

Overview of Ship Recycling Industry of Bangladesh

Khandakar Akhter Hossain*

Chief Naval Architect and Marine Engineer, BN Guided Missile Corvette Project, Wuchang Shipbuilding Industry Co Ltd, Wuhan, China

Abstract

This paper deals with the status of ship-recycling industry in Bangladesh in compare to world and 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 research has made to address whether Bangladesh should continue supporting this business on their soil. Few very viable and important statistics, fact and figure has shown and analyzed for local recycling industry as a whole. Some viable recommendations are made at the conclusion.

Keywords: Ship recycling; Breaking; Dismantling; Socio industrial safety; Environmental hazards

Introduction

Dismantling of old/scrap ships at break-yard or suitable site under ship recycling facility to recover components/materials for reprocess/re-use including storage and treatment on site with taking care of hazardous materials, known as Ship Recycling (SR). From statistic it's observed that ships used to be scrapped after 25-30 years for safety reasons. In 1998 - a bumper year - a total of 673 ships or 27,254,525 DWT were scrapped. The average age of recycled ship is 30 years and there are 95,000 ships over 100 DWT in the world fleet as per Lloyd's register. We could estimate that, the average future recycling demand would be around 3166 ship per year (=95000/30). But such approximation are simplistic as neither consider all ship types nor consider all ship sizes and moreover consider the same market dynamics over time. However, it could be estimated with some assumption that, the average of annual scrapping is about 1000 vessels. We must remember that, old ship if not recycled, will be occupied valuable space and seriously hazard to the environment [1,2].

Information and data collection of this industry was a challenge. However, through field survey was not easy as these industries are very restricted for common people [3]. 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.

Location of Ship Breaking/Recycling Industry

Most of the ship breaking is carried out in India, Bangladesh and Pakistan where the high tides are especially conducive to heaving the ships up onto the beach. Over 300 ships a year are now being processed at Alang in India; which has demolished about 2,500 ships since its inception in the early 1980. On the other hand, given the fact that this work is carried out in these low income countries, one would not want to deprive these workers, of what little income they can earn (even if it appears too little by Western standards). To the 200,000 who work at Chittagong (Fauzdarhat to Kumira), in Bangladesh and the 200,000 reportedly in Alang in India must be added all those indirectly affected or benefiting from the industry. Figures 1 and 2 have been explained the ship recycling activities around the world and status of Bangladesh [4-6].

Reasons for Ship Recycling/Breaking Industry in Few Developing Countries

Obviously, the only safe way to demolish a ship would be in a shipyard. However, the last ship to be scrapped in the UK was near a half century ago. Useable facilities still exist in Spain, Turkey and Australia has undertaken a feasibility study to establish a facility. The EU is also doing a study [7]. China which until 1993 undertook half of the scrapping in the world, dropped out of the market when stricter environmental laws were introduced and her economical condition improved tremendously. Although a ship can be scrapped in two weeks in a yard as opposed to over six months on a beach, it is unlikely that industrialized countries will move back into the business. Recycling is cost-effective only in few developing nations who have natural yard, cheap labor, and high demand for recycled goods [8].

History of Bangladesh Ship Recycling Industry

In 1964, a stranded Greek vessel scrapped at Shitakundo in Chittagong by a local scrap-yard named as 'Steel House'. In 1974 - 'Al Abbas', a salvaged Pakistan Navy vessel sunk during liberation war was scrapped in a Bangladeshi scrap-yard in Chittagong. However, other salvaged ships of liberation war boosted the scrapping industry. Finally in the year of 1984, Bangladesh appears as a major ship breaking/recycling nation in the world (Table 1) [9].

