

World Maritime University

The Maritime Commons: Digital Repository of the World Maritime University

World Maritime University Dissertations

Dissertations

2012

The role of the ship breaking industry in Bangladesh and its future with special emphasis on capacity building through education and training

Kazi A.B.M. Shameem
World Maritime University

Follow this and additional works at: https://commons.wmu.se/all_dissertations



Part of the [Education Commons](#), and the [Operations Research, Systems Engineering and Industrial Engineering Commons](#)

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.

WORLD MARITIME UNIVERSITY

Malmö, Sweden

**The Role of the Ship Breaking Industry in Bangladesh
and its future with special emphasis on capacity
building through Education and Training**

By

**Kazi A.B.M Shameem
Bangladesh**

A Dissertation proposal submitted to the World Maritime University in partial
Fulfillment of the requirement for the award of the degree of

**MASTER OF SCIENCE
In
MARITIME AFFAIRS**

(MARITIME SAFETY AND ENVIRONMENTAL ADMINISTRATION)

2012

DECLARATION

I certify that all the materials in this dissertation that is not my own work has been identified and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views and are not necessarily endorsed by the university.

Signature: 

Date: 22 October 2012

Supervisor:

Capt. Raphaël BAUMLER

Assistant Professor - World Maritime University

Internal Assessor:

Ms. Birgit NOLTE-SCHUSTER

Research associate - World Maritime University

External Assessor:

Mr. George KINIGALAKIS

Swedish Environmental Market - AB

ACKNOWLEDGEMENT

First of all I would like to express my sincere gratitude to Almighty Allah for giving me such opportunity with physical and mental health, power of patience, the guidance and wisdom and to successfully complete writing this dissertation.

I would also like to extend my sincere gratitude to Commandant, Bangladesh Marine Academy and Ministry of Shipping, Bangladesh for nominating me and allowing me to pursue 17 months post graduate studies at WMU.

My heartfelt thanks to IMO for sponsoring me with full scholarship without which my study at World Maritime University would not been possible.

I would like to express my sincere gratitude to my esteemed dissertation supervisor, Professor Raphaël Baumler who has been continuously inspiring and passionately guiding me all through to accomplish my job. I am grateful to my friends and colleagues who have been continuously supporting me with updating information and updates of SBRI in Bangladesh.

Last but not least, my deepest and heartfelt respect and appreciation to my parents, my lovely wife and kids who have indirectly contributed to my studies by encouragement and support and at the same time sacrificing my presence in the family.

The people cited in the acknowledgements are not definite. I apologize if I have forgotten to mention anyone who has directly or indirectly contributed to the naissance of this thesis.

GOD BLESSES YOU ALL.

ABSTRACT

Title of Dissertation: **The Role of the shipbreaking industry in Bangladesh and its future with special emphasis on capacity building through Education and Training.**

Degree: **MSc**

The ship breaking is considered to be the most sustainable way of disposing end of life ships. Incentives behind the development of the shipbreaking industry are multi-faceted, among which economic benefits and employment opportunities are most prominent. Yet the industry received much attention globally due to many fatal accidents causing loss of life, degradation of environmental due to the prevailing unsafe working practices especially in south Asia.

This dissertation is a study to understand the shipbreaking in general with influencing factors for driving and holding its position in south Asia particularly in Bangladesh. The shipping & demolition market dynamics analyzed with future trend of the industry.

This study focuses on the occupational health and safety issues involve in this industry and how this has been addressed by the government of Bangladesh. The transition from past practices towards green recycling is demonstrated by examining the drastic actions taken by the competent authority. The formation of new rule and its application with Education and Training of workers has been analyzed to find out the gaps.

Finally the critics and recommendations of the author in relation to capacity building through Education and Training of shipbreaking workers has been emphasized for sustainability of this industry.

KEYWORDS: Shipbreaking, Training and Education, Issues, Rule, Transition, Sustainability.

TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT.....	iv
TABLE OF CONTENTS.....	v
LIST OF FIGURES	viii
LIST OF TABLES	x
LIST OF ABBREVIATIONS AND GLOSSARIES	xi
Chapter I.....	1
Introduction.....	1
1.1 Background	1
1.2 Aims and objectives of the study.	4
1.3 Methodology of the study.	4
Chapter II	6
The Role of the Ship Breaking Industry in Bangladesh.....	6
2.1 Background of ship breaking in Bangladesh.....	6
2.2 The advantages derived from the geographical location	10
2.3 Economic interest of this industry in local and global context.	11
2.4 Rationale for locating the ship breaking industry in Bangladesh.....	20
Chapter III.....	28
Major Issues in shipbreaking industry and Addresses by local Authority	28
3.1 Two major concerns related to the shipbreaking business	28
3.2 Environmental Impact of Ship Breaking.....	29
3.3 Workers Health and Safety Issues.....	32
3.4 Addresses/Response by local Authority.....	36
Chapter IV	45
Ship Breaking Yard.....	45
4.1 Introduction to yard structure.....	45
4.2 Permanent workers.....	48

4.3 Migrant workers	49
4.4 Procedures involved in shipbreaking stages.....	53
Chapter V	60
Existing conditions of SBRI – Observations and remarks	60
5.1 Remarks on the observed yard infrastructures	60
5.2 Observation on the present operational practices.....	67
5.3 Comments and perception on safety awareness after the yard visit and interviews	70
Chapter VI.....	71
Present development of capacity building and training infrastructure.....	71
6.1 Legal background and sustainable requirements	72
6.2 Evolution of training infrastructure and Current developments.....	77
6.3 The voices and comments about the current training system.....	81
Chapter VII	89
The road for improvement	89
7.1 A maritime-inspired training system to support SBRI.....	89
7.2 Conclusion	100
References.....	104
Appendix A	108
Details of research conducted in Chittagong.....	108
Appendix B	110
List of Hazards identified by ILO in “Safety and Health in Shipbreaking, Guidelines for Asian countries and Turkey”.....	110
Appendix C	111
An example of soil contamination found in sites in Bangladesh and estimated Accumulated hazards.	111
Appendix D.....	112
Amount of hazardous materials per million GT on merchant and navy vessels.....	112
Annexes (1 to 5).....	113
Details of sample questionnaires used for interviews with different stakeholders.	113
Annex 1	113
A set of questionnaire to the workers group as a qualitative approach:	113

Annex 2	114
A set of questionnaire to the workers group as a quantitative approach:	114
Annex 3	115
A set of questionnaire for the Employer/Yard Owners as a qualitative approach	115
Annex 4	116
A set of Questionnaire for the representative of Bangladesh Ship Breakers Association....	116
Annex 5	117
A set of questionnaire for the training institute as a qualitative approach	117
Annex 6	118
Employment generation in shipbreaking linkage domain.....	118
Annex 7	120
Showing the market share of five major shipbreaking nations in %age GT & DWT.....	120
Annex 8	121
Table showing the analysis from the quantitative research on 100 workers.....	121
Annex 9(A)	122
Pictures showing various equipment and machineries usability in the local market (pictures taken by the author between 17 May to 7 June 2012).....	122
Annex 9(B).....	125
Picture gallery of the current yard infrastructure developments	125
Annex 9(C).....	128
General Overview of a Yard and yard structures with current working practices:	128
Annex 9(D)	135
Training infrastructure development.....	135
Annex 9(E).....	137
Qualitative and Quantitative Interview by Author	137

LIST OF FIGURES

FIGURE 1: A BEACHING YARD IN CHITTAGONG, BANGLADESH (PICTURE TAKEN BY AUTHOR JUNE 2012).	3
FIGURE 2: SHOWS COUNTRY WISE COMPARATIVE DATA OF GDP PER CAPITA, (DATA SOURCE: WORLD BANK, 2011).	7
FIGURE 3: SHOWS COUNTRY WISE %AGE OF POPULATION BY LITERACY RATE AND LIVING BELOW POVERTY LINE.....	7
FIGURE 4: SHOWING THE SCRAPING SEQUENCE. (COURTESY: CAPT.ANAM CHOWDHURY, BSBA).....	10
FIGURE 5: SHOWS THE TREND IN POPULATION GROWTH AGAINST RURAL AND URBANIZATION DEVELOPMENT WITH PROJECTION.	13
FIGURE 6: SHOWS STEEL EXPORT FROM BANGLADESH BETWEEN 2004-2009 (THE DAILY STAR 6 MARCH, 2010).	16
FIGURE 7: SHOWS THE SHIPPING CASH FLOW FROM DEMOLITION MARKET (MARTIN STOPFORD , 2009).	21
FIGURE 8: SHOWING THE TRENDS OF DEMOLITION MARKET IN LAST FORTY YEARS (LLOYDS LIST 8 MARCH, 2012).....	22
FIGURE 9: AVERAGE DEMOLITION MARKET OF CARGO VESSEL PRICE PER LDT, COUNTRY WISE. SOURCE: EA GIBSON SHIPBROKERS. (COURTESY: N.MIKELIS)	24
FIGURE 10: AVERAGE DEMOLITION MARKET OF TANKER PRICE PER LDT, COUNTRY WISE. SOURCE:EA GIBSON SHIPBROKER. (COURTESY: N. MIKELIS)	25
FIGURE 11: GLOBAL STATISTICS OF 5 MAJOR SHIP BREAKING NATION, (SOURCE: LLOYDS LIST SPECIAL REPORT, 8 MARCH, 2012).....	25
FIGURE 12: DETERMINING FACTORS OF SUPPLY AND DEMAND FOR SHIP BREAKING (WORLD BANK, 2010)	26
FIGURE 13: STATISTICS OF DEATH TOLL FROM 2003-2011 (SOURCE: LOCAL POLICE STATION, COURTESY: BSBA).	33
FIGURE 14: WORKERS TAKE OUT ASBESTOS AND GLASS WOOL FROM ENGINE ROOM OF SCRAP SHIP, (PHOTO: MM HOSSAIN AND MM ISLAM, 2004).	35

FIGURE 15: SHOWS THE USE AND STATUS OF PPE AT WORKPLACE.	36
FIGURE 16: ORGANOGRAM OF SBSRB (CHOWDHURY I. U., 2011).....	44
FIGURE 17: A BASIC COMMON YARD STRUCTURE, ORGANOGRAM PREPARED BY AUTHOR.	47
FIGURE 18: SHOWS A BASELINE SURVEY ON EDUCATION LEVEL AND AGE GROUP OF SHIPBREAKING WORKERS IN CHITTAGONG (YPSA, 2005).	50
FIGURE 19: AN EXAMPLE OF YARD LAYOUT PLAN TO BE ATTACHED AS PART OF SRFP (SOURCE: SBRR, 2011)	56
FIGURE 20: SHOWS THE EXAMPLE OF ZONING OF THE YARD, A REQUIREMENT AS PART OF SRFP (SOURCE: SBRR, 2011).....	56
FIGURE 21: SHOWING LOCATION OF SHIPBREAKING YARDS IN CHITTAGONG BESIDE MAIN HIGHWAY, PHOTO GOOGLE MAP.....	61
FIGURE 22: SHOWS THE CURRENT TRAINING STATISTICS (SOURCE: AUTHOR’S QUANTITATIVE RESEARCH)	75
FIGURE 23: SHOWS %AGE OF WORKERS AGE GROUP AND EXPERIENCE.....	81
FIGURE 24: SHOWS %AGE OF WORKERS EDUCATION LEVEL.	82
FIGURE 25: SHOWS PERCENTAGE OF WORKERS COMMENTS ON TRAINING CONTENTS ...	83
FIGURE 26: SHOWS PERCENTAGE OF WORKERS COMMENTS ON CURRENT TRAINING PROGRAM AND ABILITY TO IDENTIFY HAZARDS.	83
FIGURE 27: SHOWS PERCENTAGE OF WORKERS COMMENTS ON FURTHER IMPROVEMENT IN CURRENT TRAINING PROGRAM.	84
FIGURE 28: A COMPARATIVE DATA OF ACCIDENTS/INCIDENTS PRIOR AND AFTER TRAINING. PREPARED BY ASTI ACCIDENT INVESTIGATION CELL BASED ON INFORMATION RECEIVED FROM WORKERS /TRAINEES. (COURTESY: TRAINING COORDINATOR).	92

LIST OF TABLES

TABLE 1: NUMBER OF SHIPS AND VOLUME OF LDT HANDLED BY BANGLADESH BETWEEN 2000 AND 2011	12
TABLE 2: GLOBAL STATISTICS: % AGE SHARE (LDT) BY FIVE MAJOR SHIPBREAKING COUNTRIES.	12
TABLE 3: COMPARATIVE DATA OF POPULATION DENSITY BETWEEN THE MAJOR SHIPBREAKING AND OECD COUNTRIES.	13
TABLE 4: SHOWS COMPARATIVE NATURAL RESOURCES NEEDED FOR STEEL PLANT OPPOSED TO SCRAP METALS	17
TABLE 5: SHOWS THE USE OF MATERIALS/MACHINERIES COLLECTED FROM SAMPLE SHIP.	18
TABLE 6: SHOWS THE AMOUNT OF MATERIALS/SUBSTANCES COLLECTED, RECYCLED, AND DISPOSED FROM THE SAMPLE SHIP.	19
TABLE 7: SHOWS THE COST DISTRIBUTIONS AND PROFITABILITY IN BANGLADESH AND PAKISTAN.....	23

LIST OF ABBREVIATIONS AND GLOSSARIES

AESL	Amader Environmental System Limited. A limited company duly approved by SBSRB to conduct Education and Training program for SBRI workers and removal of HAZMAT from scrap ships.
ASTI	AESL Safety Training Institute, an institute under AESL Company designated for SBRI workers training.
BC	Basel convention on the control of Transboundary Movement of Hazardous Wastes and their disposal, 1989.
BELA	Bangladesh Environmental Lawyers Association.
BILLS	Bangladesh Institute of Labor Studies.
BN	Bangladesh Navy
BSBA	Bangladesh Ship Breakers Association, A trade body recognized by Ministry of Commerce and duly approved by SBSRB.
BUET	Bangladesh University of Engineering and Technology. A public Engineering University in Bangladesh.
CIA	Central Intelligence of America.
Daily Azadi	A Chittagong Based daily local newspaper published in Bangla.
DNV	Det Norske Veritas, A classification society.
DOE	Department of Explosive. A government agency responsible to inspect scrap vessel for any explosive substances. Agency provides Gas Free and Hot Work Certificate for recyclers.
DS	The Daily Star, nationwide daily English newspaper in Bangladesh.
DWT	Deadweight Tonnage is used extensively as a measure of cargo carrying capacity in bulk shipping and is expressed in metric tons.

