

## EVALUATION OF PRESENT GLOBAL SITUATION AND FUTURE CHALLENGES OF BANGLADESH SHIPBUILDING

Khandakar Akhter Hossain<sup>1</sup>

### *Abstract*

Bangladesh has the necessary standards and capability to become an emerging shipbuilding nation in the globe by exploiting her glorious shipbuilding tradition in maritime industry. The presences of many indigenous shipyards, long shipbuilding practice with large pool of young workforce are the main strengths of local shipbuilding. But, shipbuilding industry of Bangladesh failed to keep pace and consistency due to lack of stakeholder and private initiatives. This has ultimately caused slow progress of local industry and failed to penetrate international shipbuilding market. Present global geo-political situation, Russian-Ukraine war, incoming global inflation/recession, along-with image crisis, attitude of local investor, etc are considered as potential challenges for existence and expansion of local shipbuilding. Again, country like China, Turkey, and Netherlands are showing their keen interests to invest and that positively help to develop healthy growth of local shipbuilding. So, by detecting prospects and future challenges and evaluate potential and opportunities of local shipbuilding; sustainable development is possible. In this analytical reviewed paper, an effort has been taken to depict the prospect and future challenges of local shipbuilding industry of Bangladesh.

**Keywords:** Module construction, 4IR, FDI, AI, IoT, QHSE, RGM

### Introduction

Modern shipbuilding makes considerable use of prefabricated blocks or modules, ‘where entire multi-deck segments of the hull build elsewhere in the yard, transported to the building dock/slipway, and then lift into place and fabrication process has completed under the supervision of naval architects. This is known as block or module construction, where machinery, equipment, pipes, electrical cables, and all other components are pre-install within the blocks, to minimize the effort to assemble components inside the hull, once it is welded as a shape of ship’ (Hossain & MNG, 2018). Today’s shipbuilding needs lot of

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automation and modern production manufacturing process, where skilled workforce is essential. During ship design, naval architect finalize ships drawing after model testing of prototype ship either in towing tank/basin or CFD analysis.

The world is passing through an economic recession due to post COVID-19 situation and severe geopolitical crisis (Russian-Ukraine war). Shipping and shipbuilding of the world are affected by this recession and that result cancellation of orders and slow down the global business. On the other hand, countries like China, Turkey, and Netherlands are showing their keen interests to invest in this sector. So, creation of an exports shipyard zone for exporting new ship and critical ship repair facilities can positively help to viable growth of local shipbuilding. Again, the main goal of 4th Industrial Revolution (4IR) in shipbuilding is to develop intelligent shipyard which is characterized not only by adaptability, resource efficiency and ergonomic but also close integration among ship owners, shipbuilders, investors, and other related stake-holders.

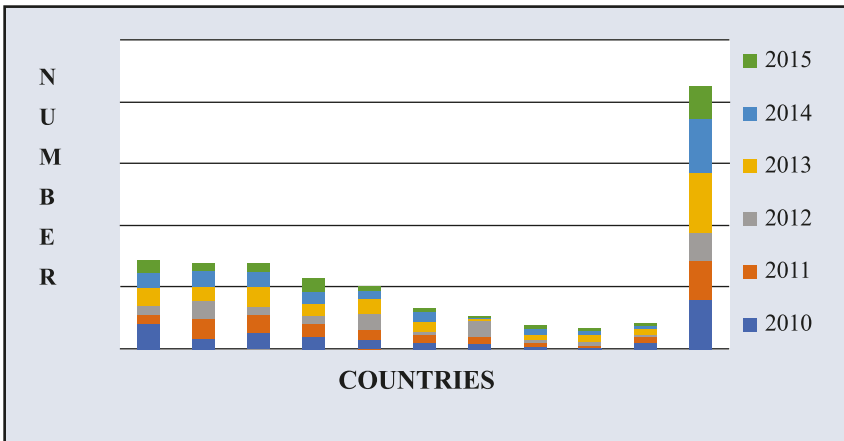
This analytical paper endeavoured to evaluate local shipbuilding industry of Bangladesh depicting present prospects, future challenges and viable recommendations and strategies to develop local shipbuilding in a sustainable way. The study has been conducted with combination of primary and secondary data including useful inputs from related stake-holders of the industry from home and abroad. The primary and secondary information about the global and local shipbuilding have been collected from available sources like, visits, interviews, books, publications, web sites, journals, reports, financial reviews, etc. In the paper, global and local shipbuilding history, potential and prospect of local industry, analysis of global shipbuilding market have been discussed.

## **History of Global Shipbuilding Industry**

There are ups and down observed in shipbuilding growth. United Kingdom (UK) was the market leader of global shipbuilding before WWII. Then after, 'Japan become the dominant ship building nation in 1960s 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 cheaper currency. South Korean shipbuilding overtook Japan's in 2003' (Zou, 2009). Again, 'from 2009, 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' (Hossain K. A., 2018). China utilizes global financial crisis to develop its shipbuilding and they initially targeted the medium and small global market of

containers, tankers and cargo ships. ‘High labor cost countries always have lost its global shipbuilding market share, during removal of state subsidies, even strong domestic policies failed to provide enough support. The British, USA, and European Countries shipbuilding is the prime example of this’ (Stopford, 2009).