It's not Aladdin's lamp miracle who make Bangladesh as a paradise of ship recycling industry. It's Almighty and nature makes so. There are few distinct reasons for the development of ship recycling industry in Bangladesh:

- Availability of long beach with combination of soft sand and muddy ground
- Perfect slope for beaching
- Large tidal difference

***Corresponding author:** Khandakar Akhter Hossain, Chief Naval Architect and Marine Engineer, BN Guided Missile Corvette Project, Wuchang Shipbuilding Industry Co Ltd, Wuhan, China, Tel: 0086-18251320510; E-mail: akhter.engineer@yahoo.com

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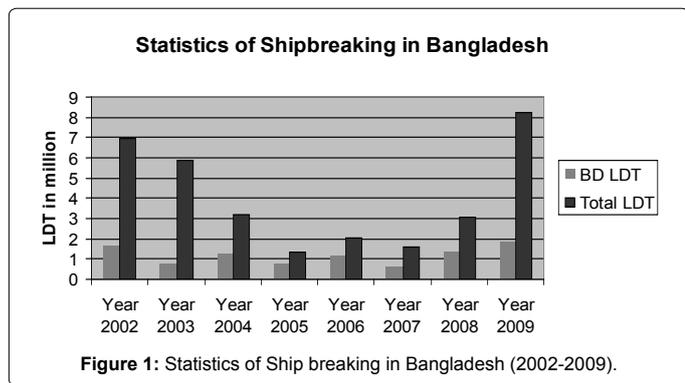


Figure 1: Statistics of Ship breaking in Bangladesh (2002-2009).

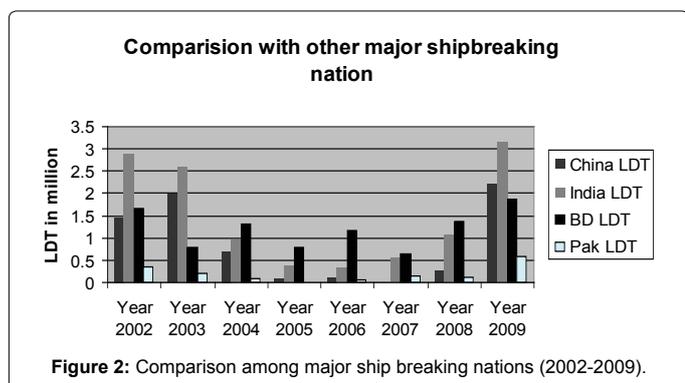


Figure 2: Comparison among major ship breaking nations (2002-2009).

Country	Bangladesh	India	Pakistan
Revenues in US\$	5613600	5261600	5505500
Total Cost in US\$	4692200	4827700	5940800
Purchase of ship in US\$	3848000	3848000	3848000
Labor cost in US\$	92700	216600	233400
Consumable in US\$	302200	230000	230000
Financial cost in US\$	147900	192900	265700
Tax, tariffs, duties in US\$	263000	250100	693600
Others in US\$	38400	90100	70200
Total Profit in US\$	921400	433900	164600

Table 1: Estimated Revenues, Main cost and Profit from a Sample 14800 LDT tanker for Major Ship Breaking/Recycling Nations.

- High demand of recovered goods
- Abundance, availability and low cost of labor
- Almost 100% materials reused locally

There are few definite reasons for choosing present location at Chittagong (Fauzdarhat to Kumira), for ship recycling industry in Bangladesh [10] (Tables 2 and 3). Those are as follows:

- Availability of a long unused beach suitable for Beaching Method
- Availability and suitable 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
- Availability of perfect slope for beaching
- Found naturally large tidal difference
- Availability and low cost of labor

Contribution of Ship Breaking/Recycling Industry toward Socio-economical Development of Bangladesh

Ship recycling industry has distinct impact on socio-economic development for the country. That has been shown below.

