficiency. Again on the basis of end-use, the shipbuilding market is classified into transport and military. In 2020, the transport segment has dominated the shipbuilding market by acquiring the maximum revenue share [12].

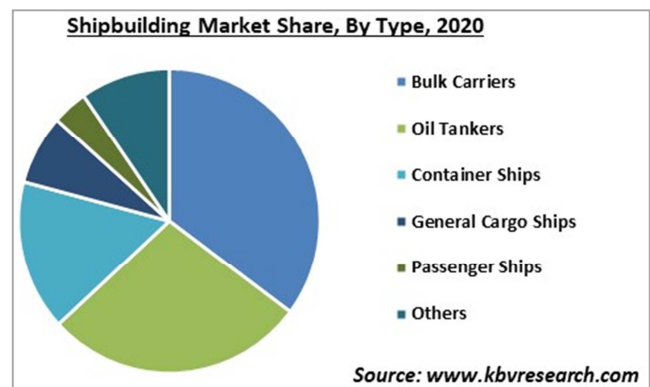


Figure 1. Global shipbuilding share by countries as new ship (main types) orders in 2021. [1, 14].

East Asian three giant (China, South Korea and Japan) has captured around 85% of new orders of main ships of global merchant fleet in 2021 and that has been shown in figure 1 below. Again, new ships orders in 2021 have dominated by container-ships and that has also been shown in figure 2 below [13]. Again, “in 2021 Gminsights forecast that, Asia’s shipbuilding industry share is rapidly expanding, with China,

Korea, and Japan accounting for over 90% of global production. Technological advancements in the shipping industry are accelerated to propel market size. Such as, in

2019, China unveiled the world's first intelligent VLCC with a capacity of over 2.257 million barrels. Such trend will likely to drive ship plates and machinery demand at future".

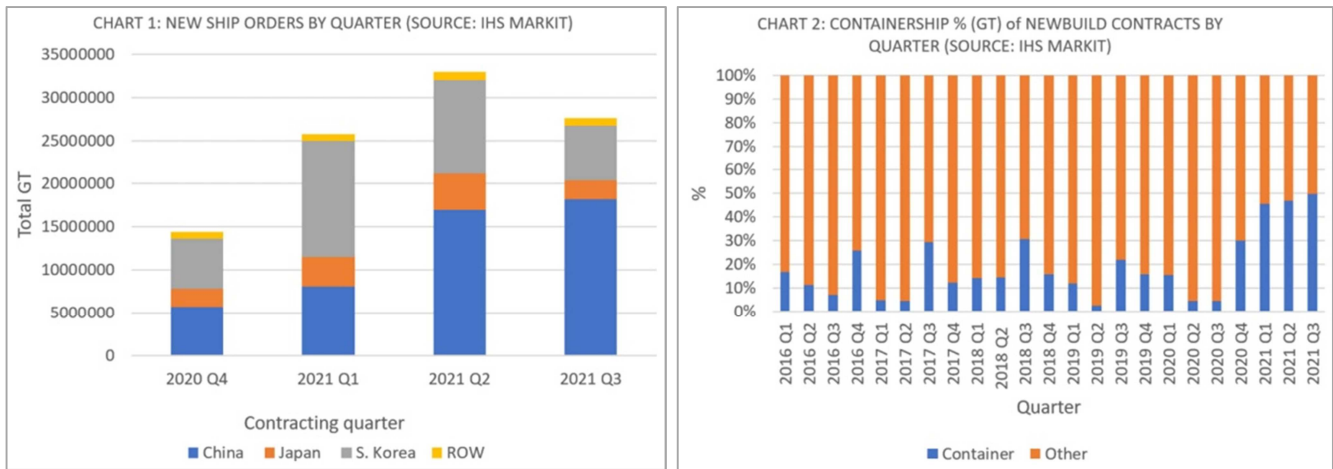


Figure 2. Global shipbuilding market share by nations and main ships types in 2020 [14].

4. Forecast of Global Shipbuilding Market

4.1. Forecast of Global Shipbuilding Market by “KBV Research”

The forecast of future global shipbuilding market (both commercial and military together) by size or value in billion USD has been shown in Figure 3 below. It has expected that shipbuilding market will reach USD 176.1 billion within 2027. The average growth of shipbuilding markets is 3.4% (as CAGR) during the forecasted period (2017-2027). However, “main factors responsible for the growth of the shipbuilding market are seaborne trade, rising demand for cargo transportation, increasing agreements related to trade, advanced technologies adopted by the ships, and automation in ships” [14]. Today's modern specialized ships design and

building is high-tech and complicated affair. As example, nuclear aircraft carrier can travel around globe with a mini airport and hundred aircrafts for few decades without refueling; nuclear submarines are capable of attacking enemy territory from deep sea by in disguise and can stay underwater around six months. Modern cruise vessel, oil tanker or buickers are so colossal that those looks like a small city.

Salient factors driving growth of the global shipbuilding market are ‘GDP, economic growth, global seaborne trade, incremental demand for cargo transportation through sea, trade-related agreements, technological advancements, market trend of EOL ships, marine rules and regulation, trend of automation in marine transport sector’ [10]. However, variations in transportation and inventory costs, ecological concerns, and global financial or other unfortunate crisis like COVID-19 pandemic or Russian war on Ukraine; which affect globally are few significant trends that could hinder growth of such market.



Figure 3. Forecast global shipbuilding market (commercial and military) in billion USD. [13].

4.2. Forecast of Shipbuilding Market by “Allied Market Research”

Global shipbuilding market is usually categorized on the basis of main ship type, end use and region. By main ship type and end-use, the market categorization has shown above. However, on the basis of region, market is separated into Asia-Pacific, North America, Europe and others. ‘The global shipbuilding industry was mark as USD 142.52 billion in 2020. Allied market research

suggests that, global shipbuilding market will reach to USD 195.48 Billion, by 2030 at 3.2% CAGR from 2021 to 2030’ [16]. Again global maritime hub has shown a global trend of shipbuilding demand for main types of ships in 2020. Where, they have shown the global trend of shipbuilding demand for tankers, bulkers, gas carriers, containers, cruise-ships, etc and also forecast the future demand up to 2024. Their trend analysis and future forecast has been shown in figure 4 below [17].

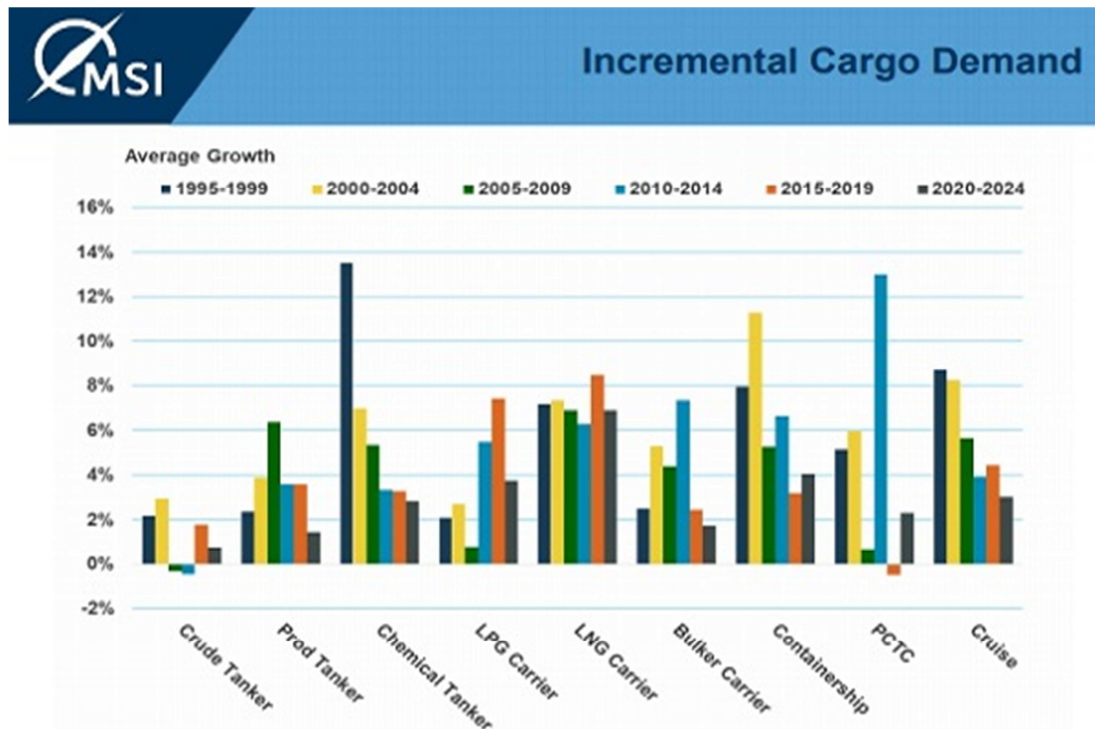


Figure 4. Global trend of shipbuilding demand and future forecast (2020 to 2024) [17].