FBCCI	Federation of Bangladesh Chambers of Commerce and Industry. Is the apex representative organization safeguarding the interest of the private sector in trade and industry.
FE	The Financial Express, A nationwide daily English newspaper in Bangladesh, mostly covers financial news.
FFA	Fire Fighting Appliances.
FIDH	The International Federation for Human Rights is a non-governmental federation for human rights organizations.
GDP	Gross Domestic Product.
GT	Gross Tonnage is a measure of the volume of a ship's enclosed spaces. IMO uses extensively the units of Gross Tons for entry into force and for various regulations' cut-off criteria.
HAZMAT	Hazardous materials are the list of waste as described under Bangladesh environmental conservation act 1995 (Act 1 of 1995 amended on 2010).
HKC	Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009
ILO	International Labor Organization.
IMO	International Maritime Organization.
ISM	International safety management
ISO	International Organization for Standardization.
LDT	Lightship Displacement Tonnage, gives an estimate of the quantities of materials to be obtained from a ship. Almost all recycling sale & purchase transactions are conducted on the basis of prices per lightship ton (long ton, i.e. 1.016 tons). Lightship is the mass of the ship's structure, propulsion machinery, other machinery, outfit and constants. On average about 95% of LDT is recyclable steel.

LSA	Life Saving Appliances.
MME	Department of Materials and Metallurgical Engineering, BUET
MOEF	Ministry of Environment and Forest, Bangladesh.
MOI	Ministry of Industry, Bangladesh.
MRCC	Maritime Rescue Coordination Center, of Bangladesh.
MT	Metric Tons.
M.T	Motor Tanker.
NAME	Department of Naval Architect and Marine Engineering, BUET
NBR	National Board of Revenue, of Bangladesh.
NGO's	Non-Government Organizations.
OECD	Organization for Economic Cooperation and Development.
OHSAS	Occupational Health and Safety Advisory Services.
OSHA	Occupational Safety and Health administration.
OSH	Occupational Safety and Health.
PAHs	Poly-aromatic hydrocarbons
PCBs	Polychlorinated Biphenyl.
POPs	Persistent Organic Pollutants.
PPE	Personal Protective Equipment.
PVC	Polyvinyl chloride.
SBRR	The Ship Breaking and Recycling Rules'2011 is the Rule under national legislation which is applicable for all ship breaking and recycling activities in Bangladesh.

SBRI	ship breaking and recycling industry in Bangladesh.
SBSRB	Ship Building and Ship Recycling Board is a special board under Ministry of Industry, Bangladesh to provide one stop service to the industry.
SRFP	Ship recycling facility plan, under the meaning of SBRR it includes the yard for ship recycling as per approved lay out and equipment with various facilities prescribed by SBSRB.
SRP	Ship Recycling Plan, under the meaning of SBRR, is a plan document developed by ship recyclers with information provided by ship owner to recycle a ship in safe and environmentally sound manner.
STCW	Standard of Training, Certification and Watch keeping. An international convention on seafarers training, certification and watch keeping for uniform standard.
TBTs	Tributyltin, Organometallic substances.
TSDF	Treatment, Stowage, Disposal Facilities.
UNCTAD	United Nations conference on trade and development.
UNDP	United Nation Development Program.
YPSA	Young Power in Social Action. A NGO in Bangladesh working on social development.

Chapter I

Introduction

This chapter will be an introduction to the ship breaking in general and will highlight the aims and objective of the study and the methodology that is applied to accomplish the study.

1.1 Background

Ship recycling, shipbreaking, scrapping and dismantling are used as synonyms. However these words are used by different organizations to express the ultimate process through which a ship is dismantled or deconstructed at the end of her operational life. Bangladesh commonly use the term as shipbreaking, hence the term ‘Shipbreaking’ will be the preferred term used later on throughout the studies.

Usually the economic life of a commercial vessel is averaging 25-30 years. But sometimes the owner may find it economically not viable to operate and sell out. Very recently a 13 year old box ship was sold for scrap in early May,2012 making it the youngest merchant vessel to be demolished since the global financial downturn took hold in late 2008.It marks the extreme of a growing trend for ever-younger vessel heading for recycling yards (Lloyds, 2012).

Out of 103,392 (UNCTAD, 2011) seagoing ships across the world, about 700 to 800 ships larger than 499 GT are scrapped annually (Sarraf, 2010). At the end of their sailing life these ships are sold so that the valuable steel about 95% of a ship’s mass can be recovered (Dao, 2005). Virtually every part of the ship and other machineries and equipment, tools are refurbished and made used as secondhand utility in the shipping industry as well as in other industries or recycled as scrap metal. The process is done either in dry dock, slip ways, alongside quay or at beach yards.

In the early 1970s ship breaking was a highly mechanized industrial operation carried out in the shipyards of Great Britain, Taiwan, Mexico, Spain and Brazil. But as the cost of upholding environmental and health and safety standards in developed countries has risen, ship breaking has increasingly shifted to poorer Asian states. In the late 80's however this industry has mostly shifted to 5 major countries such as India, China, Bangladesh, Pakistan and Turkey. Among them India, Bangladesh and Pakistan accounts for 70-80% of the international market (Sarraf, 2010).

For better economic return, ship owners prefer to send their vessels to the scrap yards of the Indian subcontinent because the local breakers pay as much as ten times higher than the recyclers in developed countries (Platform on Shipbreaking, 2009). They pay on an average of \$450-500/LDT (depending on the type of ship) for instance a ship of 10,000LDT is worth of \$5mil, which might be a good return for the ship owners, even at the end of her commercial life.

Shipbreaking is a highly labor intensive business and hundreds of thousands of peoples are engaged in this industry. Also the cheap labor cost and lower level of compliance with health and safety standards, weak law enforcement are of added advantage to the business.

Due to prevalent huge unemployment in India, Bangladesh and Pakistan workers are desperate to find a job regardless of associated work hazards. The work force in each country of Indian subcontinent varies according to the volume of work undertaken but however an estimated (2008/09) range between 8,000-22,000 is directly employed with 200,000 in the supply chain. Shops and re-rolling mills with dependents in extended families estimated to reach over 500,000 in Bangladesh alone with fewer figures in Pakistan (Sarraf, 2010). In India, Bangladesh and Pakistan the breaking activities are done at beaching yards using the intertidal zone in an uncontrolled environment. It is estimated that up to 95% of the work force is migrant labors comes from poorer regions of each country (Sarraf, 2010). An example of beaching yard in Bangladesh. **(See Figure: 1)**



Figure 1: A beaching yard in Chittagong, Bangladesh (Picture taken by author June 2012).

Although ship recycling is considered to be the most sustainable and efficient way of disposing a ship at the end of her life, Shipbreaking/dismantling is one of the most hazardous occupation (ILO, 2004) as well. Because of the complexity of the ship structure, inherent materials attached to the vessel during building, the work process and the locations do involve numerous environmental, health and safety issues.

Therefore Workers are often exposed to associated work hazards which has significant detrimental effects on human health as well as on the environment if not handled properly.

Historically working conditions have been very difficult in these major shipbreaking countries because of limited or no use of personal protective equipment, lack in use of mechanized equipment, remote location of the industries to obtain adequate shore

support as well as proper enforcement. Social conditions associated with low education level, availability of information, lack of training and education has further aggravated the situation.

The working conditions and negative impacts on the environment have been a growing concern over the past by the industry, social groups, NGO's and local and international media. A comprehensive plan of actions needs to be in place to improvise the current situations in those countries where proper training and education has been spotted to be of utmost priority.

1.2 Aims and objectives of the study.

There have been several studies on the economic, social and the environmental aspects of this industry. But the developments of the training relating to occupational health and safety are less documented.

The aim of the study is to identify the training needs and to analyze the existing practices in order to find the way of improvement.

To achieve this goal and to improve the validity/accuracy of the work, this research will cover:

- The history and processes of ship breaking industry in Bangladesh
- Evolutions of the industry since inception to the current dates
- Present transitional status of the Industry
- Legal status and directives by competent authority
- Examining the existing facilities for education and training

1.3 Methodology of the study.

A literature review will be carried out encompassing both Bangla and English literature and published articles, reports, media report, local information, various

reports from NGO's, print and electronic media, government statements, newspaper articles (Including Bangla), various documentaries and seminars, research online, where possible in Bangla. This documentation review will provide an overall idea of the shipbreaking activities in general and in particular about Bangladesh breaking yards.

In addition, following has been examined and investigated:

- Examined the legal instruments and directives by Bangladesh authorities with regard to this industry.
- Investigated the yard structures with identification of working groups.
- Investigated the present training facilities and training curriculum.
- Investigated the administrative network and support.
- Investigated the principles of maritime training institute and training programs to find possible similarities with the shipbreaking activities.

An on field qualitative research was also conducted by author from 16 May - 7 June, 2012 with practical visits to the yards, training institute and other offices. Above research focused on workers within and outside the yards including training institute but not excluding other important stakeholders. In addition to the main focus group, author also interviewed four other important stake holders.

Additionally author conducted a quantitative interview of 100 workers within and outside the yards and in training institute.

Information concerning details of this qualitative and quantitative research in Chittagong is available in **Appendix A**.

Chapter II

The Role of the Ship Breaking Industry in Bangladesh

This chapter is outlined to introduce the ship breaking industry in Bangladesh and its geographical advantages with economic aspects in local and global context and finally will make a rationale for locating the industry in Bangladesh.

2.1 Background of ship breaking in Bangladesh.

A certain number of socio economic parameters prompted the industry to develop in Bangladesh and flourished in fast.

Basic social and Geographical parameters:

Bangladesh is situated in a delta region connected to the Bay of Bengal with bordering country of India and Myanmar. Bangladesh has a total area of land 147,570 sq.km with its capital in Dhaka. The population is approximately 160 million with GDP per capita \$735. Over 40% of the total population lives below poverty line where the literacy rate is about 48% only (The World Bank, 2011).

On the other hand India and Pakistan in this region has a GDP of \$1489 and \$1194 with population below poverty line 25% and 24% respectively. The literacy rate of these countries is 61% and 50% respectively compared to Bangladesh with 48%. If we compare this region with any of the OECD countries, as for example the 'United Kingdom' whose GDP \$38,818 with literacy rate of 99% and population below poverty line is 14%, it is quite distinctive of the comparative position of these three countries (Index Mundi, 2012). (See **Figure 2 and 3**).

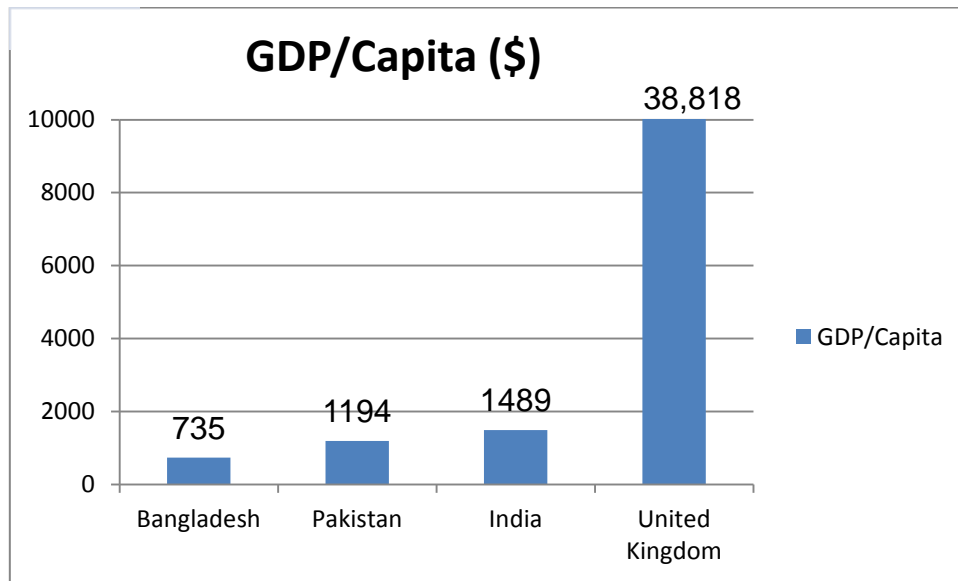


Figure 2: Shows country wise comparative data of GDP per capita, (Data source: World Bank, 2011).