Since the 1960s, American and European shipyards have seen their market share diminish, with the exception of the building of a small number of military vessels and a few specialized vessels, such as cruise liners and pleasure yachts. Today China is global shipbuilding leader with around 45% of global share. Their shipbuilding quality and technology have improved significantly and they have earned the confidence of global customers. ‘South Korea and Japan are following China securing second and third position in global market with 25% and 20% share respectively’ (UNCTAD, 2021). The global shipbuilding industry was struggling from 2008 to 2015 due to great recession (UNCTAD, 2021). Three South-East Asian countries, with few Western counterparts, emerged as new industrial hubs. Figure 1 depicts the trend of domestic investment and support for local shipbuilding. Countries such as Japan, China, Singapore, the United States, and South Korea have invested in domestic sectors, boosting their domestic industries and allowing them to compete in the global market. ‘Despite big fluctuations in price and demand during great depression in 2008-2015, the major market in China, Japan and South Korea remain as forerunner of global shipbuilding and ship-repair industry’ (Hossain & Zakaria, 2017). There are strong reasons behind the growth of their shipbuilding market; such as: financial backing by governments, domestic investment, Foreign Direct Investment (FDI), cheap



Source: Hossain & Zakaria, 2017

Figure 1: Trend of Support to Local Shipbuilding by Different Nations in 2010-2015

labour costs, infrastructure, business friendly regulations, etc' (Hossain & Zakaria, 2017).

There is a very 'close relation between world GDP, global seaborne trade and global merchant fleet and that has been shown in Figure 2' (Clarksons Research, 2021). Trade is always for population and it's more related to urban population. 'Global population in July 2010 was around 6.83 billion and it has been estimated that, it will raise 9.08 billion by 2050. 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' (OECD, 2011). This phenomenon can also benefit seaborne trade; a large urban population not only creates a domestic market for products and services but also stimulates economic expansion and innovation. At the same time, increased urbanization will foster a large middle class and increase consumption of goods and services.

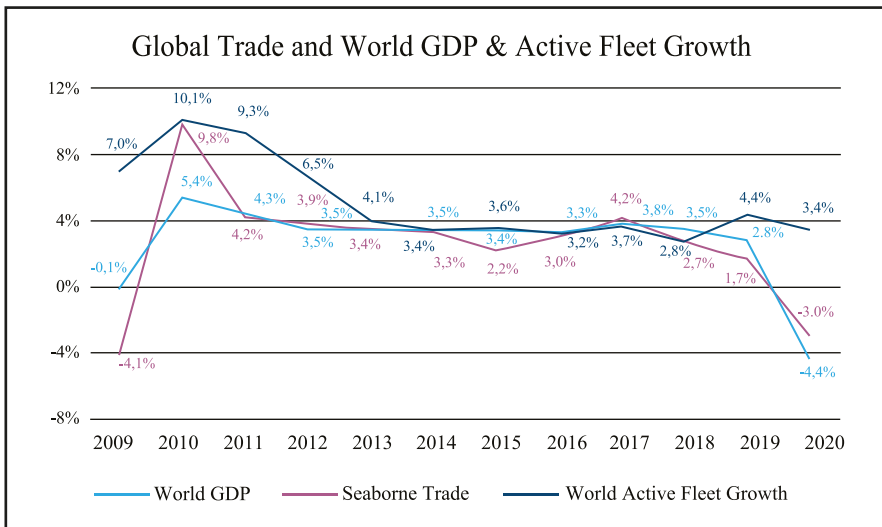


Figure 2: World GDP, Global Seaborne Trade, and Global Active Fleet Growth

## History of Bangladesh Shipbuilding Industry

Indigenous shipbuilding industry of Bangladesh has a glorious history. 'Shipbuilding consider as an early industry developed in Bengal based on its traditional boats building' (Alam, 2004). Ibne Batuta came to Bengal in 14th century and went back with a wooden ship that built in a shipyard located at

Sonargoan, Dhaka. Interestingly, 'Ibne Batuta's ship had conserved in European Museums. European Traveler Mr. Caesar Frederick viewed that, Chattogram was the centre of building ocean-going ships during middle of the 15th century' (Hossain, Zakaria & Islam, 2010). In 17th century, 'a fleet of ships was built for Sultan of Turkey at Chottogram. In Mughal period, Chottogram has manufactured a large number of warships for their Naval Force' (Hossain & Zakaria, 2017).

Again, 'the British Navy used wooden hull warships, built at Chottogram and was successfully deployed in Battle of Trafalgar in 1805. The wooden hull frigate Deutschland (1000 DWT) was built in Chottogram for German Navy in 1818' (Hossain & Zakaria, 2017).

Bangladesh has three public shipyards with a long history of shipbuilding. Dockyard and Engineering Works (DEW) Ltd, Khulna Shipyard (KSY) Ltd, and Chattogram Dry Dock Ltd (CDDL) are among them. KSY Ltd is capable of constructing 10000 DWT class ships, while CDDL, the country's sole 20000 DWT repair dry dock, will be capable of constructing medium size navy and merchant ships in the near future. However, upon independence, all of those public shipyards proclaimed them sick industries and lay off due to bad management and a few fundamental difficulties, as with other public industries. Finally, they were handed over to the Bangladesh Navy (BN), who are now successfully running them with the same civil workforce that they had previously. Hundreds of indigenous private shipyards can be found throughout Bangladesh. These local shipyards can build and repair practically any form of inland or coastal ship or boat. Few local shipyards are well-known and have a long history of shipbuilding. High-Speed Shipyard, for example, has a 70-year history of shipbuilding. Again, a few private shipyards have met international standards and are receiving international new-building orders, as well as constructing small and medium-sized ships for overseas buyers.