4.3. Forecast of Shipbuilding Market by “Research and Market”

The shipbuilding industry is considered as one of the most lucrative industries around the globe. Ship is the main mode of transportation and shipbuilding is the integral part of development for many nations. ‘The R&D collaborations between business lines are facilitating the development of innovative solutions and services which can then be used by other groups/units’ [18]. Research and Market has calculated the value of global shipbuilding market in 2021 at USD 241.5 Billion. It has been expected that shipbuilding market will reach USD 271.4 billion with CARG 2.4% by next 5 years within 2026 and that has been shown in figure 5 below [14]. “New orders are expected to resume, backed up by the implementation of full-scale LNG projects. Demand for new container ships is also expected to pick up, by improved VLCC market, resulting from reinforced environmental regulations, replacement of aging ships, and ship efficiency optimizations”.

4.4. Forecast of Shipbuilding Market by “Business Research Company”

Shipbuilding global market report in 2021 by Business Research Company has described the COVID-19 impact and recovery up to 2030. This report provides shipbuilding market overview, forecast shipbuilding market size and growth for the whole market, shipbuilding market segments, and geographies, shipbuilding market trends, shipbuilding market drivers, restraints, leading competitors' revenues, profiles, and market shares. The global ship building market has grown from USD 147.98 billion in 2020 to USD 158.18 billion in 2021 at a compound annual growth rate (CAGR) of 6.9%. “The growth is mainly due to the companies rearranging their operations and recovering from the COVID-19 impact, which had earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The market is expected to reach USD 186.6 billion in 2025 at a CAGR of 4.2% and that has been shown in figure 6 below”. [19].

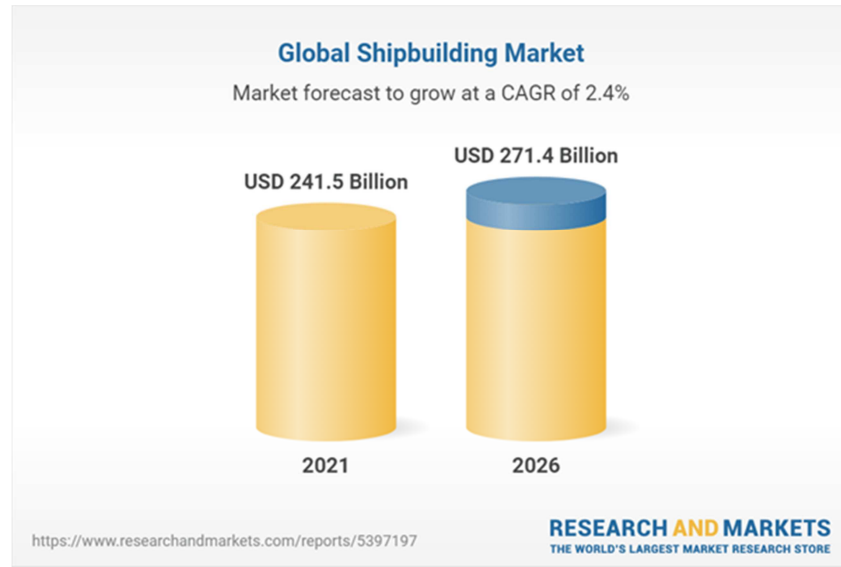


Figure 5. Forecast of global shipbuilding with CAGR from 2021 to 2026 [14].

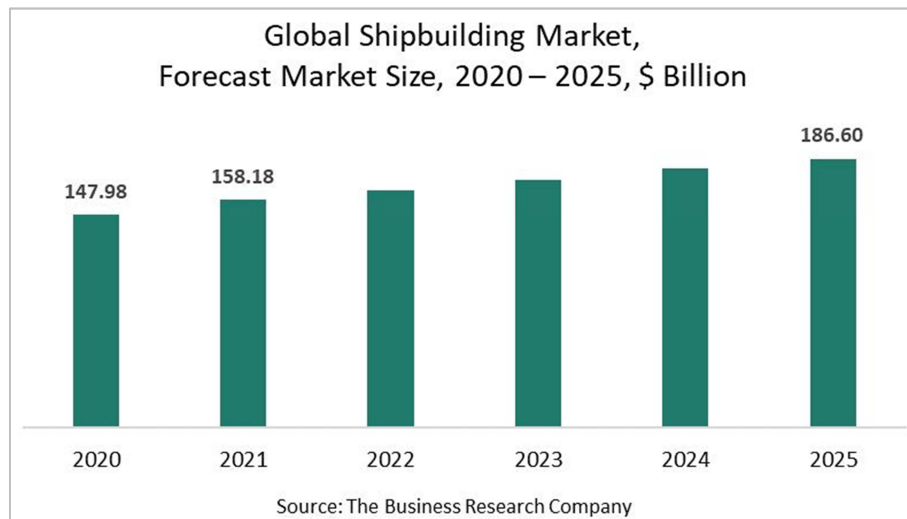


Figure 6. Forecast of global shipbuilding by Business Research Company (2021-2025) [19].

4.5. Prediction of Shipbuilding Market by “Mordor Intelligence”

Mordor Intelligence has announced that the global shipbuilding market value in 2021 is USD 132.52 billion. They have projected that the future global shipbuilding market will reach USD 175.98 billion by 2027, with a compound annual growth rate (CAGR) of 4.84%. The COVID-19 outbreak has had a significant impact on the global shipbuilding industry, causing disruptions in ship supply chains worldwide. Shipbuilders are facing delays in ship construction, leading to increased costs. Consequently, the shipbuilding market's growth during the initial years of the forecast period is expected to be hindered by these pandemic-induced interruptions. However, Mordor Intelligence predicts that the shipbuilding market will experience growth throughout the forecast period due to several factors, including increasing seaborne trade,

economic growth, rising energy consumption, the demand for eco-friendly ships and shipping services, as well as automation in shipbuilding. Figure 7 below illustrates the predicted growth of the shipbuilding market by region from 2022 to 2027.

Ship Building Market - Growth Rate by Region, 2022-2027

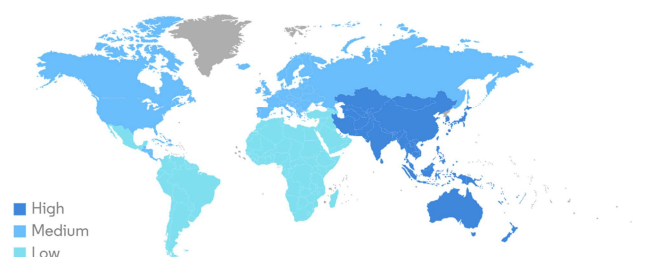


Figure 7. Prediction of Shipbuilding Growth by Region from 2022 to 2027 [8].

4.6. Forecast of Seaborne Trade by “ITF, Sea Europe, SAJ, OECD”

A network model for forecasting seaborne trade was developed by the International Transport Forum (ITF) and the OECD. This model projects international freight transport activity until 2050, considering three world trade scenarios based on the level of trade liberalization (OECD 2017). The ITF utilizes international trade scenarios derived by the

OECD's Economics Department, which are grounded in an equilibrium model for analysis. Figure 8 below displays the seaborne trade projections until 2035 as presented by ITF, Sea Europe, and SAJ. According to the ITF's network model, seaborne trade is expected to reach 20.8 billion tons by 2035. Europe and SAJ, on the other hand, predict that seaborne trade will amount to 16.2 billion tons in the same year. [21-23].

