



SHIP RECYCLING PROSPECTS IN BANGLADESH

Kh. Akhter Hossain, K. Shahriar Iqbal and N. M. Golam Zakaria

Department of Naval Architecture and Marine Engineering,
Bangladesh University of Engineering and Technology, Dhaka, Bangladesh
E-mail: ksiqbal@yahoo.com

ABSTRACT

This paper deals with the recent status of ship-recycling industry in Bangladesh which has received considerable attention during last two decades. The social and environmental impacts of the ship recycling in Bangladesh have also been covered. Considering its positive economical contribution as well as some negative effect like lack of occupational health and safety standard, the search has made to address whether Bangladesh should continue supporting this business on their soil. Some viable recommendations are made at the conclusion.

Keywords: Ship breaking, ship dismantling, industrial safety, safety hazards, environmental hazards.

1. INTRODUCTION

Ship recycling is the process of dismantling old ship to recover steel scrap and other materials. This industry had begun in Bangladesh in 1960, when a cargo vessel named M D Alpine of Greek was affected by violent storm and beached near sea shore of Fauzdarhat at Chittagong. The ship had to remain there for a long time. In 1965, the vessel was scrapped by Chittagong Steel House. In 1974, Al Abbas, a salvaged Pakistan Navy vessel, which was sunk during liberation war, was scrapped by Karnafully Metal Works and since then commercial shipbreaking began in Bangladesh. Finally in the year 1984, Bangladesh appears as a major ship recycling nation in the world [1].

Until 1960s, ship breaking/recycling activity was considered as a highly mechanized operation that was concentrated in industrialized countries- mainly USA, UK, Germany and Italy. The UK was accounted for 50% of the industry-Scotland ran the largest ship breaking operation in the world. During the 1960s and 70s, ship breaking activities migrated to semi-industrialized countries like Spain, Turkey and Taiwan, mainly for the availability of cheap labour and the existence of re-rolling steel market [2]. But from early 1980s, ship breaking is no more cost-effective in those countries and so to maximize profits ship owner's sent their vessels to the scrap yards of India, China, Pakistan, Bangladesh, the Philippines and Vietnam, where health and safety standards are

minimal and workers are desperate for work. Bangladeshi industrialists also took the opportunities of this lucrative business which resulted importing more and more ship to Bangladesh. Thus, within a short period, Bangladesh established herself as a leading ship recycling nation in the international market.

Ship-recycling industries have been located along the coastal belt of Bangladesh. The industry is providing the country's main source of steel and generates large amounts of revenues for various Govt. authorities. There are more than 50,000 people directly involved in the industry. This industry is currently supplying 60% of the raw materials for the local steel industry. Table 1 shows the steel market scenario of Bangladesh related to the ship recycling industry [3]. It has also a significant contribution to the local shipbuilding industry. On the other hand, frequent accident due to explosion, inhuman working condition, death, fatal injuries and permanent disabilities also brought this industry to the focus of attention. That is why we have to consider all economic benefit from the industry and at the same time the social and environmental costs [4] should also be taken into account.

This paper highlighted some of the relevant aspects of current ship-recycling industry in Bangladesh. At first an overview of the present ship breaking industry in Bangladesh has been depicted through studying its working condition and economic contribution. Based on data collected from the field survey, contribution

of each component from dismantled ship has been identified. Social and economical costs have been described. Some recommendation regarding safety aspect and OSH have also been put forward in line with the study.

Table 1: Yearly statistics of steel market in Bangladesh

Steel consumption	5 million MT
Steel production	2.5 m MT
Scrap steel from ship recycling yard	Up to 1.5 m MT (30% of total consumption)
Scrap steel contribution to steel production as raw material	60%
Number of re-rolling mills	About 350
Scrap yards	120 (Active 80)
Estimated no. of direct workers	50000

2. DATA COLLECTION AND ANALYSIS

Data collection through field survey was not easy as these industries are very restricted for common people. However, the authors managed to convince some of the owners of ship breaking yards to extend their help for this study. Visiting some renowned ship breaking yards, the working conditions were observed, physical data was collected and analyzed to understand the real life scenario. Since a good database on such industry was not available, data was also collected from various print media, NGO reports, private and government organizations.

3. SHIP-RECYCLING INDUSTRY IN BANGLADESH

Ship-recycling industries have been located along the coastal belt of Bangladesh, from Bahatiary to Barwalia at Sitakund. There are more than 100 registered ship-recycling yards located in this area. The industry is providing the country’s main source of steel and generates large amounts of revenues for various Govt. authorities. There are more than 50,000 people directly involved in this industry, and more than 100,000 people are involved indirectly. It is currently supplying substantial portions of the raw materials for steel production. It is also contributing to the local shipbuilding through supplying used machineries and materials.