Recently few local private shipyards have attained the capacity to construct 10000 DWT merchant ships for global market. Those are: Annanda Shipyard and Slipway Ltd (ASSL), Western Marine Shipyard Ltd (WMSL), and Karnophuli Shipyard and Slipway Ltd (KSSL). Now those local private shipyards have received orders from the foreign ship owners 'like Germany, Japan, Denmark, Netherlands, EC, Mozambique, India, and Nigeria. Presently, various types of merchant ships have built successfully and handed to foreign owners by local Shipyards.' Local shipbuilding industry has adequate strength and potential. But, 'Bangladesh becomes unsuccessful to keep pace with the continuous

technological advancement with global shipbuilding due failing to detect the challenges and threats of the industry. Moreover, few typical problems and weakness have created hindrance for development of this sector' (Hossain, 2021). It is expected that if local shipbuilding responds adequately to mitigate the challenges and threats, we would be able to construct a viable shipbuilding industry. Again, after meeting local demand, we must enhance our shipbuilding to worldwide standards in order to become a sustainable ship-exporting nation.

However, the technology employed in indigenous shipbuilding remains primitive. There are obvious deficiencies in terms of productivity, technical advancement, managerial strategy, and labor skill. The majority of local shipyards lack sophisticated shipbuilding tools and machinery. Simultaneously, there is a scarcity of skilled digital/AI operators. Moreover, at present Bangladesh is not working in the field of ship design and that creates dependency to foreign support (Hossain, 2021). Productivity expansion and export promotion are being impeded due to lack of required capital and sound investment. Existing rate of interest in working capital loans is still in double digit; whereas 5-7% rate of interest on export credit is prevailing for other export sectors, like Readymade Garments Manufacturers (RGM) and pharmaceutical industry. Insufficient training facilities for the technical personnel are observed in almost all local shipyards. Most of the local shipyards' owner considers that, every human resource development programmed as a money drain not gain.

### **Prospect and Potential of Local Shipbuilding**

Bangladesh, as a maritime nation, has a magnificent shipbuilding tradition, which motivates both domestic and foreign investors to invest in this sector. Bangladesh's coastal area and riverside are geographically advantageous for shipbuilding and other nautical industries. Around 40,000 inland and coastal ships and about 100,000 of mechanized country-boats and trawlers are plying all over the country. Those vessels carry more than 85% of oil product, 75% of cargo and 25% of passengers. All of those ships and boats are manufactured and maintained by local shipyards. Shipbuilding employs about 200,000 skilled and unskilled people, both directly and indirectly. Despite this, the government's Annual Development Program (ADP) allocation for rivers and water transport is less than 5%, but it is more than 70% for roads. Today 'local shipyards are enjoying good supports from backup industries or backward linkage with competitive prices. Our local re-rolling factories produce various accessories for shipbuilders by using scraped, which come from Bhatiary ship recycling yards' (Hossain, 2018).

We have availability of white color semi skilled manpower like naval architect, marine engineer, electronics and IT engineer, management professional, in maritime field. Effort on training and skill development will turn them into human resources. In fact, we have the world's cheapest labor. The quality of manual welding and local welders is superior to that of China, Vietnam, and the Philippines. A large number of technical institutes and vocational training centers are now creating skilled labor for the heavy industry. Presently KSY, BN Dockyard, WMSL, KSSL, and ASSL are producing few thousand of skilled labours per year in different trade courses like, welders, cutters, painters, carpenter, blacksmith, foremen, mechanics, electrician, etc. Bangladeshi maritime workforces have proved themselves as disciplined, diligent, hard working, obedient and quick learner in international arena (in Japan, Korea, Middle East, Malaysia, etc).

Present shipbuilding costs in China has increased further due to their improved standard of living. It has been predicted that, China will leave a portion of their small and medium shipbuilding market share in near future. Without taxes operations for export-oriented shipyards, relaxation of shipbuilding rules, imposed tariffs on imported ships, announcing some growth strategy for the local industry, dredging of rivers, and negotiating with connected other industries will undoubtedly strengthen local shipbuilding. There are huge numbers of Small and Medium-Sized Enterprises (SME) functioning and contributing distinctly to heavy industries like shipbuilding as backward and Forward Linkage Industries.

Careful comparison of prices of China and Bangladesh has been made and the price of Bangladesh and found to be better and competitive. And this needs continuous improvement, otherwise many cancellations of order may occur in recent recession. The classification society is extending their support to guiding to develop quality of class certified shipbuilding and also certifying the material lists for export-oriented shipbuilding. Germanischer Lloyd (GL), BV, and NKK have been playing a very vital role in the growth and development of export shipbuilding in Bangladesh (Hossain, 2018). Existing local shipyards of Bangladesh can manufacture quality ships in competitive price. Moreover, there is a golden opportunity to flourish backup industries to support local shipbuilding. There is also a chance to grow backup and foreword linkage industries with foreign collaboration.

