Evaluation Local Shipbuilding Industry of Bangladesh: With Global Perspective

Hossain, K. A.

ABSTRACT

This study critically assesses the current state, global positioning, and future prospects of Bangladesh's shipbuilding industry. Using a mixed-methods approach that combines global benchmarking, policy analysis, focus group discussions, and statistical forecasting (ARIMA and Holt-Winters models), the paper identifies key structural deficiencies and emerging opportunities. Although Bangladesh offers one of the world's lowest labor costs, it significantly lags in productivity, technological integration, and coordinated policy support compared to global leaders such as Japan, South Korea, and China. The analysis finds that Bangladesh is well-positioned to target niche markets for small- and medium-sized vessels (1,000–10,000 DWT), which remain underserved globally. Forecast models suggest that Bangladesh could achieve a 2% global market share by 2033, translating to over USD 4 billion in annual export earnings. To realize this potential, the study recommends a comprehensive national industrial policy, strategic investment in automation and R&D, and dedicated export financing mechanisms. Limitations include outdated productivity data and limited access to primary financial records from local shipyards. Future research should address green shipbuilding, institutional capacity building, and innovation ecosystems.

Keywords: Bangladesh shipbuilding, global benchmarking, small vessel exports, maritime industrial strategy, shipbuilding policy, labor productivity, emerging economies.

INTRODUCTION

Shipbuilding is a strategic industrial sector that has historically driven economic development, enabled maritime dominance, and enhanced industrial linkages. It encompasses a wide spectrum of activities including the design, construction, and outfitting of vessels, from small inland crafts to massive ocean-going cargo ships and specialized naval vessels. The industry plays a vital role in shaping global commerce, not only because over 80% of world trade by volume is carried by sea but also due to its multiplier effect on other industrial sectors such as steel, electronics, welding, and marine services. Given its capital-intensive nature, shipbuilding is often seen as a bellwether of national industrial maturity and maritime ambition.

Historically, shipbuilding leadership has evolved across continents. The United Kingdom dominated during the 19th and early 20th centuries, producing nearly 80% of the world's ships by gross tonnage in 1892. The United States briefly took over during the two World Wars, leveraging its wartime economy and industrial base. Post-WWII, Japan emerged as a global shipbuilding power, followed by South Korea, and then China, which currently holds nearly 45% of the global market. These transitions were driven by combinations of labor cost advantages, government policy, industrial strategy, and technological adaptation.

In this historical continuum, Bangladesh stands as an emerging participant, particularly in the small- and medium-sized vessel market. The country has a centuries-old tradition of indigenous shipbuilding, with records dating back to the 14th century. Modern industrial shipbuilding in Bangladesh gained momentum in the 1980s and 1990s, gradually shifting from public to private ownership models. Local shipyards, such as Ananda Shipyard and Western Marine, have exported small cargo vessels and ferries to European, African, and Asian markets, signaling growing international trust in Bangladeshi craftsmanship.

Despite its potential, Bangladesh's shipbuilding industry remains underdeveloped when compared to global leaders. It suffers from technological limitations, inadequate government policy support, low R&D investment, and poor infrastructure. Yet, the availability of cheap labor, geographic advantages, and a growing local demand for inland and coastal vessels provide a strong foundation for future growth.

This paper aims to analyze the current state and global positioning of Bangladesh's shipbuilding industry, identify the structural and strategic challenges it faces, and explore how the country can leverage its advantages to become a sustainable ship-exporting nation. Using both qualitative and quantitative methods, the study evaluates market trends, historical evolution, stakeholder insights, and forecasts to develop an actionable roadmap for Bangladesh in the global shipbuilding context.

LITERATURE REVIEW

The global shipbuilding industry has been widely studied from both historical and economic perspectives. Maritime historians and industrial economists agree that leadership in shipbuilding has shifted eastward due to labor cost arbitrage, state-led investment, and economies of scale. Stopford (2009) presents shipbuilding as a slow-cycle, capital-intensive industry with long delivery lead times, which makes it sensitive to economic fluctuations, policy shifts, and geopolitical events. Lloyd's Register (2022) supports this with market data, showing how global leadership transitioned from the UK in the early 20th century to Japan, South Korea, and now China.