- In the absence of iron ore, scrap ship ensures the sustainable economic development of the nation.
- About a million people are directly and indirectly related to the industry.
- Annual revenue earning from the industry is more than US\$ 130 million.
- Provide raw materials for linkage industries like inland shipbuilding industry, construction industry, re-rolling mills, steel mills, oxygen plants, cable, ceramics, furniture factories etc.
- Supports local shipbuilding by providing steel plates, machineries, equipments, boats, navigation aids, electrical and electronics materials, fire fighting and life saving equipment, deck fitting and fixture, hundred of seamanship items, etc. Tables 4 and 5 will define the contribution of local ship break-yard industry.
- More than 60% materials and machineries for local shipbuilding come from local ship breaking/recycling industry. Inland and some extend coastal shipbuilding will be cripple without local ship breaking/recycling industry.
- Ship breaking/recycling industry indirectly supporting another two million people who are related to local shipbuilding industry [11].
- Provides about 35000 tons of processed wood and furniture annually and henceforth preventing de-forestation (Figures 3 and 4).
- Efficient utilization of coastal area as an economic/commercial area.
- Created serge barrier, prevented erosion and provided reclamation of land.
- Contribution to the national economy is about US\$ 2 billion.
- If local ship breaking/recycling industry will collapse, than three million people and entire national economy will suffer severely and that will reduce the GDP and will hinder entire national development process (Tables 2 and 3).

Negatives Impact of Ship Breaking Practice in Bangladesh

Specific wastes that come generally from the ship breaking yard are asbestos, Polychlorinated Biphenyls (PCBs), bilge and ballast waters, oils and fuels residues. Also, metal cutting process generates

Items/Subject	Quantity/Amounts
Steel consumption	5 million (m) tons
Steel production	2.5 m tons
Scrap steel from ship recycling	Up to 1.5 m tons
SR steel contribution to production	60%
SR steel contribution to consumption	30%
Re-rolling Mills	About 350
Scrap yards	171 (active only 50)
Estimated no. of Direct workers	200000

Table 2: Ship Breaking/Recycling Industry and Contribution to Steel Production and Consumption in Bangladesh.

S. No	Materials/Machineries	Uses/Re-uses
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 and buoy, life raft, fog horns, battery, various maps, firefighting equipment, etc.	1. Inland Shipbuilding industry 2. Other Industry
d	Marine engine,	1. Re-exported 2. Inland Shipbuilding industry
e	Generator	1. Used in industries and some are exported 2. Inland Shipbuilding industry 3. Household use
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	Anchor, Cable, Chain, Block, Pulley, Wear rope, Bollard, Fairlead, Deck-eye, Hatch, Hatch coaming, Various fittings & fixture, etc.	1. Inland Shipbuilding industry 2. Other industries
h	Furniture, utensils, bedding materials, bathroom fittings, refrigerator, washing machine, etc.	1. Household use 2. Inland Shipbuilding industry 3. Used in other industries and some are exported
j	Pumps, Compressors, Steering Gear, Capstans, Windlass, Crane, David, Derik, Other Mechanical Equipment's & Machineries	1. Household use 2. Inland Shipbuilding industry 3. Other industries and some are exported
k	Fuel and lube oil	1. Transport industry 2. Inland Vessels
l	Burnt oil and oil sludge	1. Brick field
m	Coolants	1. Refrigerant Industry
n	Dye	1. Dying industry
p	Heavy metals like copper, zinc, mercury, brass, alloy metal	1. Recycled in metal industries 2. Other Industry 3. Export

Table 3: Materials/Machineries Output and their Re-use from Ship Breaking.

Industry	No of Deaths in Different Year				
	2009	2008	2007	2006	2005
Garments*	17	14	80	172	120
Construction*	63	92	77	163	80
Day labor*	49	64	24	48	09
Transport*	425	562	451	135	14
Manufacturing*	27	20	-	-	-
Ship breaking/recycling*	21	10	09	8	11
Ship breaking/recycling**	20	08	07	04	07

Note: As per the statistics of Bangladesh police people died in road accident in the year 2009-10 was 3750 and in breaking/recycling industry was only 12 (Ref: Daily Prothom Alo 16 & 18 Aug 2010; Daily Kaler Kantho).