The local shipbuilding industry has considerable untapped potential to earn significant foreign currency through the construction and export of

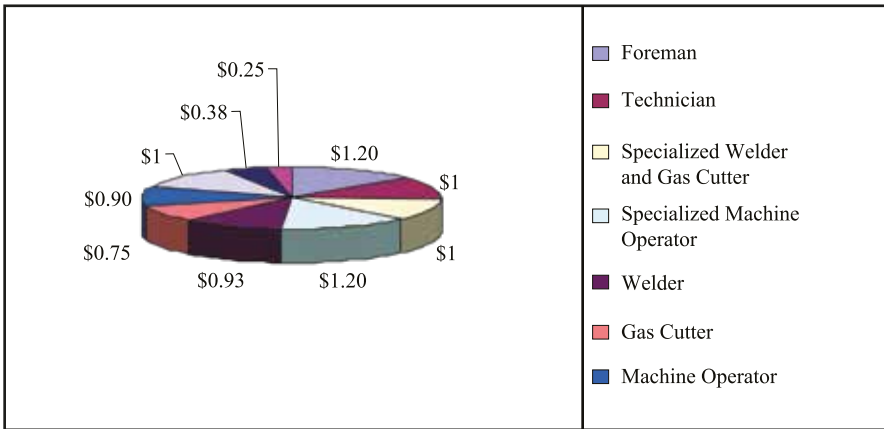
high-quality ships. In the coming years, shipbuilding could become Bangladesh's primary source of export revenue. Bangladesh has an export-import imbalance as well as a trade deficit. We need to explore potential sectors to balance deficiency. Shipbuilding may be the new opportunity. Because, there is an opportunity for access duty free market of ships, into developed countries. There is an opportunity of FDI in shipbuilding sector. Countries like China, Turkey, Netherlands are showing their keen interest in this sector. 'The foreign buyers especially in Western Countries (Europe and North America) have exhausted to China due to present geopolitical situation. They are searching new market and are imposing few mandatory requirements to using their own equipment in the ordered ships. It creates hope for LDC and developing countries like Bangladesh (OECD, 2021). Present geopolitical situation and financial crisis may increase demand for low-cost ships. This is great opportunity for local shipbuilding industry.

Shipbuilding technology and construction procedures have altered substantially in recent years. Implementing a block and module construction method and a lean manufacturing approach in shipyards necessitates an examination of the shipyard's current infrastructure and labor capabilities. Labour competency and level of skill also needs to be evaluated. Again, continuous training of workforce can improve the shipbuilding quality and productivity of any shipyards (OECD, 2021). 'The average labour wage (per hour) in Bangladesh is the lowest in the world and that has been shown in Figure 3. On the other hand, the comparison of shipbuilding labour wage for skilled labour in different nations in 2017 has also been shown in Table 1. Comparison of relative labour wage in different nations have been shown in Figure 4; where Bangladesh is the lowest one' (Hossain, 2010).

| Countries  | Average Hourly Labour Charge in US\$ |
|------------|--------------------------------------|
| Bangladesh | 1.50                                 |
| India      | 2.50                                 |
| China      | 9.00                                 |
| S Korea    | 27.00                                |
| Japan      | 30.00                                |
| USA        | 30.00                                |
| UK         | 29.00                                |
| France     | 27.00                                |
| Italy      | 26.00                                |
| Germany    | 35.00                                |

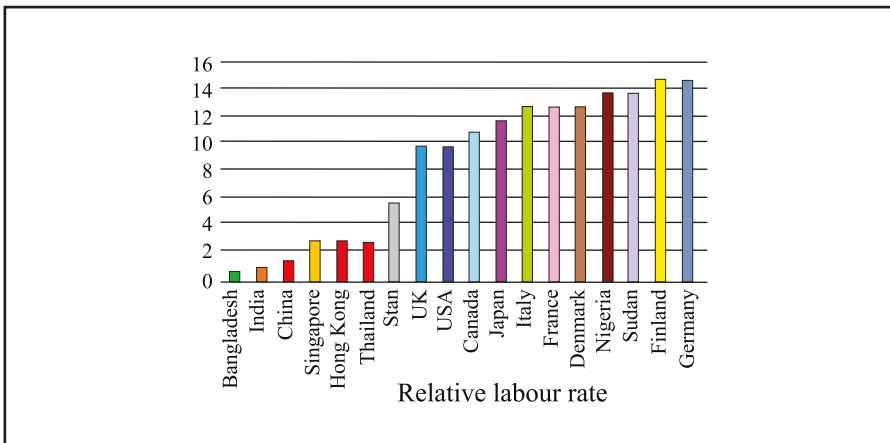
Table 1: Average Hourly Semi-Skilled Labour Wage of Different Nations in 2017





Source: Hossain, 2023

Figure 3: Average Hourly Labour Wage (In USD) for Class Ship in Local Shipyards in 2009



Source: Hossain & Zakaria, 2017

Figure 4: Relative Labour Rate or Wage for Different Nations Around The World in 2009

### Present Challenges of Local Shipbuilding

Bangladesh shipbuilding found sluggish to keep pace and consistency with technological development, though we have magnificent legacy in this sector. Shipyard owners are hesitant to accept advanced technology due to an oversupply of cheap labor. There is an evident gap between industrial needs and the curriculum or syllabus of the mass education system. Hence, to equip our children with the necessary skills greater emphasis on technical education is much needed. The shipbuilding industry requires a large amount of machinery, equipment,

components, spare parts, and accessories, which necessitates emergency imports throughout the construction phase. Present existing roles and facilities are not so adequate for emergency import requirements. Under the present import policy and foreign currency regulation, create unwanted complicacy and delay the delivery of import of ships items (Hossain & Zakaria, 2017). Finally whole process delays the production and that demoralize foreign buyers. Additional financial cost of local Shipbuilding is about 10% to 20% and that is higher than the other competing nations (China, Korea, Japan, India, and Vietnam).