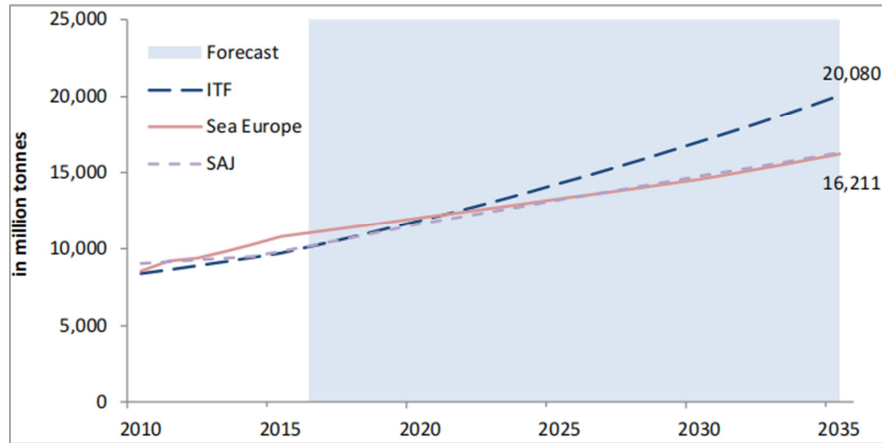


Figure 8. Forecast of seaborne trade from 2010-2035 by ITF, Sea Europe, SAJ, OECD. [21-23].

Now on the basis of seaborne trade growth rate and trend analysis the main type of merchant ships growth rate have been estimated. The growth rates for containers ranging from 4.3% per year (2015-2020), to 3.3% per year (2030 – 2035); for bulkers from 4.2% to 3.4%; and for tankers from 3.9% to 3.3%. The yearly growth rate for the aggregation of these

three ship categories is predicted to be 4.1% in the next five years and to decrease to 3.3% at the end of the forecasting period until 2035. However, seaborne trade projections for good categories corresponding to three ship types (bulkers, containers and tankers) has been estimated and shown in figure 9 below. [1, 23].

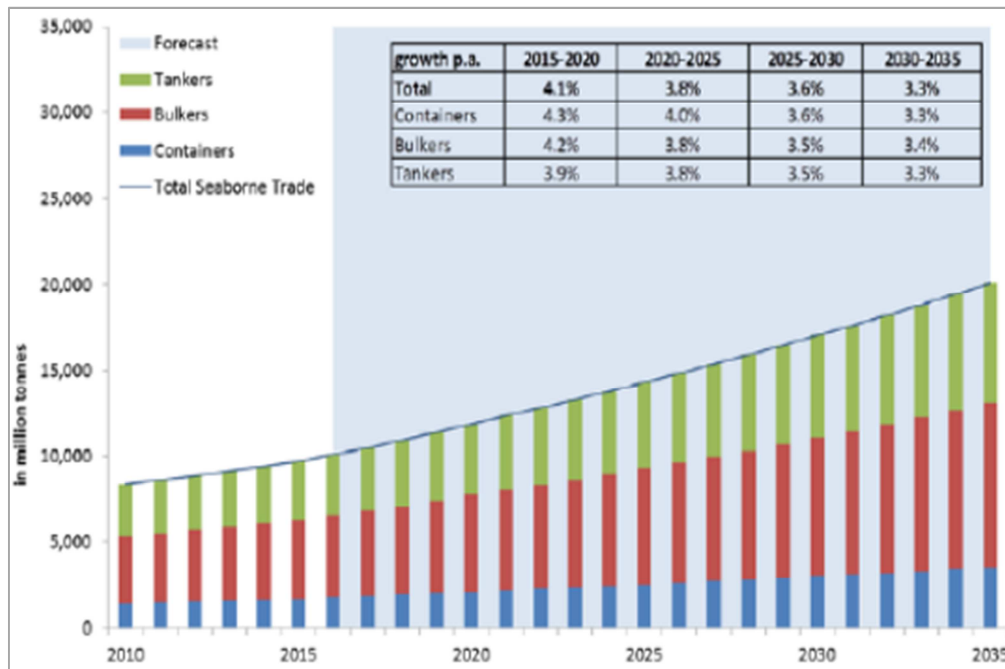


Figure 9. Seaborne trade projections for good categories corresponding to main ships. [21-23].

To determine vessel requirements, the conversion of seaborne trade from tons to deadweight tonnage (dwt) is

carried out using specific conversion coefficients for each main ship type. For example, containers have a coefficient of

10.0, bulkers have a coefficient of 11.3, and tankers have a coefficient of 7.8. These converted values are further transformed into gross tonnage (GT) using another set of specific conversion rates for each ship type. For containers, the rate is 0.89; for bulkers, it is 0.90; and for tankers, it is 0.56.

From 2015 to 2035, the estimated total ship requirements amount to 835 million GT. In 2020, it was 36.6 million GT; in 2025, it was 41.2 million GT; in 2030, it was 45.8 million GT; and in 2035, it was 50.9 million GT. By ship type, tankers are projected to require a total of 261 million GT,

bulkers around 400 million GT, and containers approximately 170 million GT. Figure 10 below illustrates the future ship requirements for seaborne trade by ship type in GT (2015 to 2035) [15].

The graph displays a linear trend in vessel requirements, with noticeable breaks every five years due to the changing growth rates. These breaks are clearly evident in the new ship requirements for seaborne trade expansion, as shown in Figure 10. The declining growth rates every five years are more prominently visible.

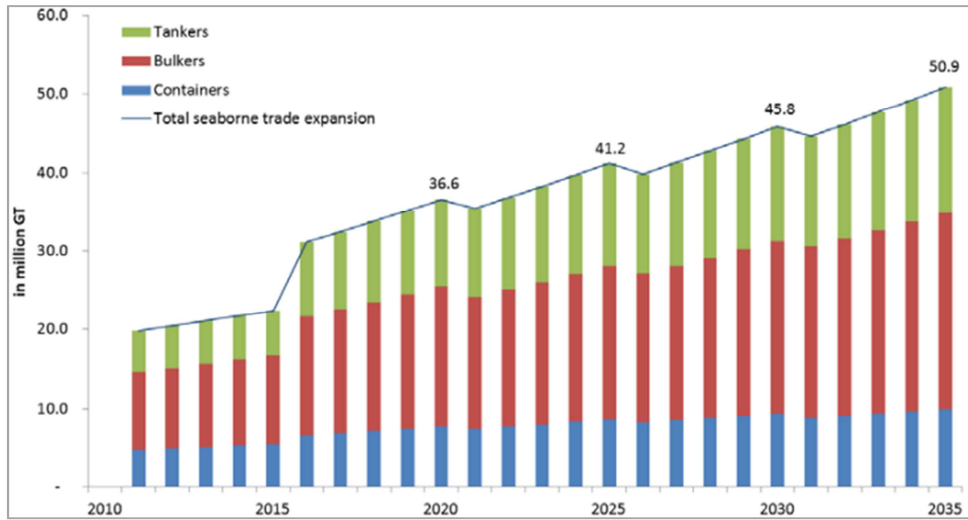


Figure 10. Future ships requirements related to seaborne trade by ship up to 2035. [21-23].

Survival rates of ships are typically influenced by various factors including the year of construction, size in GT, country of ownership and construction, ship types, economic cycles, technology, and workmanship. Consequently, bulkers and containers exhibit higher rates of demolition compared to tankers of the same age, ownership and builder country, and scrapping time. The other coefficients indicate that ships constructed in more recent years have a reduced likelihood of being scrapped due to technological advancements.

Moreover, scrapping activities are more prevalent during economic downturns as opposed to the life cycle and business trends. Similarly, European-built ships demonstrate higher survival rates in comparison to Japanese vessels. Conversely, Korean and Chinese ships exhibit a greater probability of being scrapped compared to Japanese ships. Figure 11 illustrates the estimation of future vessel requirements for each ship type based on demolition rates and historical completion levels from previous years.

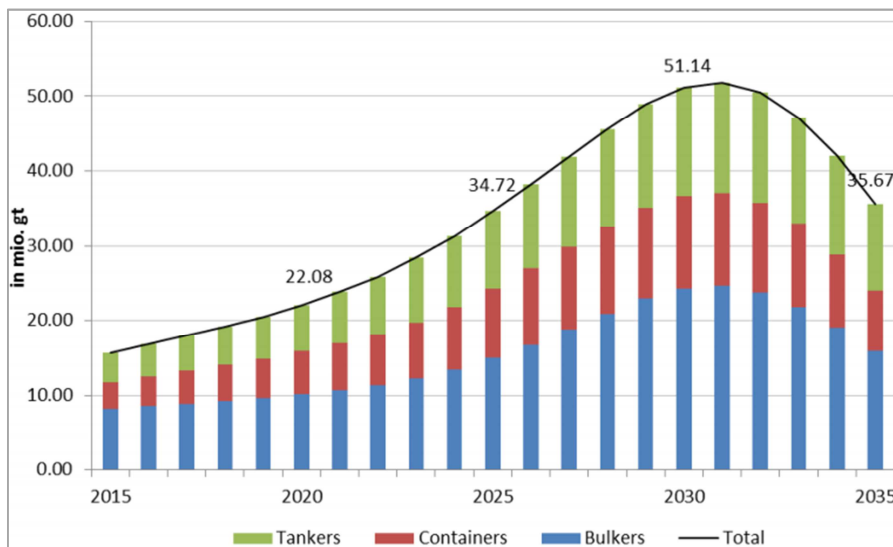


Figure 11. Future vessel requirements related to disposals by main ship up to 2035 [2, 7, 24].