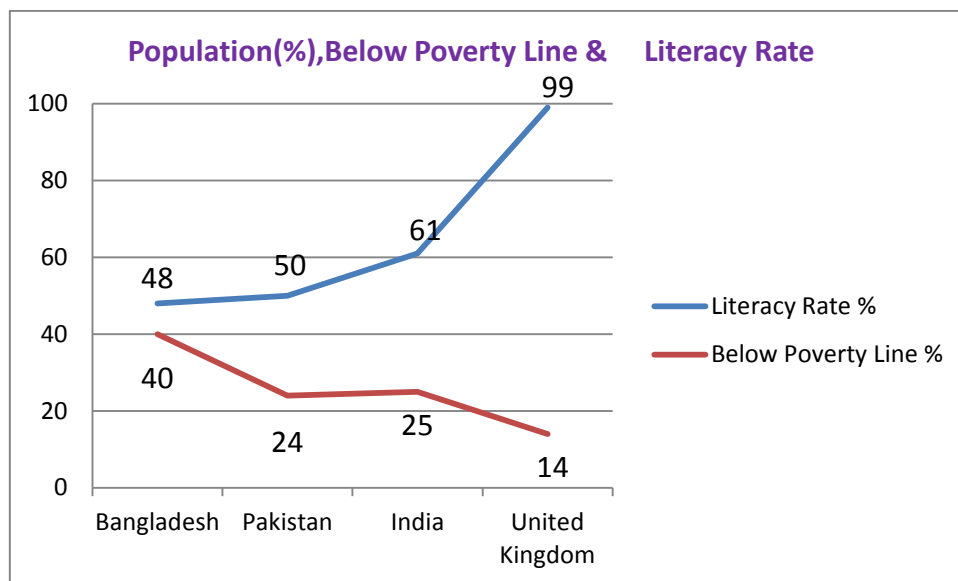


Figure 3: Shows country wise %age of population by literacy rate and living below poverty line.
(CIA World Factbook 2011)

The poverty of the population and the unemployment rate participate in the competitiveness of Bangladesh in the shipbreaking industry.

The country's main sea port is Chittagong, which is close to the beaching yard approximately 10 km away from Chittagong Metropolitan City. The main bay is connected to the river Karnafuly giving the gateway of Chittagong Port and the rest flows parallel to the coast and gradually emerges into main river streams. The major breaking yards are situated between Fauzdarhat and Kumira under Shitakunda Upazila.

History of ship breaking in the Chittagong area:

In 1960 when a devastating cyclone gave birth to a misfortune, blowing and grounding of 'M.V Alpine' near Shitakunda, a coastal belt of Chittagong. Eventually the owner abandoned and sold the vessel to local metal workers called "Chittagong steel house" who scrounge it for scrap metal and materials, and it took them several years to completely dismantle the vessel. This led the misfortune to turn into a fortune for the local population and the entrepreneurs. During the liberation war in 1971 ships were also bombarded and obstructed the navigation channel which prompted salvage of wrecks, thus cementing the way for dismantling. This has encouraged the local entrepreneurs who found it a business opportunity in terms of re-roll able scrap metals and other fittings, fixture and equipment which could be sold as secondhand utility. A huge number of workers could manage to get a steady job unlike farming where there is off seasons. Gradually a large infrastructure, a significant number of linkage industries and supply chain shops developed. By the 80's Chittagong ship breaking yard commercially entered into the business which boomed by the mid 90's and became one of the leading ship breaking nations in the world.

Back in the 90's there had been only 36-40 yards operating in this business. Currently due to increasing urbanizations and growing demand of scrap metals and profitability, the number of registered yards between 2009-11 increased to 125 (The Daily Azadi, 2011). Some of the yards are big enough to accommodate 3-4 ships at a

time. The expansion of this growth has certainly increased the global capacity as a whole.

Currently **44** yard has been awarded with **ISO 30000:2009** and **13** yards are in the process of obtaining same. **Thirteen** yards have been issued with **ISO 9000-2008, ISO-14001 and OHSAS 18000**; others have applied for same (Captain Anam Chowdhury, 2012).

Process of scrapping ships:

The process of breaking in Chittagong involves initially physical beaching of the vessel to the specific yard and this is generally done during maximum high water time, which is about 50-100 meters (depending how efficiently is beached) from the main yard. In the next high water the vessel is further pulled towards the yard with the help of mechanized winches and the same continues as the vessel is lightened by removing of stores, machineries and all other removable items.

Primary cutting is done during the intertidal zone at the beaching yard with big chunks of section about 20-50 MT each, which are pulled on to the shore yard for additional cutting known as secondary cutting area. The customized cutting, resizing the plates into truckable size, sorting, segregating, loading, delivery is done in the secondary cutting area. On an average, a 10,000 LDT size ship takes around three months to complete the whole process. (See **Figure 4**).

Dismantling At a Glance



Figure 4: Showing the scraping sequence. (Courtesy: Capt. Anam Chowdhury, BSBA)

2.2 The advantages derived from the geographical location

Geographically, Chittagong ship breaking yard is situated near the port city of Chittagong which is connected to the Bay of Bengal. A gradual continental shelf, the width and depth of water allow even to accommodate the largest tankers of the world.

Moreover, it is located in the middle hub of the main stream of east ~ west bound traffic routes, as well as at the intermediate distance from the main sale and purchase market of scrap vessels based in Singapore and Dubai. This allows ship owners to

take advantage of the sailing time and cost for their vessels to be destined for beaching.

Chittagong breaking yards are soft, sandy and muddy marshy land with an appropriate slope as better resting ground. It has an extended uniform long intertidal flat beach with 6 meter tidal gauze. Generally the weather is stable round the year and there is no particular sensitive area around the breaking yards. It is connected to main (Dhaka-Chittagong) highway giving easy accessibility for connecting transportation. Numerous linkage industries have developed on both sides of the road centering the breaking industry.

The Industry also generates various job opportunities for the skilled, semi-skilled and unskilled workers. An estimation of 24, 41,000 workers with additional 8, 00,000 daily wage laborers are employed in the total linkage domains. If considering 6 persons in a family, than over 19 million people are earning their basic bread and butter (Rice and Dhall) from ship breaking and linkage industries (ALAM, 2011). (See Annex 6).

2.3 Economic interest of this industry in local and global context.

In a global context there has been a global shift of this industry since the 80's and currently these activities are concentrated mostly in 5 major nations: India, Bangladesh, China, Pakistan and turkey. These five major countries contribute 97% (GREY, 2012) of global volume where Bangladesh takes a share of about 30%. Since 2004 there has been a remarkable increase in the volume handled by Bangladesh which never fall below 40% of the market share and eventually in 2009 became the top leader in this industry. (See Table 1 and 2).

Table 1: Number of ships and volume of LDT handled by Bangladesh between 2000 and 2011

YEAR	NO. of Ship Dismantled	Amount of LDT(MT) handled
2000	73	892,756
2001	152	1,909,055
2002	84	1,519,735
2003	88	1,088,338
2004	145	1,333,667
2005	94	840,927
2006	187	132,0170
2007	103	774,065
2008	172	1,660,212
2009	175	2,192,751
2010	107	1,296,831
2011	150	1,898,102
TOTAL OVER THE YEARS	1530	167,26,609

(Source: BSBA administration)

Table 2: Global Statistics: %age share (LDT) by five major shipbreaking countries.

YEAR	BANGLADESH	CHINA	INDIA	PAKISTAN	OTHERS
2000	5	26	44	5	6
2001	28	21	36	10	4
2002	22	26	44	4	4
2003	14	31	42	3	10
2004	40	19	27	2	12
2005	45	7	24	1	23
2006	57	5	29	2	7
2007	42	5	35	10	9
2008	49	9	36	3	3
2009	38	15	36	10	1

Data source: EA Gibson ship brokers. (Courtesy: BSBA administration)

Further details of market share in terms of DWT and GT can be found in **Annex 7**.

This situation as major shipbreaking nation is related to socio-economic factors of Bangladesh.

Labor market driver:

Bangladesh is one of the most densely populated countries with nearly 160 million people. **Table 3** shows the population density of Bangladesh ranking as the top compared with other nations of the world.

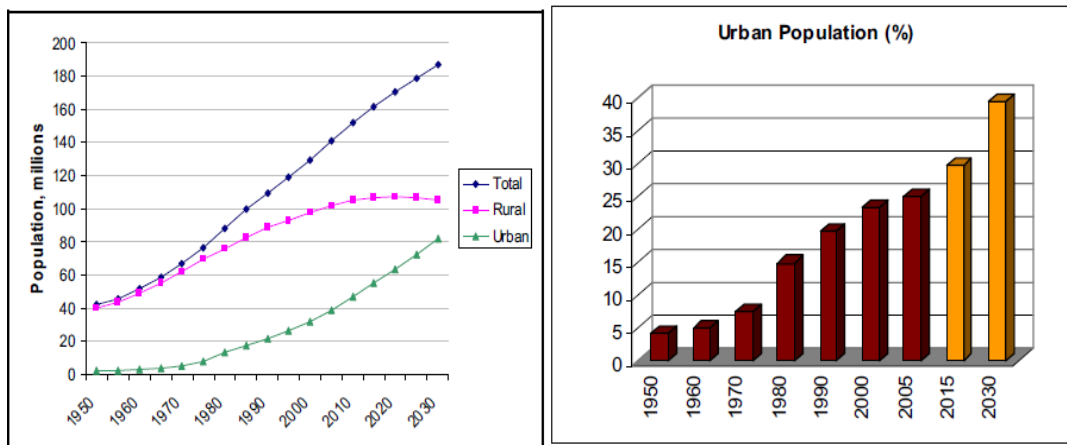
Table 3: Comparative data of population density between the major shipbreaking and OECD countries.

Country	Bangladesh	India	Pakistan	China	Turkey	USA	Norway
Density of population in World Ranking	12 (1101/ sq. km)	31 (362/ sq. km)	51 (235/ sq. km)	76 (139/ sq. km)	97 (100.5/ sq. km)	173 (32/ sq. km)	201 (14.49/ sq. km)

(Data source: CIA world fact book 2011)

In 2011, it is estimated, Bangladesh population growth of is 1.5666%. Urban population is estimated to be 27% of the total population. The rate of urbanization is estimated 3.5%, annual rate of change estimated between 2005-2010 (The World Bank, 2012).

Figure 5.1: Urbanization in Bangladesh



Data Source: UN World Urbanization Prospects

Figure 5: Shows the trend in population growth against rural and urbanization development with projection.

This upward and downward trend of urban and rural development with steady population growth is likely to increase the number of unemployed people. This large population growth leads to huge unemployment as well as development which eventually create job opportunities in return for the unemployed people. Moreover the urbanization growth rate has triggered the much needed infrastructure development with an increasing demand for steel.

Bangladesh is a developing nation with an emerging economy where the GDP growth rate is less than 7%. As such, growing infrastructure development with continuously expanding urbanization is underway.

Job scarcity and wages structure driver:

Bangladesh needs to create up to 1.5 million new jobs each year for the next 20 years (The World Bank, 2012). There is currently limited number of jobs in both the public and private sectors. As such a high degree of competition is evident to find a job. Moreover certain educational qualification and skills are pre-requisites even to find a job at the bottom scale.

With more than a 50% of illiteracy rate there is huge scarcity of jobs especially for the unskilled category. Because of lack or no education they remain mostly as floating workers. They do not hesitate to undertake any odd jobs for survival. They are mostly employed through various labor markets on a daily basis. The general conditions of this type of job is such that there are rarely employment agreement and related job benefits thereto other than earning agreed daily wages and extra through overtime.

The minimum wage structure in public sector starts with Taka 4000/month as basic salary (eqv. \$47) with other government applicable allowances and service benefits and job security. They generally work for 5 working days in a week with 2 days holiday. The average daily income on the basis of gross monthly salary is estimated to be about Taka 350 /day (eqv. \$4/day).

The general unskilled labor wages vary widely according to the nature of job. However minimum average daily wage outside the shipbreaking industry is around Taka150-300 (eqv. \$1.8-3.6)/day but with no guarantee for a next day job.

On the other hand, ship breaking workers minimum wages stipulated by government is Taka4625/Month. However usual pay system for most of the workers is on hourly basis which begins with taka 25-30/hour, with 2-4 hours overtime i.e. for 10-12 hours works/day, SBRI workers can earn on an average Taka300-360/day. That makes them earn more than \$100/month with steady job security and increased remuneration with experience.

So with no skills and education shipbreaking workers can earn more than in other equivalent minimum wage sector. Additionally, workers are also provided with free accommodation either inside or outside the yards. Moreover, working together with their known natives, communal living is also an added attraction to find a job in the shipbreaking industry.

Steel and infrastructure driver:

Basically country does not have any iron ore as raw materials of steel. There is growing demand for construction materials in the local market. Against the yearly demand of approximately 5million MT of steel, the ship breaking industry alone supplies more than 60% to the local steel production (Shaber, 2009). In addition, 90% of the local/coastal vessels are constructed, repaired and supplied with equipment from the steel and equipment recovered from the breaking industry (Chowdhury I. u., 2011).

Ships destined for breaking also contains non-ferrous metal like copper, brass, aluminum, bronze, nickel and lead. They also contain other non-ferrous items like gun metal and white metals which are precious and expensive. Depending on the ship, there is 1-3% non-ferrous metal in every ship according to local ship breakers. The price for the non-ferrous metal varies between \$1000-\$5000per ton depending on the size and quality (Haroon, 2010).

These are very attractive items to the local traders although locally there is very little use of them. However most of them are exported to Europe, Japan and the neighboring country India. According to Captain Anam Chowdhury, a senior consultant to BSBA says about 40,000-50,000MT of such metal lands each year in the breaking yard. According to a local exporter 100 containers of such metals weighing about 2000MT are exported every month (Haroon, 2010).

Further Bangladesh is also gradually emerging into a steel exporting nation. In 2009 about 85,000 tons of steel were exported to African Countries (Khan J. U., 2010). Low production cost and quality has made the country a competitor to major steel making countries (See figure 6).



Figure 6: Shows Steel export from Bangladesh between 2004-2009 (The Daily Star 6 March, 2010).