The shallow depth restricted in rivers (maximum 4m) limit the draught and size of ship built in local shipyards. It is very difficult to maintain navigable depth in the river/channel for playing of ships due to huge siltation. Again, bridges and overhead cables impose further constraints on the size of ships produced at shipyards. For important rivers, an elevation of at least 22 meters over Highest Astronomical Tide (HAT) must be maintained. Our majority of local shipyards are located in and around Dhaka, which is far from the coastal area, limiting the size of ships produced. Bangladesh does not produce class authorized MS plates, frames, girders, stiffeners, longitudinal, and other components required for export-oriented shipbuilding. ‘Image crisis and obstacle in Ease of Doing Business (EODB) discourage FDI in shipbuilding. There are lacks of information, motivation and business promotion for prospective foreign buyers of new ships’ (Researchgate, 2022). Our ambassadors in foreign mission need to address this matter. Local shipbuilding is lacks of technical expertise on modern technology and lack of government institutional financial support to meet incoming 4IR and that will be the main hindrance for sustainable development of shipbuilding.

Private shipyards have lack of corporate culture as those are managed by family members of the owners. They capture all the key and top appointments and create an unhealthy business environment. Local shipyards are operated by their desire and aspiration. As a result, employees do not have a sense of belonging to the firm. Local bank interest rates and service fees remain high. It is one of the biggest impediments to the development of shipbuilding. Again, shipbuilding necessitates bank guarantees based on the preferences of overseas customers. As a result, local commercial banks require counter-guarantees from overseas banks. This adds to the expense of local shipbuilding. The commission for opening an import LC, the counter bank guarantee, and other markups in local shipbuilding incur additional costs and fail to make export-oriented shipbuilding more competitive with competitors such as China, Korea, Japan, Vietnam, the Philippines, India, and so on.

The technology used in local shipbuilding is still rudimentary. There are distinct lacks in efficiency, technological, managerial and labour skill. Most of the local shipyards lack of modern shipbuilding tools and machineries. Moreover, there is a shortage of machine and digital/AI expert operators. Still, Bangladesh has lack of ship design expertise and we are depending on foreign support. Poor management practice has observed in most of the private shipyards. Family member are running local shipyards as per their desire and aspiration. Sometime, they consider employee as their servant. As a result, there is an obvious gap between shipyard owners and employees, creating an unfavorable economic environment in local shipyards. Local private shipyards are extremely hesitant to adopt corporate management culture. Family members have major managerial positions. Such a family management style is one of the barriers to shipbuilding development. ASSL, for example, has struggled to maintain its success in the ship export market due to a lack of corporate management culture.

The key weakness of general mass is the dishonesty and poor moral character. We should not try to cheat and earn illegal profit by unethical way. We should be more accountable and answerable of our deeds. Again, shipbuilding industry is not well understood by local investor and policymaker. As a result, the usual responses to such investment proposals are lukewarm and not treated as a booming sector. Thus, banking support that the shipbuilding sector enjoys in the current policy is meager. Export shipbuilding of other successful nations has flourished due to government support and consistency.

There is a drain of skilled manpower, naval architect and engineer from Bangladesh shipbuilding industry to foreign industry due to negative attitude and behavior of private shipyards owners. Imported raw materials include class plate, machinery, equipment, and accessories for the local shipbuilding sector. As a result, local shipbuilding is heavily reliant on other countries, incurring significant costs. Weak infrastructure, a lack of energy supply, insufficient land, a lack of EODB, and other facilities are important impediments to the quick development of local shipbuilding. Again, there is a risk of shipbuilding business both for the entrepreneurs and for bankers. Moreover, local commercial banks are shy to deal with big investments individually; but that is essential for shipbuilding. Again, present global geo-political situation, Russian-Ukraine war, and incoming global inflation/recession are the new threat to any business.

Local shipyards have negative attitudes and are very reluctant to improve quality, health, safety, and environmental (QHSE) aspects. Government pressure,

foreign buyers' demand, together with awareness and training programs on QHSE aspects may develop local shipyards to international standard. There is a demand of more favorable government policies and strategies for local shipbuilding. It is not contributing to the sector's long-term development. Again, a structure for proper creation, execution, monitoring, and updating of export-oriented local shipbuilding policy and strategy is lacking. There is poor corporate management culture found in local shipyards as well as shipyards owner attitude in the local shipyards is not quiet employment friendly. As a result, employees have less job satisfaction as well as they do not feel they belong to the organization. That's why, lack of discipline, huge absenteeism and poor turn-over of skilled manpower has usual phenomenon in local shipyards.

### **Future Challenges of Local Shipbuilding Industry**

Ocean and shipping are the heart of global trade, where technology has placed at core of the strategy since inception of ship and shipping, which observed previous three industrial revolutions. Likewise, there will be huge impact on maritime industry during incoming 4th IR (4IR) or Industry 4.0 and future ships will be controlled by Artificial Intelligence (AI), Internet of Things (IoT), or automated systems. Modern technology will steadily reduce seafarers in shipping due to unmanned ship and AI. The 4IR is anticipated to reach at the peak around the middle of the 21st century and bring disruptive changes by exploring and implementing new technology in all spheres of trade and shipping to create safer, efficient, greener, and viable solution. 'The technologies like Robotics, AI, Machine Learning, IoT, Blockchain, Drones, and Augmented Reality (AR) are going to change the equation of the job sectors and give a new dimension of maritime industry'.