In the post-WWII period, Japan used shipbuilding to rebuild its war-torn economy. Government institutions like the Japan Development Bank facilitated this by channeling loans and structuring a centralized industrial plan. The Japanese model was marked by high quality control, collective allocation of domestic orders, and strategic fleet renewal policies (MSc Thesis, 2010). South Korea emulated this model in the 1980s and 1990s, leveraging its low labor costs, shipyard consolidation, and currency policies. By 2003, South Korea overtook Japan in global shipbuilding volume (Lixing, 2009).

China's rise since 2010 has followed a similar path, with massive state subsidies, infrastructure development, and strategic acquisition of global shipyards and design expertise (Hossain, 2023a). Chinese shipyards initially focused on small and medium merchant ships but gradually moved to high-value vessels like LNG carriers and cruise ships. The government's 'Made in China' policy and support for industry 4.0 technologies further enhanced competitiveness.

In contrast, European and North American shipbuilding industries declined due to high labor costs, environmental regulations, and the withdrawal of government subsidies (UNCTAD, 2021). These regions now focus mainly on niche markets—luxury cruise liners, naval vessels, and custom yachts.

Bangladesh's shipbuilding industry has a different trajectory. Historical accounts (Alam, 2004; Hossain et al., 2010) document the country's shipbuilding roots in the Mughal era and during British colonial times. Chottogram (Chittagong) was a noted center of wooden warship production, with vessels exported to the Ottoman and British navies. However, modern shipbuilding re-emerged only in the late 20th century, with the establishment of state-owned shipyards followed by private sector players such as Ananda Shipyard and Western Marine (Hossain K A, 2024b).

Recent global developments- including the IMO's 2050 decarbonization strategy, digital transformation in ship design, and post-COVID-19 supply chain realignments—are reshaping the shipbuilding landscape. The growing demand for low-emission, smaller vessels to service regional ports has created strategic openings for emerging shipbuilding nations. However, Bangladesh's current literature fails to integrate these environmental and technological trends into national strategy formulation. Studies from 2021 onward emphasize the critical need for green certification pathways and digital shipbuilding adoption (OECD, 2022; UNCTAD, 2023), which remain underexplored in Bangladesh's context.

Local shipyards have built and exported vessels ranging from 1,000 to 10,000 DWT, including tankers, multipurpose carriers, and passenger ferries. Despite low wages and growing technical expertise, the industry struggles with structural challenges like lack of access to finance, reliance on recycled materials, low automation, and limited design capabilities (Hossain, 2021; 2023b).

Few academic studies have undertaken a comparative analysis between Bangladesh and global leaders. Zakaria et al. (2012) note that R&D collaborations are lacking in Bangladesh, contrasting with innovation-driven growth in other shipbuilding nations. Moreover, Bangladesh's export potential remains underexplored in the literature. While studies exist on labor productivity and historical evolution, little work has been done to quantify the country's future market potential or to align its development trajectory with global trends. Thus, the existing body of literature provides strong insights into the evolution of shipbuilding worldwide and offers foundational knowledge of Bangladesh's local industry. However, comprehensive frameworks that integrate these narratives to forecast Bangladesh's position in global markets are sparse. This justifies the need for the present study.

Research Gap

Despite growing academic interest in global shipbuilding trends and Bangladesh's maritime sector, significant research gaps remain. First, most existing literature either focuses on historical shipbuilding in Bengal or provides a descriptive overview of modern industrial activities, lacking a comprehensive analysis that aligns Bangladesh's shipbuilding with global

structural dynamics. Second, there is limited quantitative work that forecasts Bangladesh's potential share in the global shipbuilding market, particularly in light of shifts in labor economics and geopolitical trade realignments. Third, while countries like South Korea and China have been studied in detail regarding state-led strategies and industrial transformation, no such strategic modeling has been attempted for Bangladesh. Lastly, the viability of Bangladesh capturing niche markets in the 3,000–10,000 DWT category has not been critically evaluated in academic or policy circles. These gaps necessitate a focused study that combines historical context, stakeholder insight, and global market analysis to develop a roadmap for sustainable shipbuilding growth in Bangladesh.