A Seminar presentation on ‘Ship Breaking and Its Impacts on Steel Sector of Bangladesh’ organized by Materials and Metallurgical Engineering (MME), BUET on 27 May, 2011 shows, against 5million tons of steel demand per year, would require additional energy of 12.5mil MW yearly with greenhouse gas emission of 29 million tons per year which would eventually drain of 2.5billion USD/year. A country like Bangladesh is not in a position to afford this (Islam, 2011).

An EIA study by MECON-1997 was conducted with Gujarat Maritime Board shows the environmental assessment comparison between natural resource consumption and the associated cost involved in producing One million ton of steel through steel plant versus ship scraping metals (Sharma, 27-28 February,2009). (See Table 4).

Table 4: Shows comparative natural resources needed for steel plant opposed to scrap metals

Natural Resources	Requirement for steel plant	Requirements for Ship recycling
IRON ORE	1.75 million MT	NIL
FUEL (coal & Furnace)	1.55million MT	NIL
Process Chemical	40,300MT	NIL
Electricity	2,300MW	450MW
Water	25-60MMC	913MC
Solid waste aspects	4,39,500MT	6250MT
Land Requirements	5000Hectors	120Hectors
Cost Aspects	Taka 30 Bill, equivalent \$429Mil	Taka 1.5Bill,equivalent \$22Mil, i.e 1/20th

(Source: Atul Sharma, Gujarat Maritime Board, And Courtesy: BSBA)

Ship breaking scrap products are cheaper than ingots from the electric arc furnaces, billets and the semis from the integrated steel plants. However they do not produce high grade of steel but rods of various grades such as 40 and 60 TMT bars and angles which are popular as local construction materials.

Second hand machinery and equipment driver:

According to local perception, ship's equipment and machineries are believed to be more robust and durable. They are much cheaper than new purchases. As such there is strong demand for machineries such as generator, boilers, pumps and electrical fittings to the local industries as well as export of the same after overhauling/reconditioning. Other fitting fixtures such as kitchen fitting, furniture's

and bath room fittings have very high demand locally as household utility. Other items like LSA, FFA and bridge equipment are sold locally to the merchant vessels and to the local coastal vessels. 99.9% of a large ship finds a secondary and productive use in the dismantling countries (GREY, 2012). A case study by BUET was conducted with a sample ship of a 5000LDT multipurpose vessel and shown the usability of materials and percentage of recyclable items (Kh. Akhter Hossain, 2010). (See Table 5 and 6).

Table 5: Shows the Use of Materials/Machineries Collected from sample ship.

<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

(Source: Dept. of Naval Architect & Mar. Eng, BUET)

Table 6: Shows the 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

(Source: Dept. of Naval Architect & Mar. Eng, BUET)

To conclude, the ship breaking industry plays a valuable role in a country's economy at both the micro and macro level. It generates revenues of about 118-132mil USD per year for the government through various tax mechanisms (Chowdhury I. u., 2011).

The industry employs over 300 people for every 150,000USD invested in this industry (Chowdhury C. A., 2010). In Addition, Re using of the machineries and other items encourages the small scale industries by reducing their capital investment. This Sector also provides about 35,000tons of processed wood and furniture's annually and hence preventing deforestation. Industries yearly turnover

and contribution to the national economy is about 1.5 billion USD. Annual export of precious materials recovered from scrap ship is about 32 million USD (Chowdhury I. u., 2011).

In addition, the industry also provides business opportunities locally and internationally to shipping agents, financial institutes, banks, cash buyers, ship brokers, marine traders, transporters and gas plants. Ultimately, it brings a significant value for the ship owner at the end of life ship.

However, a strong market competition exists between the neighboring countries of India and Pakistan who also use the same beaching method as Bangladesh. On the other hand, China and Turkey having different methods of the dismantling process do not directly fall in the same competition and category.

2.4 Rationale for locating the ship breaking industry in Bangladesh

This chapter will highlight the linkage between the shipping and ship recycling industry showing market dynamics and modalities. It will also analyze the current recycling market with future trends. Finally a rationale of this industry with the local market will be made.

The direct link with shipping trends:

The Shipping industry is a dynamic business sector mostly driven by world economic growth. It is also a capital intensive business. Capital cost is a major part of the investment made by a ship owner. Ship owners always look for pay back taking into account depreciation and value recoverable from the demolition market.

Shipping markets experience ups and downs which conversely influence the demolition sector. Between 2004 and 2008 shipping saw unsurpassed freight rates as a result of high demand for maritime transportation. This high demand kept even older ships in operation during that period. This results in a record low number of vessels being offered for scrapping.

On average 700-800 ships of larger than 499GT are scrapped annually, but during that booming period demolition market was offered with 300-400 ships only (Sarraf, 2010). The shipbreaking industries do go along as reversal with such trends. Martin Stopford's, (2009) model which shows how cash flow has interplay in four different markets (the freight, demolition, sale purchase and shipbuilding). (See figure 7).

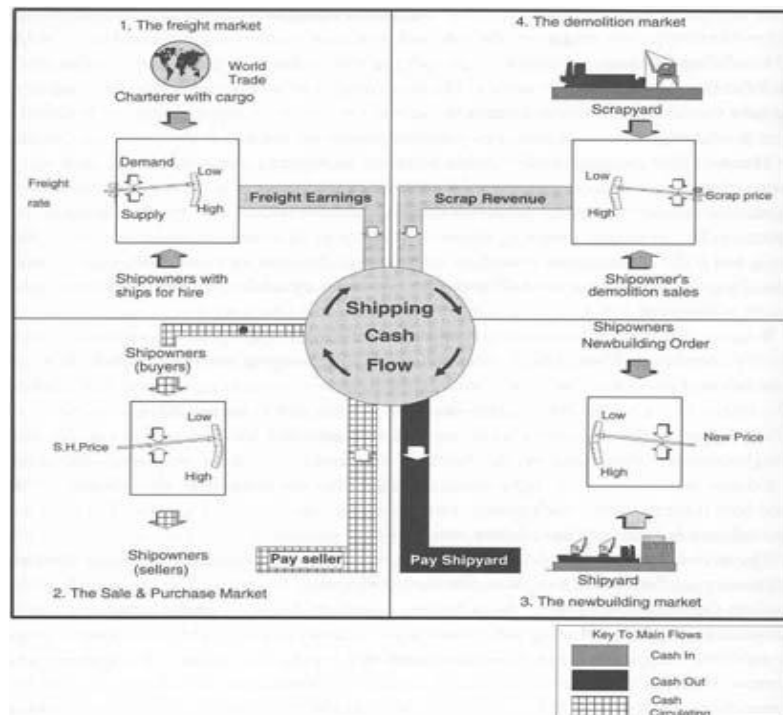


Figure 7: Shows the shipping cash flow from demolition market (Martin Stopford , 2009).

The demolition market reflects closely with the trend of the freight market. Generally, if the freight market is high, then there will be less business for ship scrapping and subsequently the price in the demolition market may go high and vice versa. In addition the oversupply of tonnage also drives the demolition market eventually for a market balance. In the wake of the 2008 global financial crisis, the international trade shrunk and shipping market suffered, but the demolition market was quite active. Regulatory regime such as phasing out of single hull tankers by 2015 has significant volume of impact on the demolition market as well.

The general expected volume of the demolition due to ageing of ships is added with further increase in volume depending on the global economy. The continued weakening of charter hire rates in 2011 became the third biggest year ever for demolition of 41Mil DWT. The first being in 1986 with 44Mil and second being in 1985 with 43Mil DWT (MCCARTHY, 2012). “If past experience is anything to go by steel traders can look forward to a bumper 2012 for the supply of vessels for recycling. If macroeconomic conditions in 2012 continue to underwhelm and scrap prices stay at their recent high levels, this year could easily surpass 1985 as a peak year for demolition (Braemer Seascope)” (MCCARTHY, 2012).

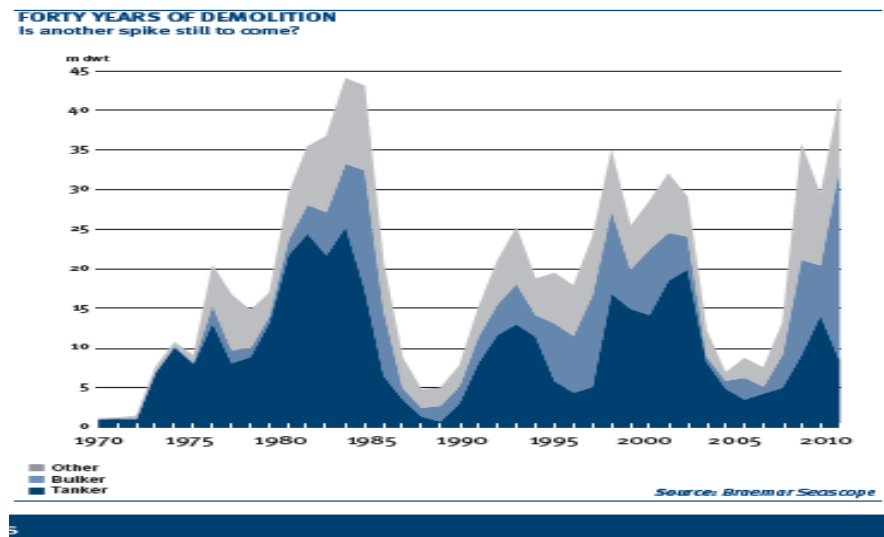


Figure 8: Showing the trends of demolition market in last Forty years (Lloyds list 8 March, 2012)

The trend in near future:

It is estimated that over the next five years, the number of ships being sent for demolition will increase dramatically as a direct result of the over-building capacity between 2008 and today. As freight rates climbed during the early and mid-2000, ship owners increased their orders for new builds to accommodate the anticipated increase in trade.

As a result the number of new ships entering the global fleet each year has grown significantly since 2008. It is estimated that in 2011 a new bulk carrier is being commissioned every eighteen hours. With freight rates still quite low, these new building programs have created a large overcapacity. Ship owners are being forced to re-evaluate their profitability of their fleets. One obvious outcome will be that older vessels will be sold for recycling. This will greatly increase the supply of the ships for the shipbreaking industry.

On the demand side, the demand for ship recycling is driven primarily by the demand of scrap metal in South Asia. Driven by economic growth in these countries, the demand for demolition vessels is a direct function of the steel price in these countries. Importantly it is also a function of the cost associated with the breaking industry itself in particular the labor cost which is one of the important cost factors in the equation (<http://www.dtashipping.com/>).

Table 7: Shows the cost distributions and profitability in Bangladesh and Pakistan.

Table ES 2. Main cost and profit margins of ship breaking and recycling in Bangladesh and Pakistan, mid-2009 (recalculated to percent for comparison)

	Bangladesh	Pakistan
Costs		
Purchase of ship	69%	70%
Labor costs	2%	4%
Consumables	5%	4%
Financial costs	3%	5%
Taxes, tariffs and duties	5%	13%
Other costs (incl. investment costs rents, and other costs)	1%	1%
Total costs	84%	97%
Comparable profit	16%	3%

(Source: World Bank, 2010)

Despite the various influencing factors on the demand sides, with the current trend an increase of ships for recycling is inevitable (MCCARTHY, 2012).

The five major countries India, Bangladesh, Pakistan, Turkey and China take the major market share of 97% (GREY, 2012). India, Bangladesh and Pakistan alone take a share of 70-80% of the global volume (World Bank, 2010). From 2004 to 2008 the Bangladesh market share was never below 40%, which made the country leading in 2005-06 (See **Table 2**). All major ship breaking nations are emerging economies and therefore the global economy has a knock-on effect.

There is huge potential in SBRI both locally and in a global context in terms of business and financial return for the ship owners. There is strong market competition between India, Pakistan and Bangladesh in the demolition market and Bangladesh most of the time being bullish (upward market trend) paying on average the highest per LDT (See **figure 9 and 10**). This strong proposition has kept the country as major ship breaking nation over the past three decades.



Figure 9: Average Demolition market of Cargo vessel price per LDT, Country wise. Source: EA Gibson Shipbrokers. (Courtesy: Dr. N. Mikelis, IMO)



Figure 10: Average Demolition market of Tanker price per LDT, Country wise. Source: EA Gibson Shipbroker. (Courtesy: Dr. N. Mikelis, IMO)

In terms of global capacity four major Asian Ship breaking nations of India, Pakistan, Bangladesh and China have the capacity of 12m LDT. In 2011 alone 8.5-9.0 mil LDT was sold for recycling (LEANDER, 2012). In the current scrap trend, it is not unlikely to accommodate an expanded volume in the near future.