Table 4: Workplace Accidents in some Industries of Bangladesh (Ref: *Occupational Safety, Health and Environment. **Sitakunda Police).

large amounts of fumes and particulate matter that pollute air. It also initiates small fires when oil or sludge is ignited by the torch. The improper storage or disposal of scrap metal and other waste generated from metal cutting may result in soil and / or water contamination, primarily from lead and other compounds. Paints and preservative coatings that can be found on both interior and exterior surfaces of a ship may contain toxic compounds such as PCBs, heavy metals and pesticides. In many ship breaking yards in Bangladesh, workers are not using Personal Protective Equipment (PPE), such as skin, eye or lung protection. Appropriate PPE for working in specialized areas, such as respiratory protective equipment for work in conditions where there is a risk of oxygen deficiency, is also generally not used. There is usually no equipment for machine safety, fire safety, chemical safety and water safety, and when such equipment exists, these are poorly maintained. With a few exceptions, the vast majority of workers do

not receive any information on the hazards or risks to health and safety, nor do they receive any training on how to minimize risks to health and safety at work. Improper storage and disposal of scrap metal and waste contaminate the soil and groundwater resources, causing acute and long-term pollution [12]. Most of the ship breaking yards have neither any containment to prevent pollution of soil, air, marine and freshwater resources, nor the technology needed to ensure the environmentally safe management and disposal of hazardous wastes and materials (Table 4).

Materials Collect from Scraps Ship and their Re-use

It's now well proven fact that, ship-breaking has earned a good reputation for being a profitable industry in developing countries. On the other hand, media well circulated that, there are a number of environmental and human health hazards in the industry. Depending

Name of the materials	Amount in percentage	Amount in tons	Percentage of re-use or re-process	Percentage thrown to nature and pollution
Steel plate, Frames, Girder, Longitudinal, Stiffeners, Doors, Hatches, Anchor, Bollards, Fairleads, Hatch Cover, Deck eyes, Bulkhead, Deck plate, etc.	94%	37600	100%	Negligible
Paint containing lead, cadmium, tins, arsenic, zinc and chromium	0.25%	100	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.	0.0187%	7.5	95%	5%
Various types of asbestos (Used in very old ship. Presently not used)	0.00001%	0.4	95%	Negligible
Engine oil, bilge oil, hydraulic and lubricants oils and grease	0.0187%	7.5	95%	5% (Again most of those collect by local boatman)
Residual oil	1.5%	600	95%	5% (Again most of those collect by local personal)
Machineries, Equipment's, Prime-movers, Generators, Pumps, Compressors, Gear box, Shaft, Propeller, Boats, Crane, David, Derik, Fittings, Fixture, Tools, Spares, Electric switch and others, TV, Fridge, AC Unit, Washing machine, various household, etc.	4.21%	1685	100%	Nil

Table 5: Sample Ship 1: Light Weight 40000 Tons Ship (Oil Tanker).