The influence of 4IR or Industry 4.0 has recently been debated everywhere. Water and steam-powered mechanical production were introduced during the first industrial revolution. 'The second industrial revolution brought electrically powered mass production system and the third industrial revolution introduced electronic and information technology (IT) for achieving automation in manufacturing process.' On the other hand, 'the incoming 4IR leads to the complex use of digitization, combining the cyber world with the physical world by including AI, IoT, big data analytics, cloud computing, virtual and augmented reality, simulation, human-machine interaction, 3D printing, advanced materials technology, etc' (Kobyliński L, 2018). The main 'goal of 4IR is intelligent shipyard which is characterized not only by adaptability, resource efficiency and

ergonomic but also close integration among all stakeholders' (Reni, Hidayat, Bhawika, Ratnawati, & Nguyen, 2020).

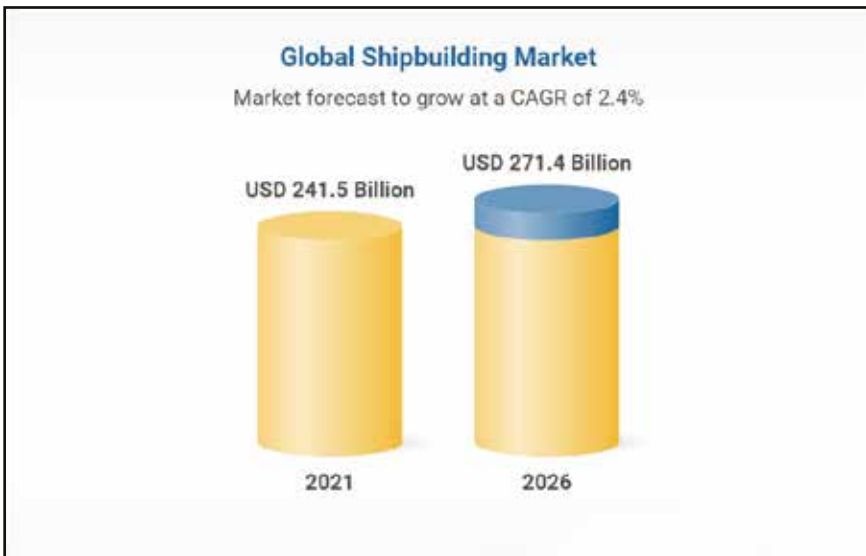
Actually, the fourth IR is balanced to link, integrate, and automate everything on a large scale: man, machine, materials, manufacturing process, goods, logistics, customers, and so on. It is also expected to have unanticipated transformational consequences not only on the industry but on all aspects of human life. This new industrial revolution wave in the shipbuilding sector is called 'shipbuilding 4.0 and it is basically the follow up of the industry 4.0 concept applicable in shipbuilding industry. Industry 4.0 will definitely influence in the whole maritime sector and the transformation that will come in the shipbuilding industry is also believed to be very crucial' (Noordstrand, 2018). The main goal of shipbuilding 4.0 is the intelligent shipyard which is characterized not only by adaptability, resource efficiency and ergonomic but also close integration among ship owners, shipbuilders, suppliers, the partners in the business and value processes.

Future engineers must be qualified to do all tasks in a multidisciplinary environment employing advanced technologies with machine interaction while the ship is in production. Also, in the design phase, it is very important to design innovative solutions together and in the closer cooperation with the selected suppliers. In near future 'shippers will be benefited from better forecasts with the increased availability of shipping data and advances in big data analytics, providing shippers with greater visibility into market and pricing trends. Automated Identification System (AIS), is a constellation of satellites that keep track of ship movements, will integrate data with information such as bills of lading to give shipping strategists a clearer understanding of how trade routes evolve over time' (Reni, Hidayat, Bhawika, Ratnawati, & Nguyen, 2020).

It is also believed that the changes that will bring by shipbuilding 4.0 will be very different compared to the previous three industrial revolutions. The shipyards that will fail to follow the changes will not survive and make profit. The modern 'shipbuilding industry that follows the revolutionary changes is expected to remain healthy in future, especially in the market segments of higher added value and with larger sales value. Almost all major players in shipbuilding industry are preparing themselves for the changes that will come in next 10 to 20 years, and strongly working on their own steps toward 4IR.' Although shipbuilding is characterized by single units or small series production, still shipbuilding 4.0 raises the question of how the shipyards need to be changed to survive in the market.

## Global Market Analysis and Opportunities of Local Shipbuilding

Previously, shipbuilding costs were lower in China. However, labor earnings have recently climbed as a result of their better living standards. It is projected that China will leave a chunk of its small and medium shipbuilding market share in the future, creating a niche market for our local shipbuilding. Small commercial shipbuilding nations such as Vietnam, the Philippines, India, Bangladesh, Myanmar, Turkey, and others have seized this opportunity. 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' (Allied Market Research, 2023). Again, 'tentative size of global small ship building market size is USD 20 billion' (Business Research Company, 2021). '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.



Source: Research and Market, 2021-2030 Report

Figure 5: Forecast of Global Shipbuilding Market with CAGR from 2021 to 2026

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 future.

Global renowned and bigger shipyards have less interest on this niche market. In near future, the world will need few thousand of merchant ships, where mostly are small to medium (Business Research Company, 2021). The niche market of small size container, tanker, cargo, multipurpose and special types of ships with 3000-10000 DWT is suitable for local shipbuilding industry. Bangladesh has all potentials and capacity to capture this market with competitive price. Again, we need to develop our own merchant fleet to maintain export and import of cargo, oil, energy and passenger. So, it is another niche market for us. The sea area of Bangladesh has enormous importance. Constant presence of BN and BCG are imperative for keeping the sea lanes of communication secure, and maintaining the sovereign rights over vast sea areas and economic benefit of the country. As a result, both in peace and conflict, a large number of military ships are necessary for operational responsibilities. This is an additional niche market suitable for the three public shipyards operated by BN.