5. Evaluation of Future Shipbuilding Market

The most of the developing world in an economic slowdown will be prolonged and weak in commodity prices over the next decade. Again, shifts in global demographics and population growth rates, coupled with long-term economic growth in developing markets, will have implications for the maritime sector over the course of the next decade. 'The middle class is growing in the emerging economies of Asia, Africa, and Latin America where disposable incomes will drive growth in demand for imports of commodities and finished goods'. [2]. Due to the rise in consumer spending in developing markets, will create opportunities for long-term growth in container ships. However, present prices of coal, iron ore, crude oil and food grain are high and likely to remain unstable for the next few couple of years. So overall shipping and shipbuilding market will develop slowly; particularly dry bulk shipping. There is a high demand in all type and size of container ships since post COVID-19 situations and it will continue further. Again, EU and USA sanctions against Iran and Russia and Ukraine war may lift Asian shipbuilding market. On the other hand, Iran's already enter to the oil export market and present attitude of Saudi Arabia and OPEC may enhance tanker market.

6. Characteristics of Shipbuilding Industry

6.1. Structural Characteristics of Shipbuilding Industry

Today, the global economic interconnection between trading partners is steadily increasing. The shipbuilding and shipping industries play a crucial role in the production and operation of merchant ships, serving as the backbone of the international trade and economic system. However, the shipbuilding industry is inherently complex and diverse.

Therefore, analyzing its characteristics involves a comprehensive examination of both general aspects and specific specifications for various types of ships. Table 1 below provides a concise summary of the structural characteristics of the shipbuilding sector. One notable feature of this industry is the significant heterogeneity of ships, which stems from the wide range of ship types and categories. These include merchant fleet vessels such as bulkers, tankers, container ships, offshore vessels, passenger ferries, cruise ships, and yachts. Conversely, warships and military platforms encompass patrol craft, offshore patrol vessels, mine warfare vessels, corvettes, frigates, cruisers, submarines, and aircraft carriers. This research, however, focuses exclusively on merchant ships. The shipbuilding industry encompasses a broad price spectrum, with large cruise ships costing around USD 1 billion, while Handy-size bulk vessels are priced at approximately USD 25 million [25, 26]. The main drivers of demand in this industry include the expansion of seaborne trade, vessel replacement, diverse applications, and even the prices of end-of-life ships. However, for the past few decades, there has been an observed surplus of ships and shipyard capacity, leading to imbalances between supply and demand across the industry.

Top ten shipbuilding companies in the world in 2020 with their annual revenue earn has been shown in table 2 below. However, list after the top ten companies are belongs to China, South Korea and Japan. World crude steel production for the 64 countries reporting to the World Steel Association that, they has produced 161.0 million tons in March 2022, and that was 5.8% decrease as compared to March 2021. However, overall global steel market is remains unstable since last few years after COVID-19 pandemic. [27]. Top 10 crude steel (blooms, billets, slabs or plates) producing companies with their origin countries in 2020 of the world has been shown in table 3 below. Table data has been taken from world steel association.

Table 1. Summary of structural characteristics of the shipbuilding Industry.

Sl No	Subjects or Characteristics	Situation of shipbuilding Industry
1	Production pattern	Unit and specialized production
2	Delivery time	Naturally long (2-3 years)
3	Production factor intensity	Usually labour-intensive industry. Very high and diversified
4	Trade ability	Play large role of ship finance in the exports Multiplier of other business as connected with back-word and foreword linkage Offshore business and it involves high risks
5	Possible change areas in future	Repair and maintenance of ships Steel construction and fabrication business
6	Product heterogeneity	Very high as wide variation of ships types Expansion of seaborne trade
7	Demand accelerate	Replacement of ships Changes of regulations Changes of owner requirement Eco-system or environment friendly product
8	Challenges	Automation and digitalization Impose regulation Design as unit production

Sl No	Subjects or Characteristics	Situation of shipbuilding Industry
9	Uses	Overcapacity
		Trade fluctuation
		Versatile
		EOL ships also have value

Table 2. Top ten shipbuilding companies in the world in 2020. [28].

Rank	Shipbuilding companies	Revenue (USD billions)	Main Office, Country
1	Hyundai Heavy Industries	USD 39.33 billion	Ulsan, South Korea
2	STX Offshore & Shipbuilding	USD 16.96 billion	Changwon, South Korea
3	DSME	USD 12.76 billion	South Gyeongsang, South Korea
4	Samsung Heavy Industries	USD 8.58 billion	Samsung Town, Seoul, South Korea
5	Sumitomo Heavy Industries	USD 6.59 billion	Tokyo, Japan
6	Fincantieri	USD 5.17 billion	Trieste, Italy
7	United Shipbuilding Corporation	USD 5.1 billion	Moscow and Saint Petersburg, Russia
8	CSSC	USD 29.79 billion	Haidian District, Beijing, China
9	Sembcorp Marine	USD 1.18 billion	Tanjong Kling Road, Singapore
10	Tsuneishi Shipbuilding	USD 1.55 billion	Hiroshima, Japan

Table 3. Top 10 global crude steel producing companies in the world in 2020. [27].

Sl No	Company Name	Country Name	Tonnage (in MT)
1	China Baowu Group	China	115,29
2	Arcelor Mittal	Luxembourg	78,46
3	HBIS Group	China	43,76
4	Shagang Group	China	41,59
5	Nippon Steel Corporation	Japan	41,58
6	POSCO	South Korea	40,58
7	Ansteel Group	China	38,19
8	Jianlong Group	China	36,47
9	Shougang Group	China	34
10	Shandong Steel Group	China	31,11

6.2. Present Global Structure of Shipbuilding Industry

According to IHS Maritime and Trade, China, Korea, and Japan collectively represented 83% of global ship completions in compensated gross tons (CGT) in 2014. In 2022, the shipbuilding trend remains similar, with these three giants still dominating around 90% of the global market. Therefore, the concentration of the global shipbuilding industry has predominantly remained in South East Asia. However, it's important to note that shipbuilding is an assembly industry where a significant portion of value is derived from inputs provided by the marine equipment industry. Europe contributes 50% of the world's supply in this regard.

Furthermore, the leading shipbuilding economies vary across different market segments. For instance, the production of cruise ships is concentrated in four European countries: Germany, Italy, France, and Finland. This particular market is niche and primarily differentiates producers based on factors such as quality, technology, services, prices, and sustainability.

The value chain in shipbuilding directly relates to achieving comparative low costs, superior quality, and timely delivery of products or new ships to customers. Maintaining a schedule is a crucial competitive advantage in the shipbuilding production process. Additionally, a shipyard's competitiveness is strongly linked to its relationships with suppliers. Therefore, shipyards work closely with suppliers

of steel plates, materials, equipment, machinery, cables, paints, furniture, and various other maritime and general goods. These suppliers represent the main backward and forward linkage industries associated with the shipbuilding industry. However, the suppliers' bargaining power is somewhat limited because the shipbuilding industry is a significant customer contributing a substantial portion of their revenues. Typically, suppliers maintain mutually beneficial relationships with shipyards.

6.3. Reasons for Imbalances Between Supply and Demand in Industry

The literature on industrial organization examines different factors contributing to excess capacity and excess supply. These imbalances can be attributed to three main causes, namely structural, cyclical, and non-market related factors.

Structural reasons arise when economies undergo changes in industries, altering their fundamental structure due to technological advancements, cost-related factors, demand-related changes, shifts in international trade patterns, modifications in the organizational structure of companies, and long-lasting or permanent changes.

Cyclical factors are temporary disturbances resulting from fluctuations in economic activity, which tend to return to their previous levels over a few years.