The beaching method widely applied in the local ship breaking is unique of this kind. This method, with flat muddy land and huge labour force, replaced the demand of expensive and heavy infrastructure, which is required for pulling and docking the ship. In this beaching method, the ship is sailed with its

maximum speed using its own power during the high tide and forced to be beached over the flat muddy land where it is dismantled to small parts using semi-skilled and unskilled labour during low tide. Then the dismantled parts are pulled to the dry shore area using electric winch and labour force.

Gas cutting is widely used to make relatively small pieces from the steel structure. Usually no study is carried out to follow any order of which parts should be separated first and which should be the next. Minimum knowledge of safety is used in this process. So, sometimes this method of inhuman working condition leads to frequent accidents due to explosion, death, fatal injuries and permanent disabilities. That is why, apart from economic benefit from this industry, the social and environmental costs demand huge attention for further development of this industry.

It is not a miracle that makes Bangladesh a paradise of ship recycling industry. There are few distinct reasons for the development of ship recycling industry in Bangladesh:

- Availability of long beach made of soft sand & muddy land
- Perfect low slope for beaching
- Large tidal difference of water depth
- Stable weather conditions
- Abundance, availability and low cost of labor
- Low level of environmental awareness and moderate enforcement of laws
- Possibility of reusing of almost 100% scrap materials.
- High demand of goods recovered from scrap ships

Again there are a few additional definite reasons for choosing the present location at Chittagong (Fauzdarhat to Kumira), for ship recycling industry in Bangladesh, which are,

- Availability of a locality to support a heavy industry
- Availability of linkage industries within a reachable distance
- Having direct road communication with linkage industries
- Non-existence of any sensitive area around

4. PERFORMANCE OF SHIP RECYCLING INDUSTRY IN BANGLADESH

Though the ship breaking in Bangladesh started in sixties, commercially it started in late seventies. The past data of ship recycling showed that Bangladesh played a significant role [1] in the ship recycling world, particularly during 2004 to 2009. In Figure 1, the share of Bangladesh to the world total of ship

recycling in LDT is shown. In Figure 2, it is seen that Bangladesh led the world ship recycling during 2004 to 2008 and India was just behind it. Before 2004, India was the number one in ship recycling for long period. However, currently India has again retained their leading position in the ship recycling world leaving China and Bangladesh as their follower. The trend of Bangladesh showed ups and downs in early of this decade, but sharply increased in the last three years. In 2009 Bangladesh recycled around two million ton scrap. So Bangladesh is now being considered as one of the global leaders in ship breaking.

A comparison of percentage cost breakdown [4] of breaking a 14800 LDT tanker in three Asian countries has been shown in Figure 3. Figure 4 shows estimated cost and profit related to the same tanker in the three countries. From the figure it is seen that cost profit ratio is 2 times higher than Indian ship braking yards and six times higher than breaking yard of Pakistan. Bangladeshi ship breakers usually offer highest price while purchasing scrap ships, but due to cheap labour and other benefit compared to neighbouring countries, cost profit ratio is high. In 2009 Bangladesh recycled around two million ton scrap ship and thus playing a vital role in the global ship recycling market [5].

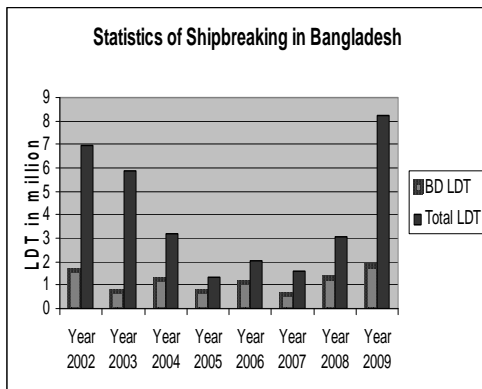


Figure 1: Statistics of Ship breaking in Bangladesh (Year 2002-2009)

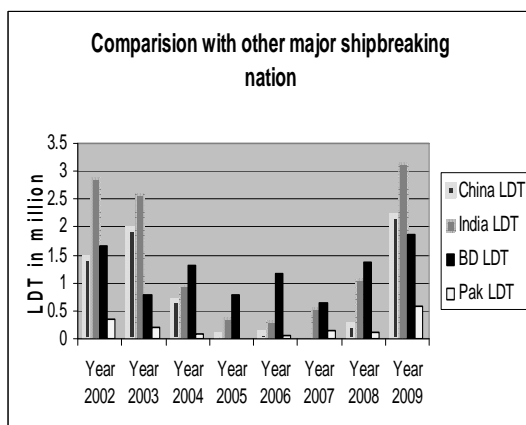


Figure 2: Comparison among major ship breaking nations (Year 2002-2009)