Many countries like Vietnam, Philippine, Indonesia, India, Australia, etc. are also trying to capture the surplus and niche shipbuilding market and that is a viable threat for local shipbuilding. As per market analysis, new ship demand or Compound Annual Growth Rate (CAGR) is increasing at a rate of around 4%. Theoretically there is formidable threat and risk for the newcomers and investors. Present geopolitical situation and financial crisis may increase demand for low-cost ships. This is an opportunity and is favourable for local shipbuilding. During the discussion with focus group, few experts have stated that, Bangladesh is the suitable for small and medium size shipbuilding. They viewed that Bangladesh have the opportunity to capture a handsome share of 3000-20000 DWT multipurpose, container, tanker and cargo ships market. Those small and medium niche markets will be alive in coming years. Local shipbuilding has enormous potential to expand and capture tiny global share, with few distinct weaknesses, and those need to be considered and convert into strength to flourish this sector.

### **Recommendation for Sustainable Shipbuilding of Bangladesh**

To address the current issues and future complexities, the government, marine administration, shipyards, shipowners, MET, and technological institutes must take a few steps. We must make the required preparations to meet the needs of 4IR. The policy, strategy, context and learning process in the mass and technical/MET education need to be formulated accordingly to develop the skills and knowledge for new generation. There are already few skill development

program for seafarers and shipbuilding workforce to meet the future challenges. Such programs are: communication and coordination, QHSE, adaptability and cognitive flexibility, automation and AI, digital proficiency, innovation and creativity, critical thinking, emotional intelligence, technical skills, self learning (online), data-based decision, people management and negotiation, complex problem solving skill, service orientation, etc. we have strategic vision to adopt with disruptive changes in 4IR but the main obstacle in this transformation is poor motivation of employees due to fear of losing job, unawareness and rigidity in old style of work.

Low labor cost can not be the only factor influencing the long-term development of shipbuilding. Nowadays, advanced technology can save money, and we risk losing our competitiveness if we rely solely on labor costs. In fact, by properly nurturing and exploiting our export-oriented shipbuilding industry, Bangladesh may make significant economic growth. Entrepreneurs have also confident on good prospect of local shipbuilding industry. Bangladesh is taking the advantages of its long history of maritime activity, favorable geographical location and availability of cheap workforces. 'Export oriented shipbuilding is truly a global industry. Bangladeshi-made ships of international standard are roughly 10%-30% less costly than ships made in Japan, Korea, China even Vietnam or India. Recently the opportunity of FDI has created in shipbuilding sector. Country like China, Turkey, Netherlands is showing their keen interest in this sector' (IHS Markit, 2022). 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.

Ship designer needs to be minimized the design period as well as the engineering costs for future ships. The IR 4.0 and shipbuilding 4.0 is definitely bringing changes in the world shipbuilding industry as well as other industries. Now many countries around the world are focusing on the advancement of technologies to gain positive impacts from it. We need to acknowledge the facts and take necessary steps to embrace IR 4.0 especially for our promising export-oriented shipbuilding in Bangladesh. We need to identify possible areas of improvement based on the scientific studies considering present industrial structure and future needs and requirements of shipbuilding' (BearingPoint, 2022). The public, commercial, and stakeholder sectors should work together to help this industry enhance its overall performance and become more competitive in the long run, as well as in the IR 4.0 environment. Policy planners, bureaucrats, bankers, and other stakeholders are generally less aware of local shipbuilding potential. To progress our local shipbuilding, we need to nurture this sector same as RGM.



## Conclusion

The cheapest labour force with moderate skill of Bangladesh is the main strength of local heavy industry. We have vast and young population and that is our immense opportunity to develop labor intensive heavy industry like shipbuilding. Now, good number of supporting industries are contributing as backward and forward linkage industries for shipbuilding. Additionally, there is availability of cost-effective human resources of whom a good number of skilled manpower are now working overseas. The emerging shipbuilding industry will strengthen the export diversification strategy. Very recently the opportunity of FDI has created in shipbuilding sector. Few countries like as; China, Turkey, and Netherlands are showing their keen interest to invest handsomely in this sector. So, creation of an exports shipyard zone for export new ship will definitely help to develop healthy growth of local shipbuilding. If we can utilize our resources and capitalize the opportunity, it is very much possible to achieve our goals.

High bank interest and service charges are the major obstacles to develop local shipbuilding. Additionally, shipbuilding requires guarantees to be issued by banks acceptable to foreign buyers. But local commercial banks have to obtain counter guarantees from foreign banks. Such dual expenses incur additional cost in local shipbuilding. Present global geo-political situation, Russian-Ukraine war, incoming global inflation/recession, along-with image crisis, integrity problem, bureaucratic problem, attitude of local investor, etc are consider as potential threat for the overall existence and expansion of local shipbuilding. Again, there are risks to maintain good well and build confidence to foreign buyers. Lack of corporate management culture observed in local shipyards and employees have poor job satisfaction and not motivated to organization. As a result, lack of discipline, huge absenteeism and poor turn-over of skilled manpower are common phenomenon in local shipyards. Incoming 4IR will definitely influence the whole maritime sector and new transformation will be taken place in the shipbuilding industry and that will be very crucial for developing countries.