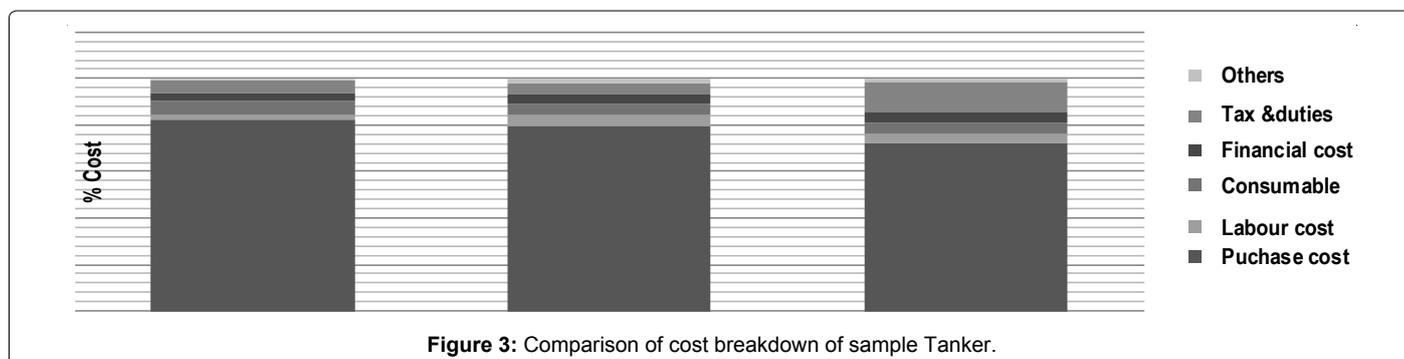


Figure 3: Comparison of cost breakdown of sample Tanker.

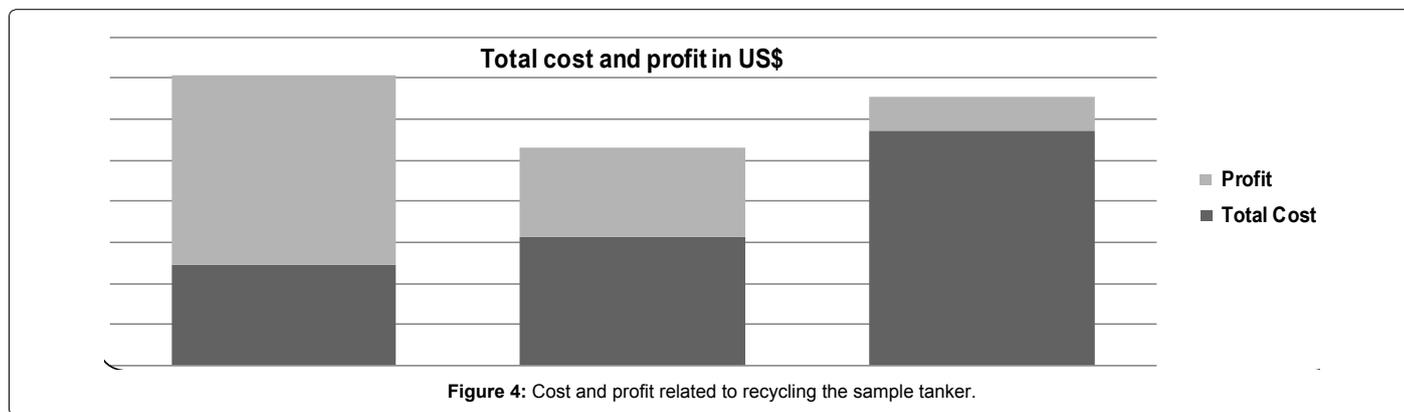


Figure 4: Cost and profit related to recycling the sample tanker.

on their size and function, scrapped ships have an unladen weight of between 5,000 and 40,000 tons (the average being 13000+), 95% of which is steel, coated with between 10 and 100 tons of paint containing lead, cadmium, organotins, arsenic, zinc and chromium. Ships also contain a wide range of other hazardous wastes, sealants containing PCBs, up to 7.5 tones of various types of asbestos and; several thousands liters of oil (engine oil, bilge oil, hydraulic and lubricants oils and grease). Tankers additionally hold up to 1,000 cubic meters of residual oil. Most of these materials have been defined as hazardous waste under the Basel Convention. But from practical experience and on ground data, totally different story found at Chittagong ship-breakyards in Bangladesh. Let discuss about few sample ships; which have been shown in below (Tables 5-7).

Challenges Ahead

- Establishment of hospital, ambulance and first aid nearby.
- Procurement of specialized vessel with oil spill prevention, fire fighting, first aid, rescue capacity, etc.
- Establishment of specialized shore Fire Service.
- Ensure protective clothing and washing area for handling asbestos in every yard.
- Procurement and use of gas detection equipment.
- Ensure provide reasonable comfort while at rest for labour.
- Ensure training of labour.