Non-market related factors include government measures and strategic decisions made by market participants, which can have a long-term impact on the industry's situation.

Although undercapacity in an industry is typically a temporary issue as new investments are attracted, overcapacity can persist for extended periods and lead to adverse consequences. Overcapacity often leads to oversupply, exerting pressure on prices and negatively affecting the economic health of organizations. This oversupply occurs because companies reduce prices to dispose of their output. Consequently, when one company initiates price cuts, others quickly follow suit out of fear that the price cutter will gain a larger market share at their expense.

The following are the structural reasons and sources for excess capacity and excess supply:

1. Long delivery times of vessel.
2. Long lead times in adding shipyard capacity.
3. Capacity expansion dynamics.
4. Role of ship finance.
5. Capacity to inventory vessels.
6. Limited opportunities to re-orientate into other markets.
7. Technological shocks.
8. Economies of scale.
9. Low to medium entry barriers and high exit barriers.
10. Push from the buyers' side.
11. Overbuilding of capacity in customers' industries.

The shipbuilding industry is known for its lengthy delivery times, typically ranging from two to three years between order placement and ship delivery. These time lags restrict ship owners' ability to quickly adapt to changing market conditions, such as a decline in freight rates or an economic downturn. For instance, despite the financial crisis, recession, and contraction of international trade in 2009, global ship completions remained historically high in 2010 and 2011 due to the delays between order placement and ship delivery. Furthermore, these significant time lags between ordering and delivery can contribute to an oversupply of vessels. Ship owners struggle to accurately predict future economic growth, often resulting in the new vessels they order exceeding actual demand two to three years later when the vessel becomes operational. As a strategic measure, ship owners are inclined to maintain reserve capacity by ordering more vessels initially, aiming to ensure meeting future demand rather than facing the costs of supply shortage if demand eventually exceeds vessel capacity. However, contractual penalties for canceling an order vary greatly and typically do not deter this practice. Nevertheless, statistical evidence from Kalouptsi (2014) suggests that the shipbuilding industry's characteristic of extended construction times positively affects the supply situation in the bulk shipping market. The study indicates that without these construction times, the bulker fleet's time to build would be twice as volatile and approximately 15% larger. New building projects would be even seven times more volatile, and vessel prices would be roughly 14% lower in the absence of long construction times.

The lengthy lead times in capacity expansion may encourage companies to initiate new projects earlier if they

hold overly optimistic expectations about economic growth. In this context, expectations regarding future demand and competitor behavior play a crucial role. Since companies in industries with extended lead times for capacity expansion face greater penalties if they fall behind without sufficient capacity, even risk-averse firms are more prone to invest, despite the inherent risk involved in capacity decisions. If the cost of supply shortage exceeds the cost of carrying excess capacity, companies have a stronger incentive to expand capacity rather than facing supply shortages during periods of high demand. This similar cause of oversupply is due to the long delivery times of vessels. The extent to which this occurs is closely tied to contractual penalties and bankruptcy legislation. Shipyards may be inclined to add capacity to avoid future supply shortages during times of strong demand.

The dynamics of capacity expansion can explain the increase in excessive capacity. In industries characterized by non-linear unit costs of capacity expansion, such as shipbuilding, each non-collusive shipyard will add more capacity for large units at less frequent intervals compared to sectors where unit costs are not a vital issue. This approach allows shipyards to save on fixed costs when installing new capacity. However, fluctuating demand introduces uncertainty for shipyards in terms of expanding capacity, often resulting in the addition of large units that surpass demand. A notable example of this dynamic capacity expansion problem occurred in the late 1960s with the overcapacity of color picture tubes. Many television set manufacturers recognized the need to secure a supply of tubes, but the efficient size of a tube plant was significantly larger than that of a television set assembly plant. As demand did not grow rapidly enough to absorb the excessive color tube capacity brought online simultaneously, overcapacity became a major issue.

Developments in ship finance have a significant influence on ship supply and shipyard capacity. Ships are highly tradable goods by nature, making exports a crucial aspect of the industry. In this regard, export credit agencies play a vital role in a yard's competitiveness. Financing schemes involving front-end or tail-end payment introduce high financial risks that considerably influence buyers' decisions when contracting with specific shipyards. In the former scheme, the buyer makes a significant down-payment, while in the latter, the shipyard is responsible for financing the building costs upfront. Easy access to finance, especially in the years leading up to the financial crisis, likely contributed to over-ordering. Limited capacity to inventory vessels also played a role in oversupply since shipyards have limited capacity for storing unused vessels. The high costs associated with building up an inventory of unused vessels and the customized nature of certain ships force shipyards to sell vessels in the market, even at low prices, rather than storing them in case of cancellations.

A recent report indicates that reorientation opportunities for shipyards are possible but entail significant risks. Some shipyards have chosen to reorient their activities towards niche markets, such as ship repair or cruise ships, during

periods of low demand for merchant vessels. However, only a few shipyards have succeeded in this endeavor. Often, shipyards lack the necessary experience, technological capabilities, supplier relationships, and workforce expertise required to operate in new markets. This lack of reorientation possibilities implies that shipyards struggle to escape the situation of overcapacity in the shipbuilding industry or redirect their capacity toward other activities. Technological shocks prompt companies to invest simultaneously to avoid falling behind, which can render existing capacity redundant and contribute to overcapacity. Additionally, if the new technology leads to productivity increases, it automatically adds further capacity.

Economies of scale or significant learning economies can also lead to overcapacity. The company with the largest capacity or the first to add capacity may gain a cost advantage, putting pressure on competitors to move quickly and aggressively. Similarly, certain industries may experience an increase in the minimum efficient scale (MES), where larger plants become significantly more efficient than smaller ones due to technological innovation and economies of scale. Consequently, unless demand grows rapidly, the number of plants in the industry must decrease to avoid overcapacity. Unless every company has multiple plants and can consolidate them, some companies will inevitably have to reduce their market share, a situation they strive to avoid. Consequently, companies build larger new facilities to reach the MES, thereby creating overcapacity. This mechanism was observed in the oil tanker shipping industry, where the size of new super tankers ordered in the early 1970s far exceeded market demand [7]. A similar trend is currently occurring in

the containership market, as highlighted by a recent report from the International Transport Forum on mega ships.

Industries with low to medium entry barriers and high exit barriers can attract numerous firms during periods of high profits. However, once the industry reaches maturity with low profits, companies are hesitant to exit despite deteriorating results. As a result, capacity accumulates within the industry, and profitability typically remains chronically poor. For example, an industry can find itself in this situation if suppliers, lenders, or governments readily finance entry, but once inside, companies face fixed financing costs that discourage exit. The global shipbuilding industry is characterized by medium entry barriers that discourage firms from entering the market but also increase the costs associated with exiting it. Entry barriers encompass delivery times, yard reliability, production location, and logistics.

Specialty vessel markets, such as cruise ships or yachts, often have higher entry barriers due to the technological and organizational expertise, experience, and highly skilled workforce required for constructing such vessels. Capital investments in facilities and infrastructure further complicate the reorientation away from any economic activity related to vessel production or repair. These exit barriers, combined with the profitability challenges faced by the entire industry, can significantly reduce overall profitability. However, several countries support their shipbuilding industries through subsidies and investments during the initial stages of development, as seen in Figure 12 below [7]. Nevertheless, subsidies can hinder the natural trend for old and unprofitable firms to exit the market, particularly in mature industries.

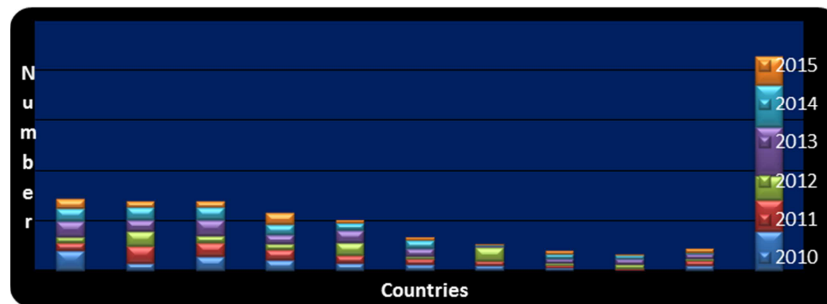


Figure 12. Trend of investment in local shipbuilding by own countries in 2010-2015. [29].