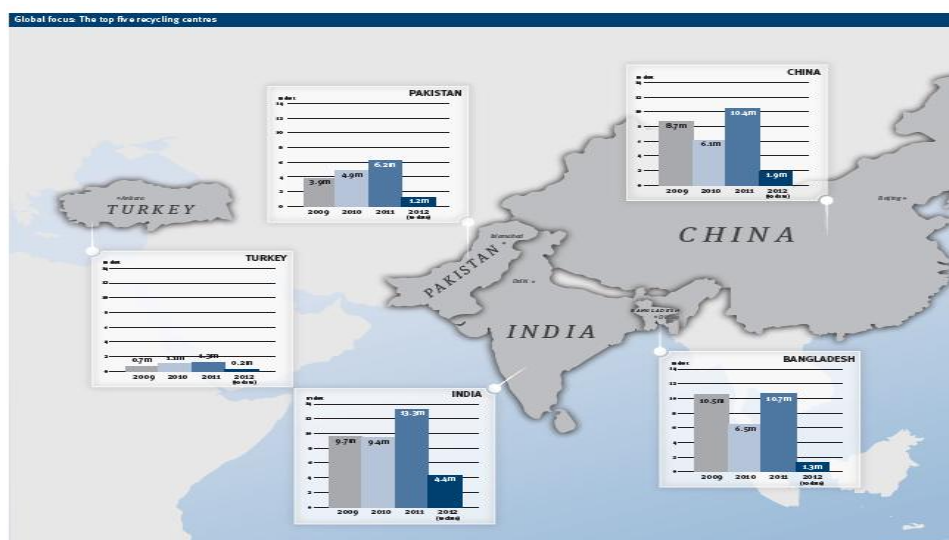


Figure 11: Global statistics of 5 major ship breaking nation, (Source: Lloyds list special report, 8 March, 2012)

The impact of local markets on breaking yards:

The basis for the sustainability of this industry is the demand of end products and the downstream industries. For shipbreakers, otherwise there is little point in purchasing vessels if they cannot sell the scrap to be remolded into new plates or rods or the materials/machineries cannot be resold. So steel demand in individual recycling nations has a direct impact on the volume of ships that the yards will be interested in purchasing for dismantling. (See Figure 12)

Figure 2.1 Ship breaking: Supply and Demand

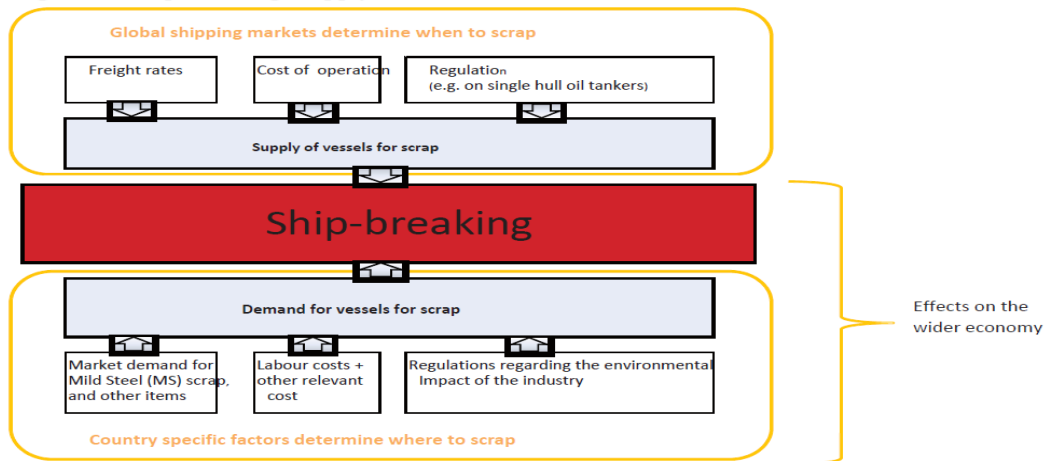


Figure 12: Determining factors of supply and demand for ship breaking (World Bank, 2010)

The demand for construction materials in Bangladesh is underpinned by the continuously expanding urbanization process in a country with very large population. The downstream demand for steel scrap has been a major driving force in the growth of SBRI in Bangladesh. Also low labor costs, huge numbers of laborer availability, technical know-how gained over the years, willingness to work in hazardous atmosphere and growing infrastructure development, coupled with socio economic conditions have contributed a lot towards sustainability of the industry locally. In addition, the natural conditions of high tidal gauge and wide beaches with appropriate slope are unique for Bangladesh. Hence it is not likely that SBRI will

relocate on a large scale from Bangladesh in the immediate future (World Bank, 2010).

In conclusion, the ship demolition market usually moves contra-cycle with the shipping market even in global economic downturn. The major market share remains mostly in five major countries without much to build in any other region. The major driving force for this industry is the local steel demand, abundance of workers with cheap labor cost, downstream industries, and geographical features. Considering all these factors Bangladesh remains as one of the strong competitors in this industry and is likely to sustain in the future as well.

Chapter III

Major Issues in shipbreaking industry and Addresses by local Authority

This chapter will highlight the major issues such as workers' health, safety and environment involved in ship breaking industries and how these have been addressed by the local government.

3.1 Two major concerns related to the shipbreaking business

Shipbreaking is considered to be the most sustainable way of disposing end of life ships. The majority of these find their final destination on the beaches of south Asian countries. These ships contain many hazardous wastes as defined by international law. Consequently, various NGO's have identified the environment and occupational health and safety (OHS) as major issues in shipbreaking industries.

Environmental effects:

The dismantling process in this region is carried out on the beach yards without containment. The soft, sandy, muddy tidal flats thus allow the sludge and other contaminants to directly flow into the marine environment affecting the coastal ecosystem.

A few studies in the past have shown high level of contamination causing the pollution of essential groundwater reserves as well the tragic loss of local fisheries and associated jobs (DNV 2000, Greenpeace 1999, 2001, 2002, YPSA, 2006).

Occupational health and safety:

The workers involved in this industry are often exposed to the hazardous materials inevitably leading to occupational diseases and illness. Chronic health affects results from physical exposure to asbestos, lead and other heavy metals and organotins such as TBT, PAHs and PCBs (Greenpeace, September,2002).

Furthermore, workers are most vulnerable due to low level of education, lack of information and adequate training, limited or no use of PPE and lack of emergency response capacity. Frequent accidents are common causing loss of lives in this industry.

ILO in 2004, listed a high number of hazards that are likely to cause work related injuries and death, illness, diseases and incidents among shipbreaking industries. They are grouped in different categories (**See Appendix B**).

The combination of beaching methods and exposure to hazardous wastes makes the working environment of ship breaking very dangerous. This has been on the spotlights around the world. The two main issues are discussed separately in the following sections.

3.2 Environmental Impact of Ship Breaking

Historically, ship breaking in Bangladesh has been done in yards located on beaches. Most of the job is done manually. There is no hard barrier along the yard which otherwise could protect the contaminant, soil and others to directly fall into the sea. The process is carried out in an open environment where there is no method of containment.

Much of the material assumed to remain on the beaches will be due to the quality of yard housekeeping practices, allowing spillages and leakages of hazardous materials or their escape during normal handling, for example, torch cutting of painted metals not mechanically cleaned

before cutting. The lack of hazardous waste disposal and treatment facilities in Bangladesh and Pakistan means that wastes produced must nevertheless be disposed of somewhere. Therefore informal disposal may also occur on the beaches themselves, on adjacent unused plots, or on other nearby land” (World Bank, 2010, p-32).

While stringent environmental regulations were redefined in China, the country modified its industry practices. The recent introduction of stricter environmental and safety laws in China has arguably made the industry less profitable, but has in no way brought it to a halt (L.Jones, 2007).

Today, Turkey and China use different methods of scrapping to fulfill their national requirement and promote their practices to attract some segment of the ship owning community. They use containment so that contaminants are controlled from directly flowing into the water. Turkey uses the hard land for cropping the big section and secondary cutting area is protected with a deep drainage system. On the other hand, China uses floating docks and alongside quay where the sections are cropped horizontally downwards from top thus the hull itself acts as retainer.

In Bangladesh, the lack of containment generates serious worries concerning the impacts of hazardous materials in the coastal zone of Chittagong.

Most of the shipbreaking 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.

Heavy metal, PCB's, POP's, sludge and bilges contained in ships are often released in the open beaches and spread by seas affecting the marine environment. Improper storage and disposal of scrap metal and waste contaminates the soil and groundwater resources, causing acute and long-term pollution. (Platform on Shipbreaking, 2009).

“Wastes of the scrapped ships are discharged directly into its adjacent areas which are ultimately draining into the Bay of Bengal. These wastes especially oil and oily substances, PCBs, TBTs, PAHs etc. and different types of trace and heavy metals (Cd, Pb, and Hg) are being accumulated into the marine biota. As a result, marine fisheries diversity of the Chittagong coast that supports highly diversified marine water fishes, mollusks and benthic organisms etc. is at stake right at the moment” (Prabal Barua, 2012).

Recent World Bank research (2010) found soil contamination in beaching sites of Bangladesh and Pakistan. This contamination is indicative of the threats to the environment caused by the practices and improper management of hazardous materials during the dismantling of ships.

Moreover, large amounts of hazardous materials are likely to accumulate in both Bangladesh and Pakistan if the prevailing practices continue over the next 20 years. Based on the ship breaking work likely to be carried out in the yards in Bangladesh and Pakistan between 2010 and 2030, an estimate was prepared about accumulation of hazardous materials in the three countries assuming continuation of the prevailing practices (World Bank, 2010). The parameters of soil contamination and the table of estimated accumulated hazardous materials can be found in **Appendix C**.

Shipbreaking activities contaminate the coastal soil and sea water environment and thus impair ecological settings. The problem mainly associates with the discharge of ammonia, burned oil spillage, floatable grease balls and metal rust (iron) and various other disposable refuse materials together with high turbidity of sea water (Dr. Md. M. Maruf Hossain, 2006).

The oils on the water surface severely reduce the primary productivity, thus affecting the phytoplankton; zooplankton and turbidity of contaminant soil affect the intertidal benthos community. The shipbreaking activities also affect the coastal area of Chittagong, including all kinds of marine algae, kelp, seagrass, marshgrass and

mangroves. Because of the contaminants, the fish community has almost disappeared and the local fisher folks have changed their livelihood to some other alternative means. (DNV, 2001).

3.3 Workers Health and Safety Issues

The extent of occupational health and safety in the shipbreaking industry is a serious concern in Bangladesh.

Dismantling of oceangoing ships that are likely to pose hazards to the general health of the people at large. Government is concerned about the health hazards that the industry entails. Health hazards are admittedly associated with the way ships are dismantled by our ship breakers. Securities of the workers who are deployed in ship breaking industries are also often put on stake. Admittedly there have been disastrous accidents even in the past causing loss of life. It is an admitted fact that ships are embedded with such hazardous as asbestos, PCB, TBT, LEAD and other heavy metals which pose serious threat to the health of the peoples. It is also not in qualm that the forces employed for the industry are treated in an inhuman manner, where they are exposed to grave risk” (First Extension order, 2011){Cited from the contents of Hon’ble High Court judgment}.

The above extract clearly indicates the public concerns related to workers health and safety issues involved in SBRI which needed to be addressed meticulously.

In SBRI, workers suffer from various chronic diseases, illness and injuries. According to a study carried out by Roy (2003), it is indicated that, 88% of the workers suffered from some form of accidental injury from foot injury to larger accidents. 87% suffered from muscle pain, 72% have problems with eyesight, 52%

have breathing difficulty, and gastric problems occur in 81% of the laborers. Whereas, 56% of them suffered from skin diseases, 28% have other infectious diseases (Hossain, 2006).

Also frequent accidents are common causing loss of lives, losing organs and becoming incapacitated. The reason is the exposure to hazardous working conditions and the vulnerability of the workers due to lack of information, inadequate training, fire protection measures, lack or limited use of PPE and lack of appropriate emergency response. The above phenomena are common in the brick-making activities in developing countries.

Because of such working conditions, there have been numerous fatal accidents causing deaths and serious injuries in the past. Although there is no official statistics, it is assumed many of the accidents are under reported or even not reported. However according to national newspaper, 43 workers died and 92 others were injured in several accidents from 2008 to 2010 in the ship yard (The Daily Star, 2011). Roughly 1000-1200 people died over three decades (Greenpeace, FIDH and YPSA, 2005). **See Figure 13** for death casualties per record in local police station. Majority of the accidents caused due to lack of awareness and unsafe work procedure. The death toll gives a glimpse of the dark side of this industry.

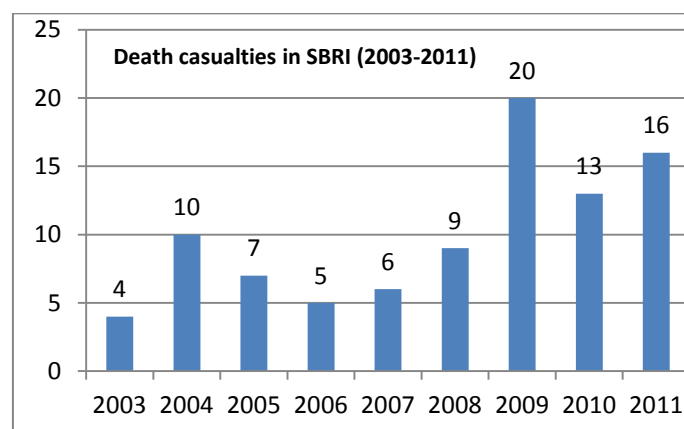


Figure 13: Statistics of death toll from 2003-2011 (Source: local police station, Courtesy: BSBA).

Scrap vessels contain a wide range of hazardous materials; particularly on ships built before the 70's. **(See Appendix D).**

Therefore, during the dismantling process, workers are often exposed to a large number of hazardous materials. They have little or no knowledge about the occupational health and safety which makes them vulnerable to harmful substances. In addition, the workplace generates excess heat, noise, radiation and vibration, which are also likely to cause deterioration of health conditions with short and long term diseases.

A high number of hazards identified by ILO in 2004 are likely to cause work related injuries and death and ill health. They have been grouped in seven categories such as:

- 1) Hazards with the potential of causing accidents, e.g. fire and explosion, falling and tripping, snapping of cables, trapping in oxygen depletion compartment, lack of PPE and housekeeping practices.
- 2) Hazardous substances and waste, e.g exposure to asbestos, heavy metal, PCB's, PVC, batteries, fire fighting liquids and welding fumes.
- 3) Physical hazards, e.g noise, vibration, radiated heat and radiation.
- 4) Mechanical Hazards, e.g lack of safety guards, equipment machinery failure, trucks and transport vehicles.
- 5) Biological hazards, e.g toxic marine organism, animal bite, risk of communicable disease and vectors of infectious diseases.