Name of the items/materials collect from the ship	Amount in percentage	Amount in tons	Percentage of re-use or re-process	Percentage thrown to nature and pollution
Steel plate, Frames, Girder, Longitudinal, Stiffeners, Doors, Hatches, Anchor, Bollards, Fairleads, Hatch Cover, Deck eyes, Bulkhead, Deck plate, etc.	92%	4600	100%	Negligible
Paint containing lead, cadmium, tins, arsenic, zinc, chromium, silicon, chromates, mercury, etc.	0.2%	10	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.	0.02%	01	95%	5%
Various types of asbestos (Used in very old ship. Presently not used)	0.00001%	0.005	95%	Negligible
Engine oil, bilge oil, hydraulic and lubricants oils and grease	0.05%	2.5	95%	5% (Again most of those collect by local boatman)
Residual oil	0	0	0	0
Machineries, Equipment's, Prime-movers, Generators, Pumps, Compressors, Gear box, Shaft, Propeller, Boats, Crane, David, Derik, Fittings, Fixture, Tools, Spares, Electric switch and others, TV, Fridge, AC Unit, Washing machine, various household, etc., Boats, Crane, David, Derik, Fittings, Fixture, Tools, Spares, Electric switch and others, TV, Fridge, AC Unit, Washing machine, various household, etc.	7.73%	386.5	100%	Nil

Table 6: Sample Ship 2: Light Weight 5000 Tons (LDT) Ship (Cargo or Multipurpose Vessel).

Name of the materials	Amount in percentage	Amount in tons	Percentage of re-use or re-process	Percentage thrown to nature and pollution
Steel plate, Frames, Girder, Longitudinal, Stiffeners, Doors, Hatches, Anchor, Bollards, Fairleads, Hatch Cover, Deck eyes, Bulkhead, Deck plate, etc.	95%	48000	100%	Negligible
Paint containing lead, cadmium, organotins, arsenic, zinc and chromium	0.22%	110	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.	0.02%	10	95%	5%
Various types of asbestos (Used in very old ship. Presently not used)	0.00001%	0.5	90%	Negligible
Engine oil, bilge oil, hydraulic and lubricants oils and grease	0.02%	10	95%	5% (Again most of those collect by local boatman)
Residual oil	0	0	0	0
Machineries, Equipment's, Prime-movers, Generators, Pumps, Compressors, Gear box, Shaft, Propeller, Boats, Crane, David, Derik, Fittings, Fixture, Tools, Spares, Electric switch and others, TV, Fridge, AC Unit, Washing machine, various household, etc	4.74%	1870	100%	Nil

Table 7: Sample Ship 3: Light Weight 50000 Tons Ship (Containership)

- Ensure handling Hazmat with care.
- Ensure ratify and follow Hong Kong Convention.
- Ensure labour safety and job security.
- Ensure rehabilitation of labour.
- Ensure monitory and medical help of the injured labour.
- Ensure infrastructure support (electricity, gas, medical, communication facility, etc) for the entire industry.
- Establishment of R&D centre and fund rise for R&D activities.
- Establishment of corporate management culture.
- Ensure uninterrupted gas and electricity supply.
- Establishment of Model yard.
- There need to be develop of ship recycling policy for Bangladesh.
- There may be joint cell of government and industry providing one stop service.
- Make ship recycling complaint to Hong Kong Convention.
- Establishment of viable training facilities.
- Procurement of hazardous material (hazmat) detection, extracting equipments and relevant transport facilities.
- Procurement of specialized vessel/tug for antipollution, firefighting and rescue purpose.
- Establishment of specialized fire fighting station on shore near recycling sites.
- Establishment of hospital with adequate support system.
- Establishment of model yard for green ship recycling.
- Establishment of ship recycling economic zone.
- Development of regional forum with Bangladesh, India and Pakistan.
- Development of bilateral ship recycling treaty with shipping nations.