6.4. Assessment of Future Vessel Requirements Related to Ships Disposal

The average lifespan of ships, along with other factors such as environmental regulations, bunker fuel costs, technical obsolescence, freight rates, new-building prices, end-of-life (EOL) ships or second-hand prices, and demolition prices, plays a significant role in driving vessel disposals [29]. Between 1988 and 2014, the average age at which vessels were disposed varied little across different ship types in selected economies. On average, ships were scrapped after 25 to 30 years, with tankers having a disposal age of 25 to 30 years and containers lasting between 17 and

26 years. However, bulk carriers exhibited more volatility in their disposal age, ranging from 20 to 35 years, with peaks at 40 years in 1996 and even 55 years in 2008. The global average scrapping activity, relative to the world fleet, increased from 1% in 2006 to 3.5% in 2012, and then decreased to 2% in 2014. This percentage varied significantly by country. The disposal rates were very low, consistent with the spike in the age of scrapped ships shown in Figure 14. Future vessel demolitions are estimated using survival rates based on ship type and age, as depicted in Figure 14. Interestingly, tankers generally have higher survival rates over the years compared to bulk carriers and containers. Double hull tankers, in particular, maintain a survival rate of around 25% during their 40 years of age. However, single

hull tankers are demolished at an earlier age than those with a double hull, due to the IMO regulation on double hull.

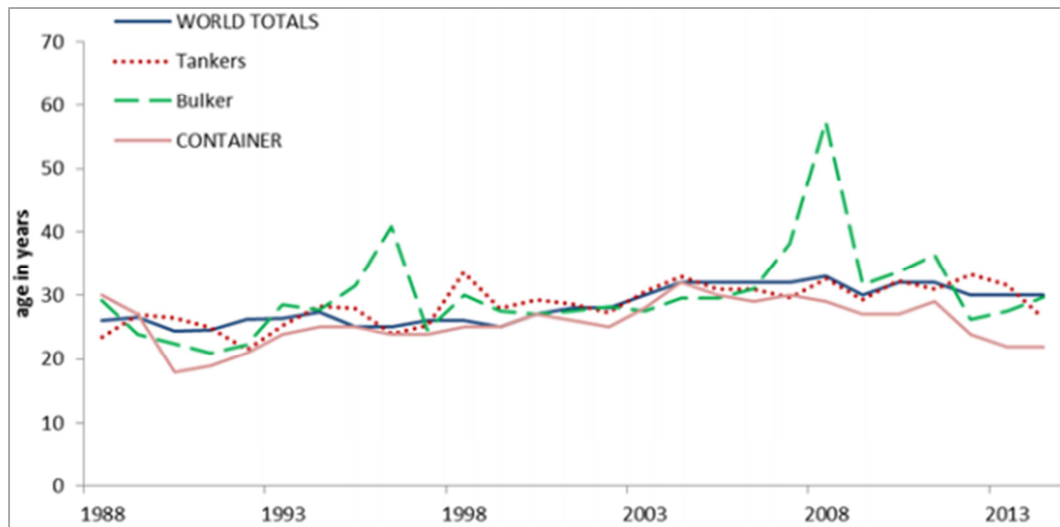


Figure 13. Average age of scrapped vessels by year and ship type. [12].

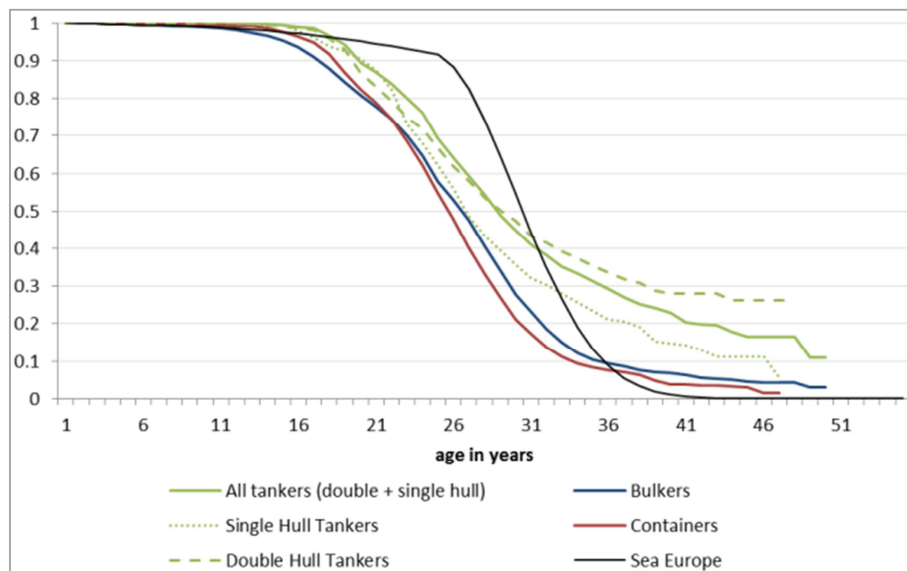


Figure 14. Survival rate by ship age. [7, 30].

6.5. Future Vessel Requirements

Estimations have been made regarding future vessel requirements based on ship disposals, taking into account demolition rates and past completion levels from 2016 to 2035. Figure 15 below illustrates these estimates, indicating that new vessel requirements associated with disposal activity are projected to reach a total of 690 million GT. This includes approximately 200 million GT for tankers, 315 million GT for bulkers, and 170 million GT for containers. It is expected that vessel requirements linked to disposal will decrease from 2030 onwards due to reduced completion activity following the economic crisis. In terms of overall new building requirements, the anticipated total between 2016 and 2035 is approximately 1500 million GT. This comprises around 460 million GT for tankers, 710 million

GT for bulkers, and 335 million GT for containers, as shown in figure 16. However, if future capacity closures do not occur, the shipbuilding industry is likely to continue facing excess capacity challenges for the next 15 years.

There is a very close relation between world GDP, global seaborne trade and global merchant fleet and that has been shown in figure 17 below. [26]. “Global population in July 2010 was around 6.83 billion and it has been estimated that, it will raised 9.08 billion by 2050” [26]. Again, the urban population around the globe has continued to grow faster than the growth of total population. Today more than half of the population is living in urban area. Therefore, the rise in urban population is anticipated to reach around 70% by 2030. [31]. This phenomenon can also have a positive impact on seaborne trade; due to a large urban population not only creates a domestic market for goods and services but also drives the economic growth and innovation. At the same time, the

increasing urbanization will also develop strong middle class and boast up higher consumption of goods and services further.

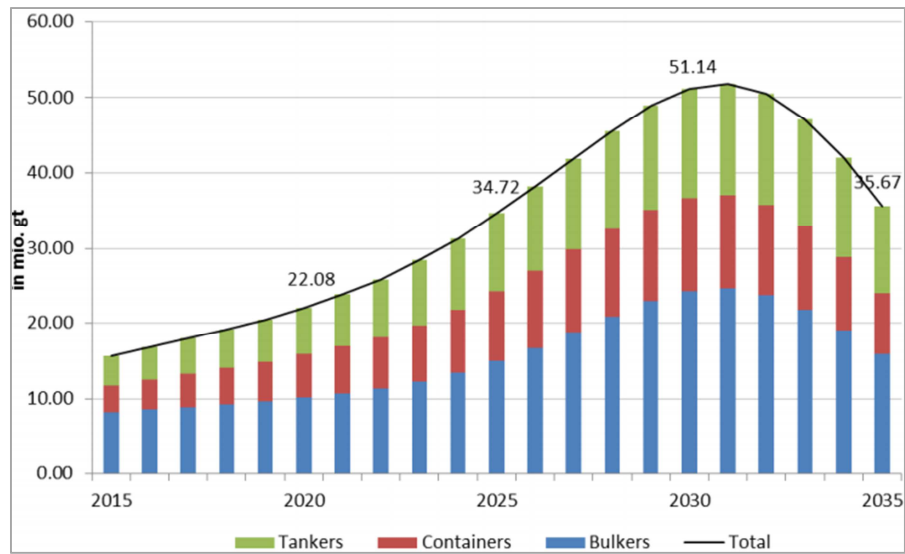


Figure 15. Forecast of future ship requirements related to disposals by main ship type from 2015 to 2035. [12].