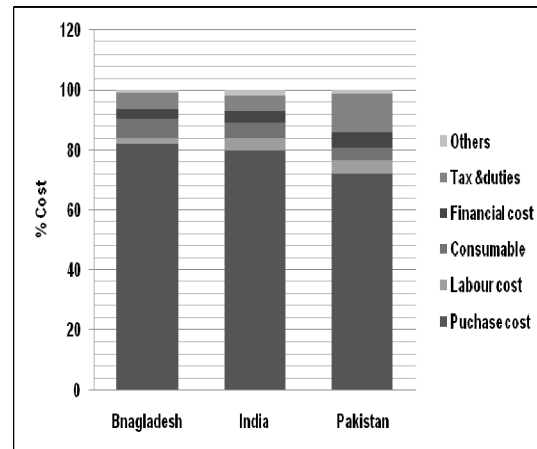


Figure 3: Comparison of cost breakdown of sample Tanker

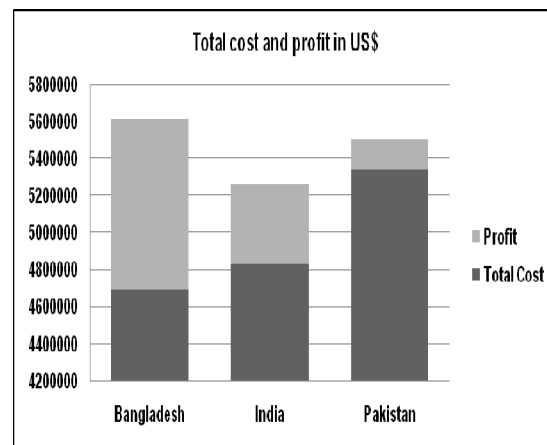


Figure 4: Cost and profit related to recycling the sample tanker

5. A CASE STUDY

Ship breaking is an important activity in context of Bangladesh. Though Bangladesh is playing a leading role as a ship breaking nation for a long time, but the data related to these industries are very rare as these yards are highly restricted to the commoner. In this study, efforts have been made to assess the social and environmental impact of ship recycling on the basis of field data collected from existing recycling yards. A sample 5000 LDT multipurpose container ship data has been collected for this purpose. Table 2 shows where the materials and components of the sample ship were recycled in Bangladesh. Table 3 shows the contribution of materials and components to the local industries as recycling materials and the amount of pollutants from this ship disposed to the environment.

From the Table 2, it is seen that ship braking industry is providing enormous contribution to the national economics through supporting inland shipbuilding industry, construction industry, re-rolling mills, steel mills, oxygen plants, and also cable, ceramic, and furniture factories. It provides about 35,000 tons of processed wood & furniture annually and henceforth preventing de-forestation. It's contribution to the national economy is about US\$ 1 billion.

On the other hand, ship destined for ship breaking may contain significant quantities of hazardous materials and that is why ship breaking operations involve high risks and harms. In Bangladesh, ship breaking takes place on sandy beaches following very rudimentary ways. Because of socio-economical conditions, labours are very cheap and they do not

bother to take any risky job. They do not have even basic knowledge of occupational safety and hazard. As a result, many fatal incidents occur in these yards. Presence of inflammable substances or gas pockets leads to break out fire accompanied by explosions specially during cutting operation. Exposure of toxic fumes during cutting by torch is also very common. The workers have no information regarding the hazardous materials they are handling or the minimum safety measures that they require. Unprotected handling of the toxic substances may cause wide range of complications. However it was not possible to assess such damage carried out by the sample ship, as no such information directly related to the sample ship was available.

Table 2: Materials/Machineries Collected from 5000 LDT Multipurpose ships and their uses

<i>Materials</i>	<i>Uses</i>
a. Steel	1. Raw material for re-rolling mills. 2. Steel plate, frame, girder, stiffener, longitudinal, etc. are used for construction of inland vessels
b. Electric cable and cable sheathings	1. House hold and industry 2. Cable sheathing is used in rubber industry 3. Inland Shipbuilding industry
c. Navigational instrument such as compass, navigation light, life boat & buoy, life raft, fog horns, generator, battery, various maps, fire fighting equipment, etc	1. Inland Shipbuilding industry 2. Other Industry
d. Marine engine	1. Export 2. Inland Shipbuilding industry
e. Generator Pumps, Compressors, Other Mechanical Equipments & Machineries	1. Household use 2. Inland Shipbuilding industry 3. Other industries and some are exported
f. Motor, Light, Fans, Fridge, Switch, Switchboard, Various Electrical & Electronic Materials	1. Household use 2. Inland Shipbuilding industry 3. Used in industries and some are exported
g. Steering Gear, Capstans, Windlass, Crane, David, Derik, Anchor, Cable, Chain, Block, Pulley, Wear rope, Bollard, Fairlead, Deck-eye, Hatch, Hatch Coaming, Various fittings & fixture, etc	1. Inland Shipbuilding industry
h. Furniture, utensils, bedding materials, bathroom fittings, refrigerator, washing machine, etc.	1. Household use 2. Inland Shipbuilding industry 3. Used in industries and some are exported
i. Fuel and lube oil	1. Transport industry 2. Inland Vessels
j. Burnt oil and oil sludge	1. Brick field
k. Coolants	1. Refrigerant Industry
l. Dye	1. Dying industry
m. Heavy metals like copper, zinc, mercury, brass, alloy metal	1. Recycled in metal industries 2. Other Industry 3. Export