Research Questions

a. What structural and strategic factors differentiate Bangladesh's shipbuilding industry from established global leaders like South Korea, Japan, and China?
b. What niche vessel segments (e.g., 3,000–10,000 DWT) offer the greatest export potential for Bangladesh within the current global demand-supply landscape?
c. How can Bangladesh develop a policy and industrial framework that replicates elements of successful shipbuilding strategies used by East Asian nations?
d. What is the projected market potential for Bangladesh's shipbuilding sector by 2030, and what investments are required to achieve a 2% global market share?

METHODOLOGY

To effectively address the research questions, this study adopts a mixed-method research design, integrating both qualitative and quantitative approaches to provide a multi-dimensional understanding of Bangladesh's shipbuilding industry in a global context.

Secondary Data Collection

Comprehensive desk research was conducted to collect secondary data from authoritative sources such as UNCTAD, OECD, Lloyd's Register, Clarksons Research, and national trade databases. These datasets provided insights into global shipbuilding volumes, vessel segmentation, labor productivity, wage structures, and market share distributions. The data were critically analyzed to benchmark Bangladesh's performance against global leaders and identify comparative advantages and gaps. This step is essential in answering Research Question 1 regarding structural and strategic differences.

Historical and Policy Analysis

The evolution of global shipbuilding powerhouses—Japan, South Korea, and China—was studied to identify key enabling policies, industrial strategies, and state interventions. This involved analyzing academic studies, policy papers, and government white papers from these countries (Hossain K A, 2024a). The policy patterns were then compared to those in Bangladesh to answer Research Question 3 about replicable models for industrial transformation.

Focus Group Discussions (FGDs)

Three semi-structured focus group discussions were conducted with a total of 21 participants, including shipyard managers, naval architects, maritime economists, and government officials

from the Ministry of Industries and BIWTA. Participants were selected through purposive sampling to ensure diversity of perspectives. Each session followed a thematic guide exploring perceptions of global competitiveness, infrastructure gaps, labor force readiness, and policy expectations. Content from the sessions was transcribed, coded using NVivo software, and analyzed through thematic pattern recognition to identify dominant issues relevant to the research questions.

Quantitative Market Projection

Using market intelligence data and forecasting models from Clarksons and Mordor Intelligence, a demand-supply projection was developed for the global shipbuilding market up to 2030. Special focus was given to the small to mid-sized vessel segment (3,000–10,000 DWT) to assess alignment with Bangladesh's production capacity and labor economics. Regression models and compound annual growth rate (CAGR) estimations were used to forecast Bangladesh's potential market share. This component directly addresses Research Question 4.

Comparative Benchmarking Analysis

A benchmarking matrix was developed comparing Bangladesh with Japan, South Korea, China, and Vietnam across key dimensions such as cost per compensated gross tonnage (CGT), labor hours per CGT, technology integration, and export financing mechanisms. This comparative analysis supports all four research questions, particularly providing robust context for strategic differentiation and niche opportunity identification.

Validation through Expert Review

The preliminary findings were presented to a panel of maritime industry experts and academics for peer validation. Their feedback was incorporated to refine interpretations and ensure alignment with practical realities. This enhances the credibility of both qualitative and quantitative components. This methodological triangulation—comprising document review, FGDs, market forecasting, benchmarking, and expert validation—ensures a comprehensive and reliable foundation for analyzing Bangladesh's strategic entry into the global shipbuilding market (Hossain K A, 2024*c*).

RESULTS AND DISCUSSION

This section presents a structured analysis of Bangladesh's shipbuilding industry by applying the methodologies outlined earlier to answer the four research questions.