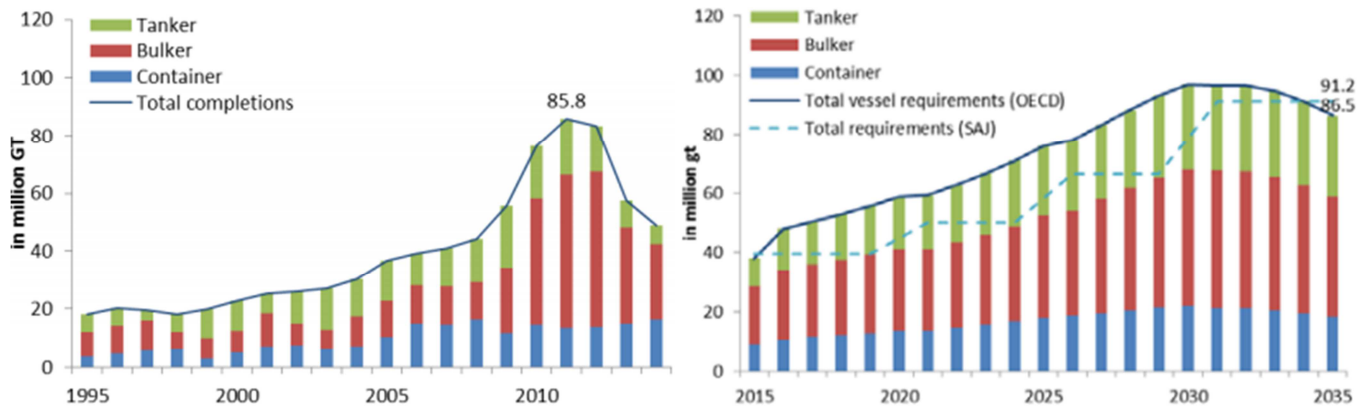


Figure 16. Completions (1995-2014) and forecast of future vessel requirements (2015-2035) by main ship types. [25, 31].

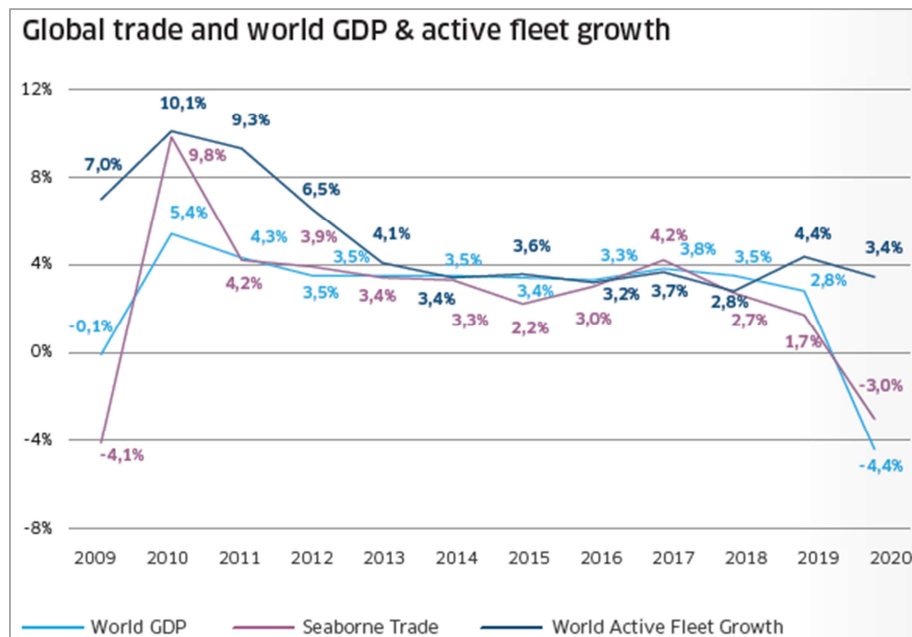


Figure 17. World GDP, Global Seaborne Trade and Global Active Fleet Growth. [7, 26, 32].

7. Capacity and Capability of Local Shipyards

Shipbuilding consider as an early industries developed in Bengal based on its tradition of building boats and ships. [33]. IbneBatuta came to Bengal in the 14th century and went back with a wooden ship that built in a shipyard located at Sonargoan, Dhaka. Interestingly, IbneBatuta's ships has conserved in European Museums. European Traveler Mr. Caesar Frederick viewed that, Chattogram was the centre of building ocean-going ships during the middle of the 15th century. [6]. In 17th century, a fleet of ships was built for Sultan of Turkey at Chattogram. In Mughal period, Chattogram has manufactured a large number of warships for their Naval Force. The Royal Navy of UK used wooden hull warships which have built at Chattogram and was successfully deployed in the famous Battle of Trafalgar in 1805. The wooden hull frigate Deutschland was built in Chittagong and delivered to German Navy in 1818.

17.2 There are hundreds of indigenous private shipbuilding and repairing yards within various location of Bangladesh that are manufacturing and repairing almost all the inland and coastal water transports. Among these, some of them have long shipbuilding history and reputation. As an example High-Speed Shipyard Ltd (HSSL) has 60 years of shipbuilding history. Again, some private shipyard has gained international standard and are manufacturing small and medium new ships for international market. Recently few of these shipyards have attained the capability to manufacture 10000 DWT merchant ships. Few local private shipyards have received orders from the foreign ship owners (such as Germany, Japan, Denmark, Netherlands, EC, Mozambique, India, Nigeria, etc). Those promising local shipyards are Annada Shipyard and Slipway Ltd (ASSL), Western Marine Shipyard Ltd (WMSL), Khulna Shipyard Ltd (KSYL), and Karnophuli Shipyards and Slipway Ltd (KSSL). Those local shipyards have constructed and have already handed over dozens of ships to foreign owners. There are few more local shipyards are improving their capability. There are new hope has been developed to receiving FDI in local shipbuilding from foreign countries.

Bangladesh has long and glorious shipbuilding and maritime history. It will encourage local entrepreneurs and foreign investor to come forward in this field and definitely we will be successful in this sector. Around 40,000 thousands inland and coastal ships and around 100,000 of mechanized country boats are plying all over the country, which carry more than 85% of oil product, 65% of cargo and 25% of passengers in total. All of those ships and boat are manufactured and maintained by local shipyards. There are around 100 indigenous shipyards in Bangladesh. There are 4 local shipyards are capable of making class and export standard ships around 10000 DWT. Another few shipyards are developing facilities and capacity aiming to enter into export market. Around 200,000 skilled and semi-skilled/casual workers are employed in shipbuilding industry.

Two million people either directly or indirectly are related with local shipbuilding industry.

Productivity of Bangladesh shipbuilding labor is 11.43, and average hourly labor wage is only USD 1.00 (in 2009) and which has been shown in table 4 and figure 18 respectively below. Again relative labor wage of local shipyard is only 0.45 and that is lowest in the world (in 2009) and which has been shown in table 5 below. On the other hand, the comparison of relative labor wage in different nations around the globe has also been shown in figure 19 and that is lowest in the world. However, average hourly labor wage in Bangladesh in 2021 has increased and that is remained comparatively lowest in the world. Ultimately Bangladesh shipbuilding remains at advantageous position in the world in term of cheap labor wages.

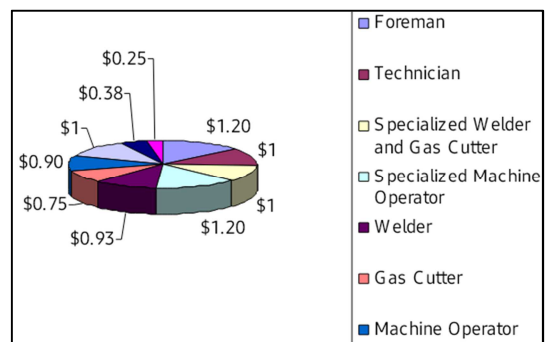


Figure 18. Average labor wage for class ship build in local shipyards in 2009. [2, 34].

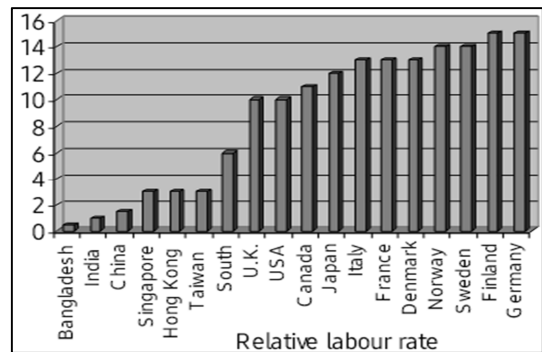


Figure 19. Relative labor rate or wage for different nations around the world. [2, 34].