Ergonomic and physical hazards, e.g repetitive strain,

- 6) Monotonous work, excessive work load, long working hours, temporary employment and lack of education and social environment.
- 7) General concerns, e.g Lack of safety and health training, poor working organization, inadequate accident prevention and inspection, inadequate housing and sanitation, lack of emergency preparedness and lack of medical facilities.

In Bangladesh, because of low labor costs and lack of available machinery in yards, most of the breaking process is done manually. It is also understood that the application of the beaching method makes the accessibility of heavy equipment difficult, especially in the primary cutting area. Thus workers are very often exposed to various hazards.

Lack of Training and Personal Protective Equipment (PPE)

A vast majority of the workers involved in this industry have no or very low level of basic education. They are hardly aware of their occupational health and safety. The consequences of exposure to hazardous waste without protective measures are not known to them. Prior to 2011, there was no education and training scheme for these workers, as such they probably were not aware of associated work related hazards.

Moreover, workers are provided with limited or no protective gears leaving them exposed to these hazardous working conditions. This exposure to hazardous working conditions is further amplified by the inadequacy of training, limited or no use of PPE, lack of appropriate measures with regard to fire protection and emergency response (ILO, 2004). Therefore, they become particularly vulnerable to occupational hazards and hazardous materials.



Figure 14: Workers take out asbestos and glass wool from engine room of scrap ship, (photo: MM Hossain and MM Islam, 2004).

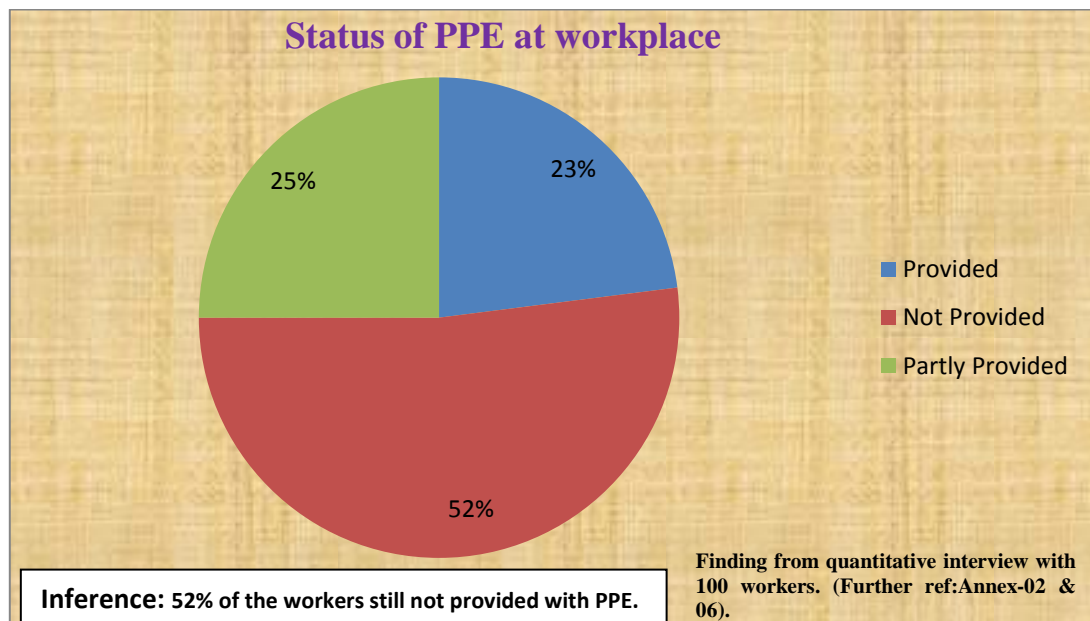


Figure 15: Shows the use and status of PPE at workplace.

Among others a comprehensive education and training program must be established for the improvement of occupational health and safety standards and also for the sustainability of this industry.

There are a number of other internal and external issues, all of which cannot be addressed in this study. This study will mainly focus on the education and training with regard to workers health and safety issues.

3.4 Addresses/Response by local Authority

As discussed in earlier chapters, the death toll in SBRI due to poor working conditions, and environmental degradation of fragile coastal area of Chittagong generated public concerns both locally and internationally. The media as well as several local and international NGO's, like BELA, YPSA, Greenpeace, NGO platform on shipbreaking and social activists were active in these issues and were trying to draw public attention known as a common NGO's strategy. During the

2000s and early 2010s, clear signals were sent to the industry: the past practices should change for the sustainability of the whole industry.

The beginning of the change:

The turning point of the industry evolves following various petitions by BELA which is enumerated in this discussion (BELA, 2004).

Writ petition: No.2991 of 2003 was filed by BELA before Honb'le High Court Division against various Government agencies and BSBA as Respondent.

Purpose: For legal protection on environment and labor in SBRI.

Main Urges:

- Shipbreaking activities causing pollution damages to coastal and marine eco system of Shitakunda area.
- Shipbreaking yard not having Environmental clearance despite national requirement under industry and factory law.
- Violation of labor related law and cause of fatal accidents.

Verdict: Rule Nisi (A court order to “show cause”) was issued to the respondents asking for show cause in the following cases.

- Why the agency responsible will not be directed to ensure that shipbreaking operations is undertaken only after obtaining Environmental clearance Certificate(ECC) under national Environmental Conservation Act'1995.
- Why they should not be directed to adopt detailed and appropriate Safety and Labor welfare measures under national legislation of Factory Act'1965.

- Why shipbreaking shall not be undertaken only after obtaining Gas Free certificate from DOE in order to prevent fatal accidents.
- Why import of scrap ships shall not be regulated in line with the requirements of the Basel Convention, 1989.

The concern on ships with hazardous materials

Writ Petition: No.3916 of 2006 was filed by BELA before High Court Division against responsible government agencies.

Purpose: To prohibit entry of Greenpeace listed hazardous ships.

Main Urges: Challenging the legality of the Entry of M.T Alfaship which was one of the 50 hazardous ships listed by Greenpeace.

Verdict: Subsequent ruling by the Court on 06.07.2006 stopped the said vessel entering into Bangladesh territory along with banning of import of all those 50 ships.

Concerns about workers Bill of Rights

Writ petition: No.23 of 2008 was filed by BELA before High Court Division against responsible government agencies.

Purpose: To establish Compensation for the deceased and injured labors in SBRI.

Main Urges: Appeal for Protection of the workers in the ship breaking yards seeking for adequate compensation to the deceased and injured laborers/workers against damages caused by explosion or otherwise in the yards.

Verdict: On 07/01/2008 the Hon'ble Court ruling served notice to the administrative bodies asking for show cause:

- Why they should not be directed to take measures to protect the workers employed in the breaking yards.
- The Court also directed to file a report before the Court stating number of workers died so far or injured as a result of casualties in the yards, reasons for such loss of life and or injury, amount of compensation given to the deceased families and the measures taken by them to prevent such incidents of loss of life and injury.

Significant ruling and reshape of the industry

The major significant change brought about in the industry follows the case below:

Writ petition: No.7260 of 2008 filed by BELA before High Court Division, versus 15 different responsible government agencies/departments and 4 other stake holders as respondents.

Purpose: Challenging the entry of the Greenpeace listed ship M.T. Enterprise into Bangladesh.

Main urges: Despite the previous High Court directives regarding refusal entry of “M.T Alfaship & SS Norway” and prohibition to further import of Greenpeace listed ship yet M.T. Enterprise made its entry into Bangladesh and was substantially dismantled.

Verdict: **The High Court Bench delivered verdict on March’ 2009 disposing the Writ Petition 7260 of 2008 gave as many as 9 (nine) directives, which are quoted below for ready reference (M.T Enterprize, 2011):**

- (1) So far as the vessel M.T. Enterprise is concerned the injunction on further dismantling of the ship will continue until such time as the respondent No. 17 (yard owner) obtained a clearance certificate from

the Department of Environment for the purpose of dismantling the remaining of the vessel.

- (2) The Ministry of Environment and Department of Environment are directed to immediately take steps to ensure closure of all ship breaking yards which are operating without necessary Environment Clearance.
- (3) The law-enforcing agencies, including the Police, Magistrate and local administration are directed to accord cooperation and assistance to the Department of Environment as enjoined by section 4(Ka) of the “Environment Conservation Act 1995 and the Rules framed there under 1997” in ensuring the closures of ship breaking yards operating without prior clearance from the Department of Environment.
- (4) The Department of Environment is directed to file compliance within 2(two) weeks giving details of what steps they have taken in this regard.
- (5) If and when the ship breaking yards or any importer of any vessel apply for clearance certificate, then the Department of Environment shall deal with the application expeditiously and supply the clearance certificate only upon satisfaction that all the facilities required for proper dismantling of the vessels, taking into consideration whether safety measures for the workers and the conservation of the environment and in particular disposal of hazardous waste generated by the dismantling process, are in place.
- (6) The Ministry of Environment is hereby directed to frame Rules and regulation for the proper handling and management of hazardous materials and wastes, keeping in view the Environment Conservation Act 1995 and the Rules framed there under, the BASEL Convention, 1989, the Factories Act, 1965 and Labor Act, 2006.

- (7) Thereafter the Ministry of Environment is directed to file compliance in this regard within 3(three) months from receiving a copy of the judgment.
- (8) The Ministry of Shipping and Department of Shipping are directed to ensure that hazardous vessels enlisted in the Greenpeace list of vessels containing hazardous materials are not imported into the country and when such vessels are imported after having been decontaminated at source or outside the territory of Bangladesh, the prior Environment clearance has been obtained on showing that adequate safety and precautionary measures have been taken for their dismantling in accordance with law.
- (9) The Government is directed to set up a High Level Technical Committee comprising representatives from the Ministry/ Department of Shipping, the Ministry/ Department of Environment, Ministry of Labor and Manpower, Retired Naval Officers, Academicians/Experts in the field of Marine Engineering, Marine Biology, Specialists in the field of Environment, Soil Science and Ecology, Hazardous Waste Management and relevant NGOs, such as BELA.”

Following the judgment, all 36 ship breaking yards had to close down their business as none of them had the environmental clearance. This decision by Hon’ble High Court triggered the industry to reshape and things started to take positive change.

Response by different stakeholders:

Subsequently, BSBA appealed to The Hon’ble High Court. BSBA sought short lived dispensation by way of some relaxation to the directions passed earlier so that they can import ships until such time the new Rules is formulated. They argued not only their members suffering financially but also the general peoples due to the ban. They aver that the Ban has created pressure on the job market, reduced supply of raw

materials to certain industries causing price hike of essential items and affecting country's economy.

Considering all the facts and circumstances and of the recent declaration of the ship breaking as an industry by Hon'ble Prime Minister's and **Her Unequivocally expression that the ship breaking industry shall be subject to maintenance of congenial working Environmental and Safety standard**, The Hon'ble High Court Conditionally relaxed the previous order for a limited time till the new Rule is framed.

Among other conditions a clear directives came with regard to workers training.

Subsequent to the court directions, on 26 January 2010, the government also formed a high-powered committee comprising various relevant agencies. Its purpose is to monitor and to take necessary steps in the interim period with regard to ship-breaking activities in the country.

Stringent regulation under construction:

However, the kind attention was further drawn to the Hon'ble Prime Minister forwarding a letter by 'NGO platform on shipbreaking' on 13 December, 2010 requesting intervention against the dumping of end of life ships, which exploit the workers and harm Bangladesh environment. Subsequently on 13 February, 2011 the Hon'ble Prime Minister declared the ship breaking as an Industry. Following this declaration, a gazette notification was published under the Ministry of Industry (MOI) on 21 April, 2011.

On 20 October, 2011 the Ministry of Industry, as the concern Ministry, has declared the ship breaking yards as "Industrial Zone" comprising 07 Mouzas under Sitakunda Upazila, Chittagong with a total land area of 317.73 acres comprising 125 registered yards.

After gazette notification by MOI, the dilemma of responsibility shifted from the Ministry of Environment and Forest (MOEF) to the Ministry of Industry. Since then Ship Breaking and Recycling Industry (SBRI) is administered and regulated under the jurisdiction of MOI.

The MOI under the earlier Directives from Hon'ble High Court finally formulated the long awaited. "The Ship Breaking and Recycling Rules, 2011" (SBRR) published under gazette on 12 December, 2011. Currently SBRI is regulated under the above mentioned legal instrument.

This rule also emphasizes on the terms and meaning of existing national and international instruments such as (Government Gazzete, 2011):

i) "National": Petroleum Act 1934, Explosive Act 1884, Bangladesh Environment conservation Act 1995(1st amended in 2010), Labor Act 2006(BLL), National Import policy order.

ii) "International": The ILO guidelines for Safety and Health in Ship Breaking activities, The Hong Kong International Convention for Safe and environmentally sound recycling of ship's 2009, BASEL convention 1989.

Formation of Special Board:

The formation of a special board, "SBSRB" within the scope of this law is another significant step. SBSRB will be acting as one stop service under the Ministry of Industry in integration with other government agencies. This board is the main focal point for the ship breaking and recycling activities. All the official formalities of arrival ship and subsequent breaking permission and monitoring will be done by this board. The board is headed by a chairman followed by a Director General with 4 different directorates. The organizational flow chart is shown in **Figure 16**.