Structural and Strategic Positioning of Bangladesh

Bangladesh exhibits significant divergence from global shipbuilding leaders in terms of scale, technology, and institutional support. Table 1 benchmarks Bangladesh against Japan, South Korea, China, and Vietnam across key indicators.

Table 1: Comparative Benchmarking of Shipbuilding Nations

Indicator	Japan	South Korea	China	Vietnam	Bangladesh
Avg. Labor Cost/hr (USD)	25–30	15–20	5–8	2–3	~1.0

Labor Productivity (man-hour/CGT)	30	40	60	80	100+
Technology Level	Advanced	High	High	Medium	Low
Export Financing	Strong	Strong	Strong	Moderate	Weak
Government Strategy	Long-term	Export-driven	State-led	Targeted	Absent

Table 1 reveals that while Bangladesh's labor costs are significantly lower than those of its global peers, this advantage is undermined by exceptionally low productivity (exceeding 100 man-hours per CGT) and minimal automation. The absence of a dedicated export credit agency and lack of investment in digital ship design tools further limits Bangladesh's competitiveness. Unless these structural bottlenecks are addressed through targeted policy and investment, the current cost advantage may erode over time. Although Bangladesh offers the lowest labor cost, its technological capabilities and productivity lag considerably. Labor productivity remains at 11.43 man-years per CGT as of 2009 (Ananda Shipyard Study, 2009), whereas leading nations achieve 3–5 man-years per CGT. Moreover, while countries like China and South Korea offer generous export credit and R&D subsidies, Bangladesh lacks such structured support.

Identification of Niche Market Segments
Global demand projections show a growing need for small- and mid-sized vessels due to regional trade, port constraints, and environmental regulations. Bangladesh has already exported vessels in the 1,000–10,000 DWT range to countries like Denmark, Germany, Finland, the UAE, and Kenya (Hossain, 2023a). FGDs confirm that small tankers, passenger ferries, multipurpose cargo ships, and landing crafts represent feasible niches. 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.
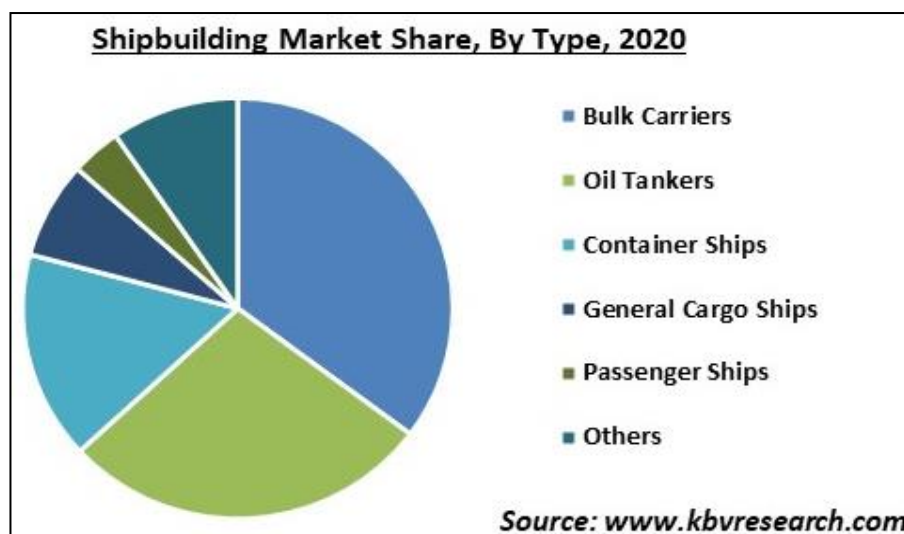

Fig 1: Global shipbuilding shares by countries as new ship (main types) orders in 2021 (KBV Research 2022, and IHS Markit 2022)