Expert Suggestions for Safe Ship Recycling

Some consolidate expert views and few suggestion regarding safe ship recycling and handling hazmat has been shown in Tables 8 and 9 in below.

Recommendations

There are few important recommendations has been given below to improve the overall situation of ship re-cycling industry in Bangladesh [2,6].

Major risks	Mitigation method/ suggestions
Exposure to Hazardous materials	a. Use of personal protective equipment like gloves, goggles, apron and mask. b. Workers training on safe handling of Hazmat. c. Use of appropriate procedures and equipment. d. Environmentally sound storage and management of Hazmat. e. Health monitoring. f. Training.
Falling from height	a. Use of safety belt, harness, etc. b. Training.
Heavy materials falling from height on workers	a. Ship recycling plan. b. Communication of daily work plan. c. Mark areas as off limit where cutting work at height is carried out. d. Use of PPE like helmet, face shield etc. e. Avoid free dropping of objects from height using crane. f. Training.
Accidents related to confined space	a. Ensure space is safe for entry. b. Ensure confined space free of toxic gas. c. Ensure permissible level of oxygen. d. Ensure adequate ventilation. e. Ensure adequate lighting. f. Training.
Fire and explosion	a. Ensure working area safe for hot work. b. Area is properly ventilated. c. Mark areas not safe for hot work. d. Maintain gas free and safe for hot work status until work is completed e. Training.
Cuts and bruises	a. Use safety shoes, gloves & other Personal Protective Equipment (PPE). b. Use of magnetic crane for lifting. c. Training.
Injury related to torch cutting	a. Ensure area fit for hot work. b. Remove flammable material before cutting. c. Use protective goggles, shield and gloves. d. Use of torch with long handle. e. Training.

Table 8: Suggestions regarding health & safety issue.

Pollutants	Mitigation/ Suggestions
Asbestos	a. Wet asbestos and asbestos containing materials before removal. b. Remove in big pieces to minimize formation of airborne particle. c. Cover with suitable lick proof material. d. Bury underground. e. Training.
Ozone-depleting substances	a. Collection by trained contractor with appropriate collector. b. Store/reuse in safe manner. c. Training.
Polychlorinated hydrocarbon	a. Incineration. b. Training.
Radioactive material	a. Store in adequate conditions by appropriate authority. b. Training.
Heavy metals	a. Store in sealed lick proofed container. b. Training.
Bilge and oily water mixture	a. Separation of oil and water by using oil water separator b. Reuse/incinerate recovered oil. c. Training.
Cargo residues	a. Treatment depends on nature of Cargo. b. Training.
Sludge	a. Recover with mixture of sand and oil for reused in brick field. b. Relevant training.

Table 9: Suggestions regarding Handling of Hazardous Materials.

- Cases in the honorable court should be solved soon.
 - Isolated initiatives by Government or NGO's should be stopped.
 - Ministry of Shipping (MoS) being the focal ministry should sit
- with other concerned ministries and stake holders for taking actions on:
- Adopt ship recycling policy in line with Hong Kong Convention.