A number of various types of ships and vessels are built in local shipyards around the country. The vessels built in local shipyards are: Multipurpose vessel, Coaster, Dry Cargo Vessel, Cargo Coaster, Passenger Vessel or Ferry or Lunch, Double Decker Passenger Vessel, Tanker, Container vessel, Landing Craft, Tug, Dump Barge, Supply Barge, Deck Loading Barge, Self Propelled Barge, Dredging Barge, Research Vessel, Survey Ships, Hospital Ship, Tourist ship, Inspection Vessel, Pleasure Craft, Yachts, Ro-Ro Ferry, Crane Boat, Speed Boat, Hydrographic Survey Boat, Work Boat, Pilot Boat, Water Taxi, Pontoon, Catamaran Vessel, Sand Carrier, Troops Carrying Vessel, Fast Patrol Boat, OPV, PC, LPC, LCV, LCT, Deep Sea Trawler, etc. There are around

40,000 inland vessels are playing in the river and sea-coast and half are registered in Department of Shipping (DOS). Again, more than 100,000 of mechanized and manually operated country boats have not yet come under the preview of registration and organized statistics. There are more than 500 coastal ships have been registered with Mercantile

Marine Department (MMD). To get the real number of vessel actually build in local shipyard is quiet more than the registered either in DOS or in MMD. Principal data (L, B, d, dwt, etc) of most common types and sizes of ships which built locally and ply in inland and coastal water has been shown in table 6 below.

Table 4. Shipbuilding labor productivity of different nations in 2009. [2, 34].

Country	Formula for Labor Productivity = Man-Years/Unit Output (in CGT)	Productivity
Japan	Using basic formula	1
European countries	Same	2
United States	Same	4
China	Same	6
India	Same	10
Bangladesh	Same	11.43

Table 5. Relative labor wage for different nations around the globe in 2009. [2, 34].

Country	Relative Labor Wage	Country	Relative Labor Wage
Bangladesh	0.45	Canada	11
India	1	Japan	12
China	1 to 2	Italy	13
Singapore	3	France	13
Hong Kong	3	Denmark	13
Taiwan	3	Norway	14
South Korea	6	Sweden	14
U. K.	10	Finland	15
USA	10	Germany	15

Table 6. Principal data (L, B, d, dwt, etc) of most common types and sizes of ships which built locally and ply in inland and coastal water.

Types of Vessels	dwt or no of passenger	Length in Meter	Breadth in Meter	Draught in Meter	Usually Ply
Multipurpose ship or Coaster	1500 - 4000	60 - 120	10 - 16	3.5 - 6.0	Coastal
Cargo	1000 - 3500	50 - 100	10 - 15	3.0 - 5.0	Inland & Coastal
Passenger ship or Launch	300 - 1500 Passenger	60 - 110	10 - 20	3.0 - 4.0	Inland
Tanker	1000 - 4000	50 - 120	10 - 16	3.0 - 6.0	Inland & Coastal
Sand Carrier	200 - 500	20 - 40	5 - 10	2.0 - 3.0	Inland
Barge	200 - 1000	20 - 60	6 - 14	2.5 - 3.5	Inland
Dredger	30 - 100	10 - 30	4 - 8	2.0 - 3.0	Inland

8. Suitable Market for Local Shipbuilding

World middle class society of Asia and Africa is flourishing in 21st century. At the same time, shipbuilding labor price of China has increased manifold in recent years. As a result, china is going to reduce their small and medium container, cargo, tanker, and multi-purpose ships market share very soon. Here the opportunity has created for small commercial shipbuilding nations like Vietnam, Philippines, India, Bangladesh, Myanmar, Australia, Turkey, etc. However, indigenous shipbuilding in this region has a glorious history.

To find out the suitable market, help has been taken from empirical research and the outcome has based on quantitative and qualitative data collection methods. The data and information have also been collected from Focused Group Discussion (FGD), who is working on board different types of merchant ships around the world and at various shipping companies of Bangladesh. Size of global shipbuilding market

is around USD 200 billion, where small ship building market is around USD 20 billion. There is a serious demand of container ships in all size. UNCTAD, WB, WTO, and OECD have detected the high demand of container ships in coming days ahead. Small niche shipbuilding market is suitable for local shipbuilders. In coming future, the world will need few thousand of vessels, mostly small to medium sized. Old single hall tanker fleet will be replaced totally and immediately as per IMO requirement.

Some expert have been viewed that, the niche market of small size container, tanker, cargo, multipurpose and special types of ships with 3000-10000 dwt (approx) is suitable for Bangladesh. Global renowned and bigger shipyards have less interest on this niche market. Bangladesh has all potential and capacity to capture this market with competitive price. On the other hand few other experts have been stated that, Bangladesh is the suitable for small and medium size shipbuilding market. They viewed that Bangladesh have the golden opportunity to capture a handsome share of 3000-10000 DWT and 12000-20000 DWT multipurpose, container, tanker and cargo ships market. Those small and medium niche markets will be alive in coming years. In

future we need to develop our own merchant fleet to maintain our export and import business of cargo, energy and other goods. There will be another local niche market for us.

The sea area of Bangladesh is of enormous importance, because it is the only way of direct connectivity to the rest of the world during crisis with any of our neighbors. Constant presence of BN and BCG are imperative for keeping the sea lanes of communication secured, establishing and maintaining the sovereign rights over our 118813 sq. km sea areas and economic benefit of the country. In order to avert any threat to national security by 'traditional' and 'non-traditional' means both the organizations remain vigilant by deploying ships at sea. The troop transportation in the bays also necessitates some landing crafts for the navy and army. In these ways a good number of military ships are required for operational tasks both in peace and wartime. And that is also a local niche market for BN operated private shipyards along with huge local inland and coastal fleet.

9. Conclusion

Global shipbuilding market is usually categorized on the basis of main ship type, end use and region. Historically, shipbuilding has suffered from the deficiency of global control and has a tendency towards over-investment due to its involvement of wide range of technologies, enhanced other small industries, employ a significant number of workers, generate income and overall its global nature. This phenomenon and trend has found common to all leading and successful shipbuilding nations. Nowadays global shipbuilding market is suffering from inflation, over-capacities, depressed prices, low profit margins, trade distortions, widespread subsidization, financial and pandemic crisis, volatile global politics, trade imbalance and many more.

Present government has taken some step and drafts a shipbuilding policy to improve the shipping and shipbuilding sector as a whole. Before implement the policy, it needs to consider proper evaluation and uniform priority, so that both public and private shipyards get benefit equally from the policy. Recently the opportunity of FDI has created in shipbuilding sector. Country like China, Turkey, Netherlands are showing their keen interest in this sector. So creation of an exports shipyard zone or air-marking a special zone for export shipbuilding can positively help to develop healthy growth of shipbuilding industry in Bangladesh. Small and medium size container, tanker, cargo, multipurpose and special types of ships with around 3000-10000 DWT is suitable for Bangladesh. Bangladesh has all potential and capacity to capture this niche market with competitive price.

19.3 From this study, it has been depicted that, the tentative size of global shipbuilding market is around US\$ 200 billion, where small ship building market is US\$ 20 billion. In near future, the world will need few thousand of ships, mostly small to medium size. Old single hull tanker fleet along with good portion of bulk ship will be replaced immediately as per IMO requirement. Again, there is a

serious demand of container ships in all size. Shipbuilding cost in China in last decade was cheaper. But at present, due to their standard of living has improved and their labor wages have also been increased. So, small shipbuilding nation like Bangladesh remains in advantageous position in this aspect. It has been predicted that, at future, China will leave a good portion of their small and medium shipbuilding market share. On the other hand, Bangladesh has all potential and capacity to get 1 to 2% of global market share within 2030 and the worth value will be US\$ 2 to 4 billion. Bangladesh need to take necessary steps to capture this niche shipbuilding market and sustainable development of this industry is essential.

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Biography

Khandakar Akhter Hossain, (E), NUP, ndc, psc, PhD, BN, joined the Bangladesh Navy in 1988 and obtained a commission in the engineering branch. He excelled in his studies, earning BSc and MSc degrees in naval architecture and marine engineering from BUET. With extensive training, including psc, ndc, and ISMC, he served as an engineer officer on various ships and contributed to UN peacekeeping efforts in Sudan. Commodore Hossain held key positions in shipbuilding, port authorities, and as a Managing Director. He is a respected fellow of IEB, RINA, and IAMSP. Currently, he serves as Commodore Superintendent Dockyard in Chattogram.