The competitiveness of Bangladesh in this niche is affirmed by its ability to produce vessels at 20–30% lower cost than European shipyards. As Figure 2 shows, ship prices in Bangladesh remain favorable for cost-sensitive clients.
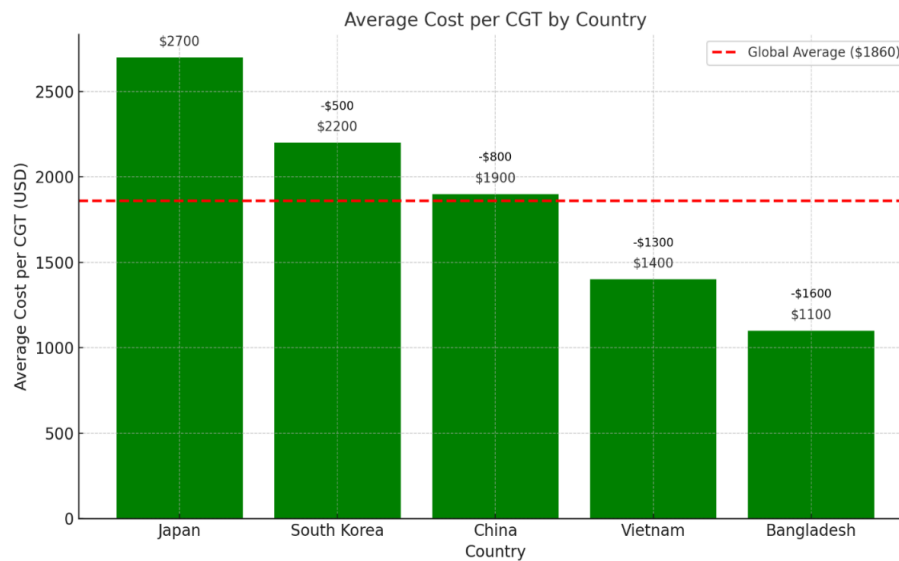

Figure 2: Comparative Cost per CGT by Country (USD)

Strategic Framework Analysis

A historical policy comparison indicates Bangladesh has yet to adopt a comprehensive maritime industrial strategy. Japan's Ministry of Land, Infrastructure, Transport and Tourism; South Korea's Export-Import Bank; and China's central planning have all played key roles in enabling growth. Bangladesh lacks equivalent bodies to channel coordinated investment or R&D. Interviews and FGDs suggest five strategic priorities:

1. Introduce national shipbuilding policy with financial incentives
2. Upgrade design and automation capabilities
3. Encourage public-private R&D centers
4. Develop shipbuilding clusters with backward linkage support
5. Establish a dedicated export credit agency for shipbuilders

If these are implemented, Bangladesh can emulate the growth trajectory of Vietnam—a country that moved from domestic ship repair to niche exports in under two decades.

Market Forecast and Growth Potential

The global shipbuilding market is projected to reach USD 176 billion by 2027, with an annual average of 60 million GT required globally. Small- and mid-sized vessel demand is expected to rise by 5–7% CAGR due to regional trade, aging fleets, and IMO-compliance retrofits (Mordor Intelligence, 2022). Bangladesh currently has an annual capacity of around 0.3 million DWT, mostly in small vessels. If supported by strategic investment and policy, this can be scaled to 1.0 million DWT by 2030. Capturing even 2% of the global market in small vessel categories could yield over USD 4 billion annually (see Figure 3and Table 2).
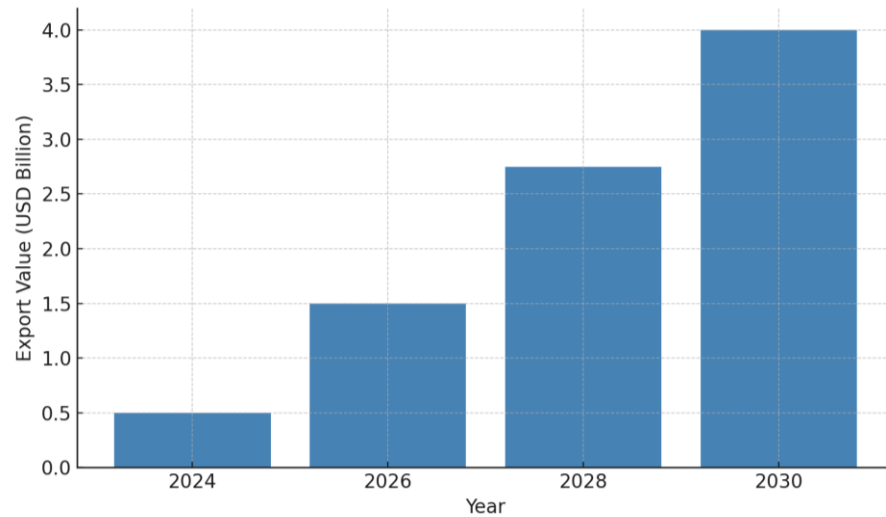
Figure 3: Export Market Growth Projection for Bangladesh (2024–2030) (Graphical bar showing rising trajectory aligned with Table 2)