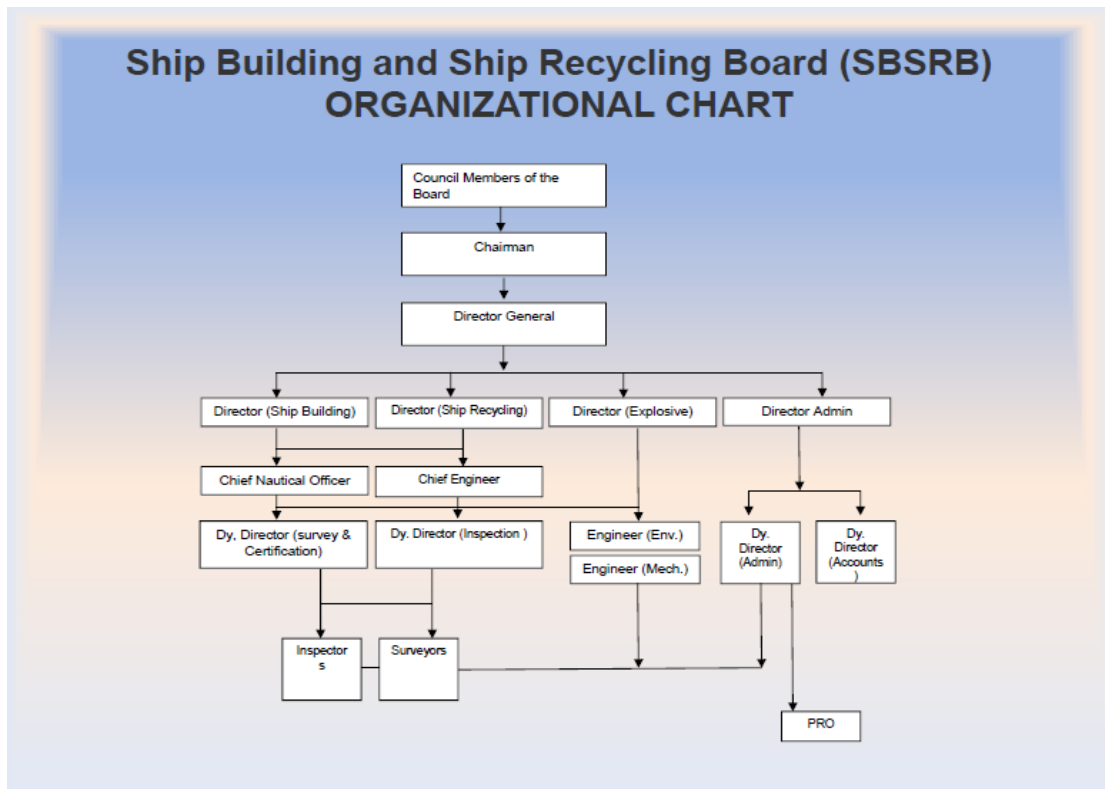


Figure 16: Organogram of SBSRB (Chowdhury I. u., 2011).

Conclusion:

The outcome of this long judiciary and political process is hoping to improve the industry through a better involvement of the government and its related agencies. The shipbreaking industry is currently taking a different shape than in the past. The changes are becoming more and more visible. However, it is an ongoing process which may require a considerable amount of time. There is presently a transitional period. This is a period of construction and definition of the future practices. The yards are slowly modifying their practices and relationships with the environment and workers. The goals are to enhance the reputation of the shipbreaking industry and to maintain its sustainability by addressing environmental and social issues and by developing transparency.

Chapter IV

Ship Breaking Yard

This chapter will give an overview of the yard structure and their mode of operation. Different working groups within yards and their work procedure will be identified.

4.1 Introduction to yard structure

There are presently 125 (The Daily Azadi, 2011) registered ship breaking yards in Chittagong, but not all of them are in operation. Some of the yards are owned by individual owners, some are with joint ownership and some owners own a few different yards at the same time. Some of the yards are large enough to accommodate 3-4 ships simultaneously and some are of the standard size prescribed by the authority.

A few yard owners have their own downstream linkage industries such as re-rolling mill and steel plant, gas plant but most of them do not have these facilities. Yards and yards owners are all different. It is hard to identify a uniform management set up of this industry. There is no hard and fast rule how the management system should look like. As such it all varies with the taste of individual yard owners. They are presumably free to manage their business in their own way.

However, recent SBRR, 2011 Chapter VII Para.30 requires “OSH management systems should be implemented by each recycler for achieving acceptable level of occupational safety and health and environmentally sustainable conditions”. Main components of OSH management system should include:

- OSH policy
- Establishment of responsibility and accountability, awareness and training, documentation, communication and information.

- Hazard and Risk assessment; planning and implementation of OSH activities.
- Evaluation, Review and corrective action for improvement.

Despite their differences, yard structures share some similarities. The author had personal interaction with yard owners, managers, supervisors, foremen, so some common points were found. They will be enumerated in the following discussion in order to provide a general idea of the management set up.

The majority of the yard owners have a corporate head office in the main city of Chittagong who controls and administers their business. Each yard has a site office that looks after the day to day operational activities, local administration including delivery and receiving of materials.

Each site office is headed by a manager with supporting staff. They maintain the accounting of the scrap materials and keep record of the attendance of the laborers engaged in the yard.

On field there are four key personnel namely yard supervisor, ship supervisor, shift in-charge and safety officer. They are the main coordinators for all the activities carried out on board and in the yard.

The safety officer concept is newly introduced and is a consequence of the ship breaking and recycling rule that came into effect from December 2011.

The organogram in **Figure 17** show the basic structure of a yard in Bangladesh but may slightly vary from yard to yard.

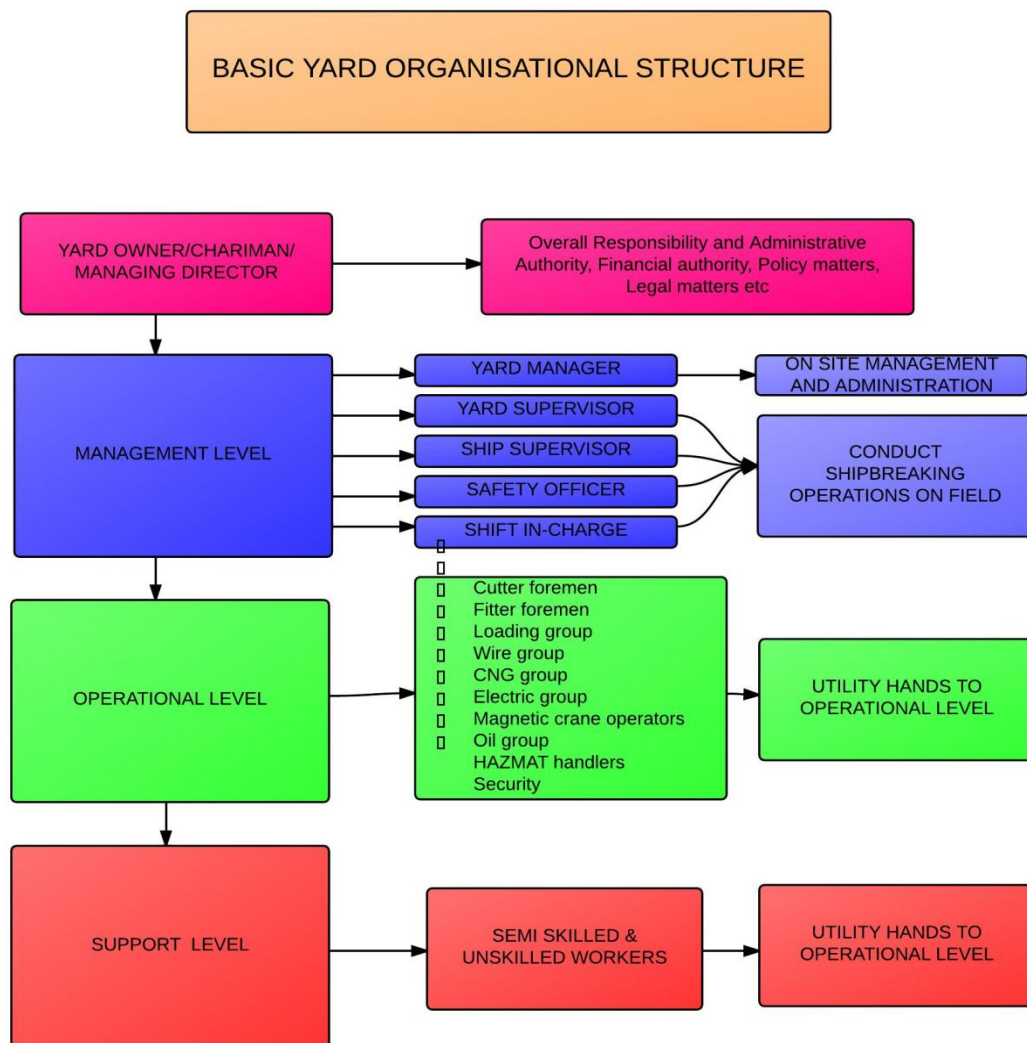


Figure 17: A basic common yard structure, organogram prepared by author.

As enumerated in the organogram, the yard uses mainly two categories of workers: The **operation group** and the **support group**.

4.2 Permanent workers

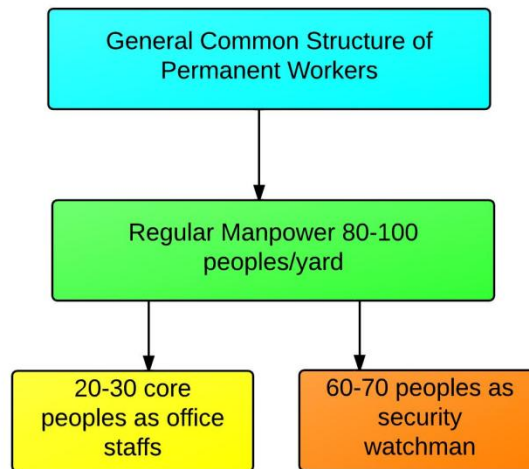
Every yard has some core people who are basically appointed by owners and are paid monthly. There are approximately 80-100 people per yard in the category of permanent workers. The figures provided are not absolute. However, they can be considered as an average for standard yards. These permanent workers can be divided in two groups

- Educated, skilled and experienced workers. About 20-30 people close to the owners form this first group. These skilled workers play a very important role in the management system. They are office managers, accountant, yard managers, supervisors, winch operators, cutter foremen, magnetic crane operators, fitter foremen, loading foremen, shift in-charges and safety officer.
- There are about 60-70 other unarmed security personnel. They act as watchmen on board as well as in the yard. They are mostly unskilled workers but trustworthy people for the owner.

The managers are qualified people with university level of education and some of them are MBA also. The yard supervisors and other foremen may not possess a high degree of education, but they have vast area of experience in this field, and are promoted on this basis.

The cutter foreman is the key person who designs the cutting plan. He does not have any institutional degree but his knowledge through experience dictates the quality of his job. There has been no such big inclination of vessel due to wrong cutting plan so far.

No wonder the other foremen are of similar standing although they had to learn a lot through the mistakes over the years of time. Every yard owner prefers to keep them under permanent employment for the key functionality of the breaking process.



A handful of people remain as regular/permanent employees with good skills and competence. These core people with necessary education and training can be further developed and utilized as resource personnel to ensure workplace safety. They can be better integrated to the management of the safety and health policy.

4.3 Migrant workers

This second category of workers represents the vast majority of the manpower in the yard.

Seasonal worker:

They are mostly migrant workers who often come from far northern district of Bangladesh. They account for about 95% (World Bank, 2010) of the work force in semi-skilled and unskilled category. They are basically farmers and jobless people from backward and drought prone regions where there are farming seasons for 6 months and rest of the years is off seasons. During the off seasons these people hunt for jobs through their predecessors in the Chittagong breaking yards. They are seasonal workers.

Education level:

They have no or very little basic education. In addition, they do not have any specific knowledge concerning ships, ship breaking conditions and elementary principles of OSH. A base line survey shows the different percentage of age group and the education level of the workers in Chittagong breaking yards (YPSA, 2005). (See Figure 18)

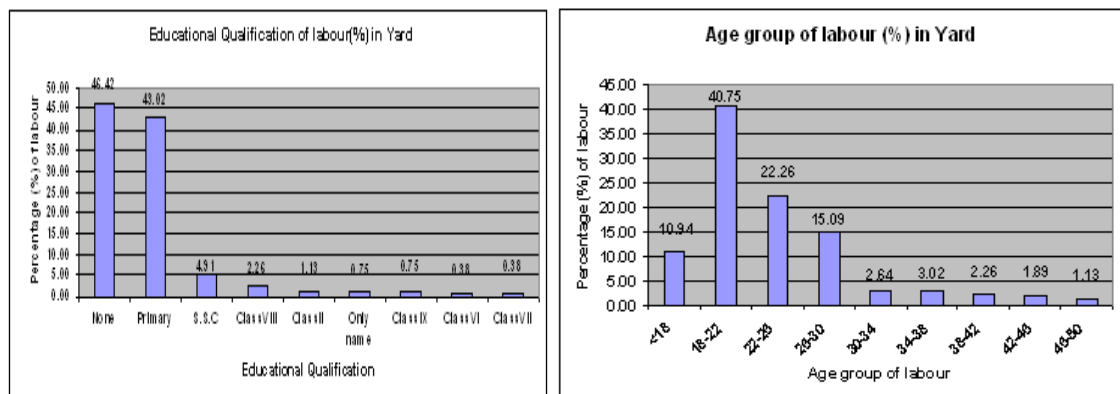


Figure 18: Shows a baseline survey on education level and age group of shipbreaking workers in Chittagong (YPSA, 2005).

Age distribution:

As the data shows the majority of the workers fall in an age group between 18~22. Their lack of experience and awareness makes them particularly vulnerable to accidents. Moreover child labor, age below 18 has been an issue in this industry. Several studies especially FIDH and YPSA in “Child Breaking Yards’08” have enumerated thousands of child laborers engagement in Bangladesh ship breaking yards. “When we conducted field investigations in 2000, 2002 and 2005, we repeatedly noticed children among the workers involved in shipbreaking activities” (YPSA, FIDH and International platform on shipbreaking, 2008).