- Take actions to ratify Hong Kong Convention.
- Undertake bilateral recycling policy agreements with flags.
- Take initiative to form regional cooperation.
- Take steps to create a ship recycling economic zone.
- Organize recycling policy as a green industry.
- Solve any dispute and misunderstanding among the related organization.
- Every concern should understand the socio-economic importance of the sector.
- Comply general requirements for ship recycling facilities.
- Stop import of warships, nuclear/ radioactive ships.
- Passenger ships should not to be imported till no asbestos.
- There should be system for submission of list of hazmat to the administration prior import of any scrap ship.
- Ship recycling plan need to be developed by facilities in consultation with owner as per capability of recycling facility.
- There should be system for supervision of administration during ship recycling.
- There should be incident and completion reports in the recycling area.
- There need to be certification system for break-yards for compliance to regulations.
- It needs to establish R&D centre for the improvement of the sector.
- It needs viable budget and allocation of fund for the improvement of the sector.
- For the purpose of workers safety and training:
 - Ensure availability and use of personal protective gears and equipments.
 - Ship break-yard need to have safety equipment such as: fire fighting equipment, rescue equipment and fast aid facilities.
 - Regular health check up for workers.
 - Utilities and amenities for workers as per labor law.
 - Ensure cargo tanks are gas free for hot work.
 - Ensure labeling of all hazardous material on board.
 - Training for workers, supervisors and managers.
 - Stop employment of child labor.
- For the purpose of environmental Protection
 - Recycling yard should not to be establish in or near environmental sensitive area.
 - Recycling yard need to be established only in designated areas with the supervision of Government.
- Prior removal of hazmat to the extent practicable and as per the recycling plan.
- Asbestos and asbestos material should not to be recycled.
- Different type of waste and hazmat should not be mixed.

- Electric cable/cable insulation should not to be burnt.
- Ballast water to be changed in deep sea.
- Establish waste recycling facility in the recycling area.

Conclusion

Bangladesh is the paradise of ship breaking/recycling industry in the world. It's Almighty's blessing and nature makes so. Availability of long beach with combination of soft sand and mud ground; perfect slope for beaching; large tidal difference; high demand of recovered goods as almost 100% materials reused locally and finally availability and low cost of labor make Bangladesh the best ship breaking/recycling nation in the world. There can be no doubt that breaking/scraping a ship that has been run up onto a beachhead qualifies as unsafe and dangerous work. But for a least developing or poor country like Bangladesh, where most of the population live just hand to mouth; such so called dangerous industry is nothing but blessing. About two lac of worker are directly and three million people are indirectly related to the industry. Annual revenue earning from the industry is more than US\$ 130 million. This industry provide raw materials for linkage industries like inland shipbuilding industry, construction industry, re-rolling mills, steel mills, oxygen plants, cable, ceramics, furniture, machinery/tools factories, etc. The overall contribution of local ship breaking industry to the national economy is about US\$ 2 billion. If local ship breaking/recycling industry will collapse, than three million people and entire national economy will suffer severely and that will reduce the GDP and will hinder entire national development process. This industry could contribute more in future if country can handle the industry with care.

References

1. (2010) Shipbuilding Statistics, The shipbuilders' association of Japan.
2. Misra H (2009) Status of ship breaking industry in India. IUP Journal of Managerial Economics 7: 109-116.
3. (2010) Statistics of World Bank. Dhaka office, Bangladesh.
4. Abdullah HM, Mahboob MG, Biruni AA (2010) 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.
5. Cotzais Shipping Group
6. Hossain KA (2010) Evaluation of potential prospect and challenges of Bangladeshi shipbuilding in the light of Global contest. Thesis submitted to Dept. of Naval Architecture and Marine Engineering, BUET, Dhaka.
7. (2015) Statistics of the Shipbuilders Association of Japan.
8. Lloyd's Register of shipping- Fairplay.
9. <http://www.ilo.org/global/lang-en/index.htm>
10. Hossain KA, Iqbal S, Zakaria NMG (2010) Ship Recycling Prospects in Bangladesh. Proceedings of MARTEC 2010: The International Conference on Marine Technology, BUET, Dhaka.
11. Iqbal S, Zakaria, NMG, Hossain KA (2010) A Study of Socio-Economic and Ecological Impact of Ship Recycling in Bangladesh. The Journal of Naomi 27: 35-47.
12. Hossain KA (2010) Maritime Bangladesh- Her Shipbuilding and Vision 2021: World Maritime Day 2010 Journal, Published by DOS, Bangladesh.