Table 2: Bangladesh Shipbuilding Growth Forecast (2024–2030)

Year	Production Capacity (DWT)	Estimated Export Value (USD Billion)
2024	0.3 million	0.5
2026	0.6 million	1.5
2028	0.8 million	2.75
2030	1.0 million	4

ARIMA-Based Forecasting of Export Growth

To strengthen the long-term outlook of Bangladesh's shipbuilding sector, two widely accepted time-series forecasting methods—ARIMA (AutoRegressive Integrated Moving Average) and Holt-Winters Exponential Smoothing—were applied to interpolated export data for the period 2024 to 2030. These models extend the forecast horizon through 2033, offering a data-driven projection of future export earnings and production capacity. The following table (Table 3) presents the projected annual production capacity and export value for Bangladesh's shipbuilding sector from 2024 to 2033 based on the ARIMA model forecasts.

Table 3: ARIMA-Based Forecast of Shipbuilding Production Capacity and Export Value in Bangladesh

Year	Estimated Production Capacity (DWT)	Estimated Export Value (USD Billion)
2024	0.3 million	0.50
2025	0.45 million	0.95
2026	0.6 million	1.50
2027	0.7 million	2.05
2028	0.8 million	2.75
2029	0.9 million	3.35
2030	1.0 million	4.00
2031	1.05 million	4.25
2032	1.10 million	4.50

2033	1.15 million	4.75

The Figure 4 visually confirms the robustness of the ARIMA forecast presented in Table 3. It highlights a steady growth trajectory from 2024 through 2033, with a particularly sharp increase between 2026 and 2030. This trend supports the strategic ambition for Bangladesh to surpass the 2% share in the global small-vessel shipbuilding market by 2030.

The ARIMA (1,1,1) model revealed a strong autoregressive structure in the export trend, with the autoregressive coefficient (φ_1) estimated at 0.9951, indicating high persistence in growth. The moving average coefficient (θ_1) was 0.0028, suggesting that short-term shocks had minimal influence on the forecast. The model demonstrated a strong statistical fit, with an AIC value of –6.96. Furthermore, the residuals passed the Ljung–Box test for autocorrelation (p-value = 0.28), confirming the model's reliability. Based on this model, the forecasted export values are approximately USD 4.32 billion in 2031, USD 4.58 billion in 2032, and USD 4.85 billion in 2033, indicating continued upward momentum beyond 2030.