Table 3: Amount of materials/substances collected, recycled, and disposed from the sample ship

<i>Name of the Items/Materials collect from the ship</i>	<i>Amount in Tons</i>	<i>Percentage of amount of all materials/substances</i>	<i>Percentage recycled</i>	<i>Percentage disposed to environment (Pollution)</i>
Steel plate, Frames, Girder, Longitudinal, Stiffeners, Doors, Hatches, Anchor, Bollards, Fairleads, Hatch cover, Deck eyes, Bulkhead, Deck plate, etc	4600	92%	100%	Negligible
Paint containing lead, cadmium, tins, arsenic, zinc, chromium, silicon, chromates, mercury, etc	10	0.20%	95% (as remain with plate)	5% (During cutting dragging and transporting of plate and others fittings)
Various hazardous wastes, rubber, Cables, Batteries, Composite materials, sealants containing PCBs, etc	01	0.02%	95%	5%
Various types of asbestos (Used in very old ship. Presently not used)	0	0	0	0
Engine oil, bilge oil, hydraulic and lubricants oils and grease	2.5	0.05%	95%	5% (Again most of the amount is collected by local boat-men)
Residual oil	0	0	0	0
Machineries, Equipments, Prime-movers, Generators, Pumps, Compressors, Gear box, Shaft, Propeller, Boats, Crane, David, Derik, Fittings, Fixture, Tools, Spares, Electric switch & others, TV, Fridge, AC Unit, Washing machine, various household, etc, Boats, Crane, David, Derik, Fittings, Fixture, Tools, Spares, Electric switch & others, TV, Fridge, AC Unit, Washing machine, various household, etc	386.5	7.73%	100%	0

6. CONCLUSIONS

Ship breaking is an important activity in the lifecycle of maritime transportation. It makes a significant contribution to the global conservation of energy and resources. From the above discussion and case study, the following conclusions can be drawn:

- In Bangladesh, almost 100% materials and equipments collected from a scrap ship is recycled. Through this process ship recycling has become a major contributor to the development of national economy.
- Contribution of ship breaking to inland shipbuilding in Bangladesh is enormous [6].
- Occupational health and safety can be ensured by strict monitoring of govt. regulatory bodies as well as imparting training to the worker and also providing personal protective clothing & equipment to the workers.

- Environmental pollution can be kept to a minimum level by following standard international procedure for disposing ships' materials. Development of detailed ship recycling guidelines for local scrap yards is also a necessity for improving the standard of this industry.

In Bangladesh, ship breaking takes place on sandy beaches without any containment or barriers to prevent water and soil pollutions. But environmental pollution by other industries like tannery, paint, dyeing, brickfield, inland/coastal vessels and road vehicles are not even less severe in Bangladesh. Actually, level of environmental awareness among the different industries is still very poor and ship

breaking is no exception. Hazardous waste and materials, which cannot be recycled, are usually dumped on the spot because of lacking of reception facilities. So, pointing only to the ship recycling industries for destroying our environment and human health is not unbiased.

REFERENCES

- [1] Shipbuilding Statistics, The shipbuilders' association of Japan, march 2010.
- [2] Misra, H., 'Status of ship breaking industry in India', The IUP journal of managerial economics, Vol. VII, Nos. 3 & 4, 2009.
- [3] Statistics of World Bank, Dhaka office, September 2010.
- [4] Abdullah, H.M., Mahboob, M. G. and Biruni, A.A., 'Drastic expansion of ship breaking yard in Bangladesh: a cancerous tumor to the coastal environment', Proc. of international conference on environmental aspects of Bangladesh (ICEAB 10), Japan, Sept. 2010
- [5] Cotzais Shipping Group (online), Accessed on june 2010, available: www.cotzias.gr
- [6] Hossain, K. A., 'Evaluation of potential prospect and challenges of Bangladeshi shipbuilding in the light of Global contest', M.Sc. Engg. Thesis, submitted to Dept. of Naval Architecture and Marine Engineering, BUET, Dhaka, 2010.