Bangladesh government has taken few steps including drafts a shipbuilding policy for local industry, to improve the shipping and shipbuilding sector as a whole. Tax free activities for export-oriented shipyards, ease of rules for shipbuilding, imposed tax on import ship, declare some development strategy for the industry, dredging of rivers, enhanced forward and backward linkage, and negotiating with related other sectors to improve the local shipbuilding. There are opportunities to have more employment in this sector. The Country has abundance

of easily trainable work-force. We need to impart suitable training and which can elevate the quality and competency of local workforce into international standard. Moreover, in Bangladesh there is huge number of white color semi-skilled manpower is also available to join in local industry. The government, investors, business people, shipbuilders, ship owners and related stakeholders are somehow understanding that, shipbuilding is a promising sector and that could be one of the alternative sectors in replace of RGM in near future.

## References

- Alam, M. K. (2004). Bangladesh's Maritime Challenges in the 21st Century (Vol. illustrated edition). Pathak Shamabesh.
- Allied Market Research. (2023). <https://www.alliedmarketresearch.com/>. Retrieved January 2023, from <https://www.alliedmarketresearch.com/>: <https://www.alliedmarketresearch.com/shipbuilding-market-A08511>.
- BearingPoint. (2022, January). Industry 4.0 and IoT Insight. Retrieved 2023 March, from [www.bearingpoint.com](http://www.bearingpoint.com): <https://www.bearingpoint.com/en/insights-events/insights/industry-4-0-and-iot-insight/>.
- Business Research Company. (2021, January). <https://menafn.com/>. Retrieved January 2023, from <https://menafn.com/>: <https://menafn.com/1102455116/The-Shipbuilding-Industry-Takes-On-3D-Printing-Technology-As-A-Latest-Trend>.
- Clarksons Research. (2021, June). Shipping Review Outlook. Retrieved January 2023, from [www.hellenicshippingnews.com](http://www.hellenicshippingnews.com): <https://www.hellenicshippingnews.com/clarksons-research-offshore-review-outlook-signs-of-improvement/>.
- Hossain, K. A. (2010, January 10). Evaluation of Potential, Prospect and Challenge of Bangladeshi Shipbuilding in Light of Global Contest. Dhaka, Dhaka, Bangladesh: BUET, MSc Thesis Paper.
- Hossain, K. A. (2018, April 10). Analysis of important steering factors which give success to global shipbuilding leaders. *Recent Advancement of Petrochemical Science*, 4(5).
- Hossain, K. A. (2018). Proposed viable ship recycling process for South East Asian recycling yards specially for Bangladesh. *Procedia Engineering*.
- Hossain, K. A. (2021, December 16). Strength Weakness Opportunity, Threat (SWOT) analysis of Bangladesh shipbuilding industry. Technical Paper: NAME, MIST.

- Hossain, K. A., & MNG, Z. (2018, January). SWOT Analysis of China Shipbuilding Industry by Third Eyes. 4(2), 1-10.
- Hossain, K. A., & Zakaria, N. (2017, July). A Study on Global Shipbuilding Growth, Trend and Future Forecast. *Procedia Engineering*, 194, 247-253.
- Hossain, K. A., Zakaria, N. M., & Islam, M. S. (2010). SWOT analysis of shipbuilding industries in Bangladesh and its challenges to become potential ship exporting nation. *Journal of Ship Technology India*, 6(2).
- Hossain, K. A. (2023). Evaluation of Global and Local Shipbuilding Market. *Science, Technology & Public Policy*, 7(2), 52-68.
- IHS Markit. (2022, February). Maritime and trade research and analysis. Retrieved February 2023, from <https://ihsmarkit.com/research-analysis/shipbuilding>.
- Kobyliński, L. (2018). Smart ships: autonomous or remote controlled? *Scientific Journals of the Maritime University of Szczecin*, 28-34.
- Noordstrand, A. (2018, March). Experience with Robotic Underwater Hull Cleaning in Dutch Ports. 3rd Hull Performance and Insight Conference, 4-9.
- OECD. (2011, March 11). International trade and capital movements in OECD. Retrieved July 2022, from <http://www.theworldeconomy.org/advances>: <http://www.theworldeconomy.org/advances>.
- OECD. (2021, May). [www.oecd.org](http://www.oecd.org). Retrieved from <https://www.oecd.org/sti/ind/shipbuilding-market-developments>: <https://www.oecd.org/sti/ind/shipbuilding-market-developments>.
- Reni, A., Hidayat, S., Bhawika, G. W., Ratnawati, E., & Nguyen, P. T. (2020). Maritime Technology and the Industrial Revolution. *Journal of Environmental Treatment Techniques*, 8(1), 210-213.
- Research and Market. (2021-2030 Report). Shipbuilding market by type and end use: Global opportunity analysis and industry forecast. Retrieved March 2023, from <https://www.researchandmarkets.com/>: <https://www.researchandmarkets.com/reports/5548405/shipbuilding-market-by-type-and-end-use-global>.
- Researchgate. (2022, February). <https://www.researchgate.net/>. Retrieved 2023 February, from <https://www.researchgate.net/>: [https://www.researchgate.net/figure/Comparison-of-Japanes-shipbuilding-productivity-and-labor-costs-2-Slika-1-Usporedba\\_fig1\\_277843837](https://www.researchgate.net/figure/Comparison-of-Japanes-shipbuilding-productivity-and-labor-costs-2-Slika-1-Usporedba_fig1_277843837).

Stopford, M. (2009). *Maritime Economics* (Vol. 3rd Edition). New York, USA: Routledge.

UNCTAD. (2021). Trade and Development Report 2021.

Zou, L. (2009). Development-oriented Finance and Economy in China: A Historical Review and Prognostic Assesment. *Indiana*, USA: AuthorHouse; Illustrated edition.