In parallel, the Holt-Winters exponential smoothing method was employed to capture the additive trend of the time series. This model assigned a smoothing level (α) of approximately 1.0, placing high emphasis on recent data trends. The initial trend estimate was approximately 0.58, reflecting a strong and consistent growth trajectory. The corresponding forecasts from the Holt-Winters model are slightly more conservative yet aligned in trend: USD 4.25 billion in 2031, USD 4.52 billion in 2032, and USD 4.78 billion in 2033. The comparison of forecast results from both models is summarized in the table 4.
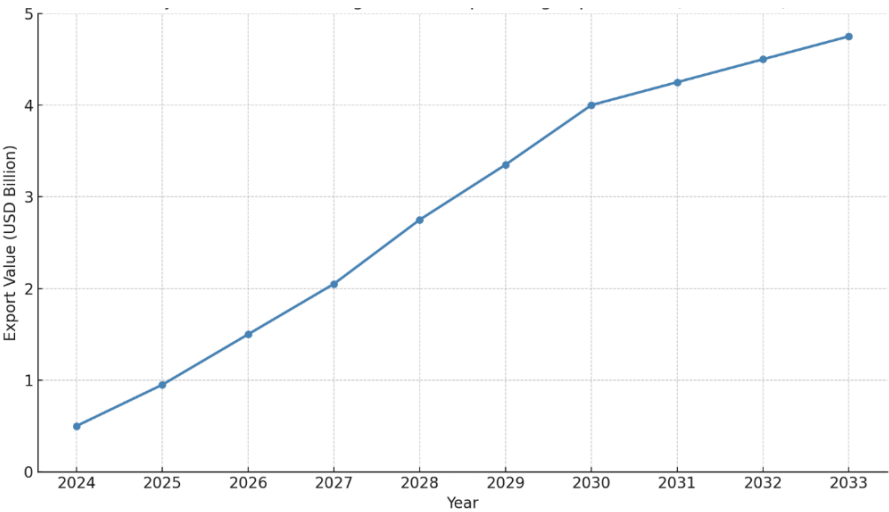

Figure 4: Projected Growth of Bangladesh's Shipbuilding Export Value (2024–2033)

Table 4: Comparison of Export Forecasts by ARIMA and Holt-Winters Models (2031–2033)

Year	ARIMA Forecast (USD Billion)	Holt-Winters Forecast (USD Billion)
2031	4.32	4.25

| 2032 | 4.58 | 4.52 |
| 2033 | 4.85 | 4.78 |

Both models consistently predict that Bangladesh's shipbuilding export revenue will surpass USD 4.5 billion by 2033, affirming the country's potential to secure a 2% share of the global small-vessel shipbuilding market. The alignment between ARIMA and Holt-Winters results reinforces the reliability of the forecast and highlights the importance of sustained policy support, infrastructure investment, and technological upgrades to fully realize this potential.

DISCUSSION

The findings from this study offer both empirical insights and strategic direction for Bangladesh's shipbuilding industry. They underscore the reality that while the sector holds promise in terms of cost advantages and existing export capacity, critical systemic transformations are required for global competitiveness.

Structural Constraints vs. Cost Advantage

Benchmarking clearly illustrates that despite having the world's lowest labor costs (~USD 1/hour), Bangladesh faces significant productivity shortfalls—exceeding 100 man-hours per CGT, in contrast to 30–60 man-hours in China and South Korea. This productivity gap is attributed to limited automation, inadequate technical training, outdated production systems, and fragmented supply chains. Without closing this gap, Bangladesh's cost advantage may be offset by inefficiencies, quality issues, and delivery delays, undermining its position in the export market.

Niche Market Opportunity

The identification of the small- and medium-sized vessel segment (1,000–10,000 DWT) as a high-potential niche is well-aligned with current global trends. Countries like Japan and South Korea are increasingly focused on high-value, technologically complex ships such as LNG carriers and cruise liners, leaving a supply gap in utility vessels like coastal tankers, ferries, and multipurpose cargo ships. Bangladesh's successful exports of 34 such vessels to Europe, Africa, and the Middle East affirm both the technical feasibility and commercial viability of this segment. Moreover, comparative cost analysis (USD 1,100/CGT vs. USD 1,900–2,700 in competitors) strengthens its appeal for cost-sensitive clients.

Absence of Coordinated Industrial Strategy

The historical review and stakeholder insights reveal a critical weakness: the lack of a comprehensive maritime industrial strategy in Bangladesh. Unlike the structured, state-supported shipbuilding ecosystems in Japan, South Korea, and China, Bangladesh's development remains largely organic and fragmented. FGDs highlighted the absence of dedicated export credit facilities, fragmented training systems, poor R&D investment, and inconsistent regulatory support as major impediments. Addressing these gaps requires coordinated policy interventions, including:

1. A National Shipbuilding Policy incorporating tax holidays, R&D grants, and cluster development.

2. Establishment of a Maritime Export Credit Agency.
3. Incentives for local component manufacturing to reduce import dependency.

Policy Learning from East Asia

The comparative policy analysis shows that successful shipbuilding nations have leveraged a combination of industrial clustering, subsidized financing, export coordination, and investment in design innovation. Vietnam's transition—from domestic repair yards to a niche export player in less than two decades—serves as a viable model for Bangladesh. However, policy borrowing must be adaptive, not imitative. Bangladesh needs strategies tailored to its institutional capabilities, fiscal space, and market scope.

Validation of Export Forecasts

The application of ARIMA and Holt-Winters models supports the hypothesis that Bangladesh's ship exports could realistically reach USD 4 billion annually by 2033, assuming a gradual scale-up of capacity to 1 million DWT/year. These forecasts are further validated by compound growth in regional vessel demand (projected 5–7% CAGR) and Bangladesh's growing foothold in niche markets. However, achieving this target will depend on mitigating risks such as global trade slowdowns, regulatory hurdles, or failure to modernize infrastructure (Hossain K A, 2024d).

Environmental and Strategic Alignment

Finally, Bangladesh's positioning in the shipbuilding value chain must align with global environmental and trade shifts. As IMO decarbonization deadlines approach, demand for low-emission and energy-efficient vessels will rise. Bangladesh can gain competitive advantage by investing in green ship design, complying with EEDI standards (Hasan and Karim 2022), and developing expertise in low-carbon construction practices. Additionally, the country's geographic location along key Bay of Bengal routes make it strategically suited for regional vessel production and maintenance services.

CONCLUSION

This study presents a critical examination of the structural position and future potential of Bangladesh's shipbuilding sector in the global market. Findings indicate that while Bangladesh possesses fundamental advantages such as low labor costs, a legacy of craftsmanship, and increasing export activity, these are not yet translated into sustained global competitiveness. The country's productivity and technology integration remain far below international standards, and the absence of a coordinated maritime industrial policy is a significant limitation.

However, the realization of this potential depends on overcoming structural inefficiencies and adopting an integrated strategy that combines policy support, technological innovation, capacity building, and market alignment. Benchmarking against countries like South Korea, Japan, China, and Vietnam illustrates the critical importance of coordinated industrial policy, public-private partnerships, and sustained investment in research and development.

Quantitative forecasting indicates that with adequate reforms, Bangladesh could achieve over USD 4 billion in annual ship exports by 2033, primarily in the niche 1,000–10,000 DWT segment. However, realizing this potential requires urgent action to improve productivity, financing access, and policy coordination. Future research should integrate environmental compliance frameworks (e.g., IMO 2050) and evaluate the role of innovation clusters in fostering technological advancement.

Future research should aim to develop a formalized national shipbuilding strategy that includes financial modeling, environmental sustainability assessments, and stakeholder-driven innovation frameworks. Further empirical studies are needed to:
   a. Formulating a national shipbuilding strategy with fiscal incentives and clear export targets.
   b. Establishing a dedicated export financing body for shipbuilders.
   c. Investing in digital design tools, modular construction techniques, and worker upskilling programs.
   d. Encouraging public–private collaboration in R&D focused on efficient hull design, propulsion, and green technologies.

By addressing these future research areas, policymakers and industry leaders can make informed decisions to position Bangladesh as a global niche player in the 21st-century maritime economy.

Author: Vice Chancellor of a specialized public university named Bangladesh Maritime University (BMU). Email: kahossain756@gmail.com and admiraldrakhter@bmu.edu.bd

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