Due to the severity of the financial crisis in their families, the parents/guardians are unable and often unwilling to provide education to their children. This lack in educational expenses and other “Pull Factors” encourages them to work in this industry to financially support their families. Working in the same hazardous conditions as adults, the children and teenagers who lack the physical strength and are still growing are even more vulnerable to accidents and illnesses.

However, this has been an issue not only in shipbreaking industry but also in other sectors of Bangladesh. According to the Bangladesh Labor Law (BLL-2006) the minimum age for admission to work is 14 years and 18 years for hazardous work. Further, light work for children between the ages of 12 - 14 years is defined as non-hazardous work that does not impede education. The UN Committee on the Rights of the Child expressed concern in 2009 that many Bangladeshi children continue to work in five of the worst forms of child labor, namely welding, auto workshops, road transport, battery recharging and tobacco factories.

The government has prohibited child labor for the children aged below 14 according to the BLL 2006 and adopted the ‘National Child Labor Elimination Policy, 2010’ with a view to withdrawing children from hazardous and the worst forms of labor. The policy is aimed to support families to break the vicious cycle of poverty so that children remain out of labor.

In addition, in the recent years a government initiative for ‘free primary education’ coupled with adoption of ‘National Child Labor Elimination Policy’ has significantly reduced the number of child workers in this industry which is much more visible in the current state.

As a result of the new legislation, child labor is now clearly regulated in SBRI as per SBRR, 2011 Ch.-III, Para.15 (e). This Rule states that “No person under the age of 18 shall be employed and no female worker shall be allowed to enter into the yards” (SBRR, 2011). However, proper monitoring and enforcement of the Rule should demonstrate the effectiveness of this policy.

Language and cultural difficulties:

For most of these workers, language is an issue. These migrant workers have a language barrier in the work place. They speak particular Bangla which is clearly different from Chittagong locals. If both ends of the people try to communicate, it is obvious they have difficulty to understand each other. Their food habits and behavioral pattern also vary distinctively.

Employment system:

This category of workers is mostly engaged through local contractors on an hourly basis. Some are engaged for particular jobs under the supervision of foremen on sub contracts. The primary contractor works on contractual agreement with the yard owner on the basis of tonnage.

However, there are no particular rules of engagement between contractors and the floating workers. There is neither any system of employment letter nor contract of agreement signed in paper form between contractors and the workers (YPSA, 2005).

As such workers are not aware of their legal rights of employment such as working hours, night work, overtime, break, lunch, accommodation, holidays, equipment, service benefit and compensation. Although in SBRI all of the above criteria are maintained mostly in verbal form and according to general norms and practices; however that may not guarantee any legal protection for the workers if there is any such deviation from the norms. Moreover there is no labor union system within yards which otherwise could negotiate and protect such rights.

In the above circumstances the unskilled non-permanent workers do not always stick to one contractor. They rather like to move from yard to yard when there are better opportunities. Once more, the new regulation should modify this practice by establishing minimum standards of employment.

The Hon'ble Court decision dictates that "NONE shall be employed without duly executed contracts of employment. Master roll and all forms require by labor law

must be maintain by employer” (Extract from the Hon’ble High Court Verdict on 06/04/2011).

Duties in the yards:

Migrant workers mostly remain as helping hands to various cutter and fitter groups or as utility hand on demand from any group leader. They are also engaged as manual labors such as diggers, sweepers, cleaner, wire pullers, sorting groups, electric cables carrier, housekeeper, weight lifter and kitchen helper. There is no clear work description. They are used as per job request.

Many of them do not continue to this job when they need to go back home in the farming season. This always makes a new group of entrants in the breaking yards making the system more vulnerable.

To conclude, the migrant workers are the vast majority of workers in this industry. They are mostly floating and lack in education and experience. They do not belong to any particular working category. They do not possess a formal agreement of employment other than being on the mercy of the contractor. Although they account for vast majority of workforce, the circumstances and conditions often neglect their rights and make them more vulnerable. However, the new Rule is expected to improve their standards of employment and bring more discipline into the system.

4.4 Procedures involved in shipbreaking stages

Since the Ship Breaking and Recycling Rules came in effect from 12 December 2011, the previous procedures have been modified/changed. SBSRB being the central focal point are responsible for providing all necessary permissions relevant to ship breaking and ship recycling in co-ordination with other government agencies.

A ship destined for Chittagong beach yard is subjected to undergoing various stages upon arrival until the completion of the cutting process under the current regulatory

regime. The stages are: i) Preparatory stage ii) Operational stage iii) Cutting stage iv) Reporting stage.

Preparatory stage:

In the preparatory stage most of the official formalities are completed. They involve the following:

- Arrival notification to MRCC, coastguard, port authority, Custom, SBSRB and other officials as required by the local regulations. Usually this is done through local shipping agent.
- Arrive and drop anchor in Chittagong port limit.
- Submission of all necessary documents through agent including list of hazardous material (i.e. operational waste, bunker, CO₂, Freon, lube oil, chemicals, paints etc)
- Inspection by custom authority for contraband/illegal items against import policy
- Inspection by SBSRB along with other members from NBR, DOE&F, DOE and technical personnel from SBSRB
- Cross examine of the documents including details records of bunker, lube oil, grease, chemical, bilge, ballast, oily sludge and gases are recorded by Dept. of environment and forest.
- DOE inspect all tanks, cofferdam, engine room and other area of interest and provide Gas free and hot work certificate on satisfactory results.
- On completion of satisfactory survey and payment of govt. taxes and levies vessel is permitted to proceed for beaching.

Operational stage:

Operation stage starts with the physical beaching of ship at the specific yard. Mean time breakers have to submit a ship recycling plan (SRP) and a copy of ship recycling facility plan (SRFP) to SBSRB to accord necessary permission to physically start the job on board. The operation stage involves followings:

- Proper securing of the vessel at yard.
- Disembarkation of the crew, if foreign crew through immigration department.
- Removal of left over bunker to registered dealer.
- Removal of oily sludge and used oil to yard facilities.
- Removal of all CO2 bottles to authorize dealers.
- Removal of all radio and pyrotechnics (Distress signals) by Bangladesh navy (BN).

Cutting stage:

In the cutting stage ship breakers have to obtain permission from SBSRB prior commencement of actual cutting, this involves the following:

- Submission of SRP to SBSRB
- Submission of environmental clearance certificate of the yard to SBSRB
- Certificate from BN as evidence of removal of radio and pyrotechnics.
- Treasury Receipt as evidence of payment of government taxes.
- Workers registration.
- Proof of removal of bunker, lube oil (vendor Receipt).
- Gas free and hot work certificate from DOE.

See Figure 19 and 20 to understand the general layout of the yards which need to be submitted prior obtaining cutting permission. Once SBSRB is satisfied with the above documents, then the cutting permission is issued. On receiving the cutting permission, actual dismantling process begins.

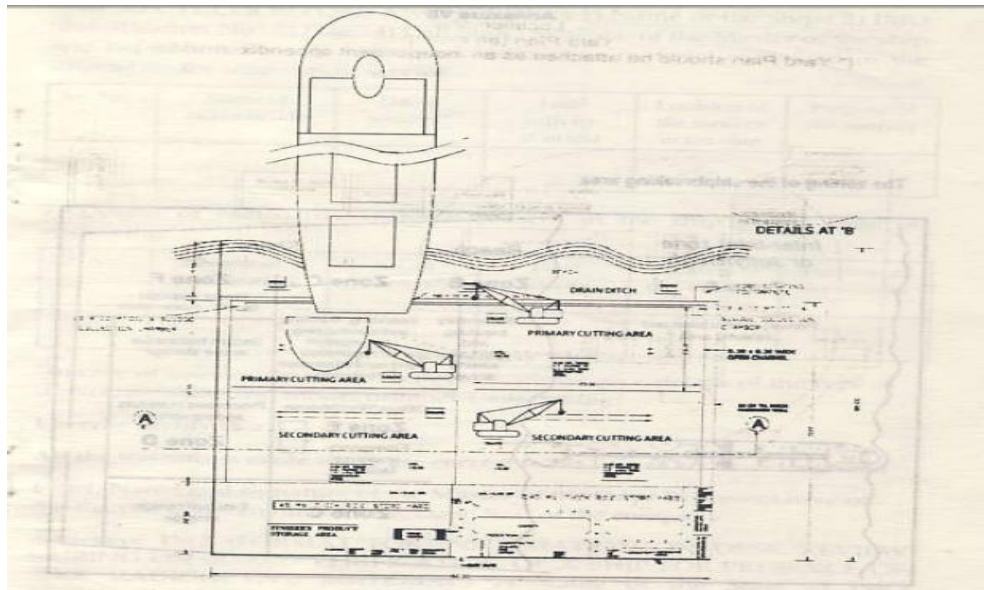


Figure 19: An example of yard layout plan to be attached as part of SRFP (Source: SBRR, 2011)

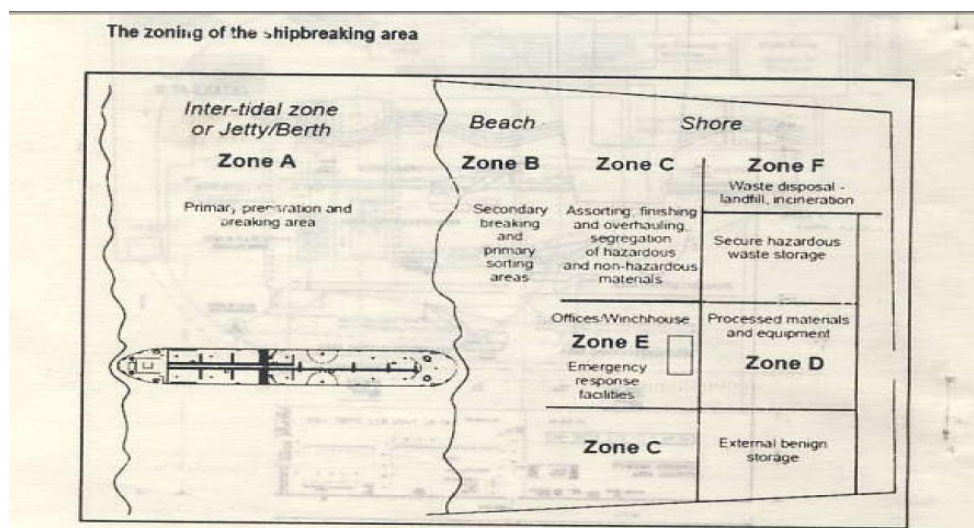


Figure 20: Shows the example of zoning of the yard, a requirement as part of SRFP (Source: SBRR, 2011)

Beginning of Dismantling:

Under local regulations no fitting fixtures are allowed to land at anchorage other than bunker fuel, oil sludge or residues to enlisted vendors.

Because the ship contains a lot of equipment and material that the yard owner cannot process directly themselves, independent traders or trading companies are expected to take charge of numerous lucrative items such as accommodation fitting fixtures, tools decorative items, outfitting, engine, machineries, electrical and electronics goods, furniture's, kitchen utensils, sanitary items, accessories, navigational equipment and paints chemicals. These items are sold to different traders in a spot tendering process. The open tendering process is usually done at the beach yard after beaching but sometimes at Chittagong anchorage while the preparation stage is underway. However, the yard owner can remove these items and later calls for auction.

Therefore, removal of fittings and dismantling/cutting can be of two different operations.

Once the awarding process is over and depending on the condition of sale, the removal can be done either through deploying the buyer's own people or through various labor contractors. If the buyer of some particular items engages their own people, the yard staff remains as security to make sure that none of the buyers can take any other items not belonging to their tender schedule. But some of the yards owners prefer do this under their strict supervision deploying their own staff and workers to avoid any unwanted situations and prevent damage to other types of equipment.

Generally the cutting operations are conducted through contractors under agreement with yard owners on a tonnage basis. Cutting contractors deploy laborers according to the delivery demand and time frame stipulated by the owner. Initially it takes 1 to 2 weeks to plan various dismantling preparations, which include some gas freeing operation as well. Another 2 weeks is required for removal of all fittings by various interested traders including removal of hazardous materials by special agency under current the Rule.

However, from these points onwards hundreds of workers step into the ship. The hot and cold work continues simultaneously. Altogether the whole dismantling operation can take more or less 2-3 months depending on the size of the ship.

The number of people engaged on board and in the yard depends on the size of the ship and volume of work corresponding to the scrap demand from downstream industries. The steel delivery rate imposes the rhythm of the breaking process and therefore the number of workers in the yards varies. Usually 50-60 fitter groups and 4-6 cutter groups are engaged simultaneously on board and in the yard. Each fitter and cutter is assisted by at least 3 helping hands that are unskilled or semi-skilled laborers. The fitters are numerous on board because they have a short allocated time frame to remove fittings, equipment and machineries in preparations for the cutting operations. Usually, one or two weeks are necessary to remove the fittings.

On the other hand cutter groups multiply in the yard where they process the steel. Major cutting, resizing and customizing of plates are carried out at secondary cutting areas. In addition, there are wire groups, loading groups, bottle groups, and forward groups continuously assisting in the whole process.

Therefore, the determination of the average number of workers at any one time is difficult to establish. Although the figure may vary depending upon the yard management strategy and volume of work, generally a 10,000LDT vessel when working in full swing engages between 400-500 workers at a shift.

Reporting stage:

To improve the transparency of the industry and to provide accurate data and statistics, the new regulation emphasizes on the reporting and monitoring process. In the reporting stage the ship breakers have to report of any occupational health and safety related issues such as accidents involving death, serious injury, diseases and illness to SBSRB. They also have to record and demonstrate the proper management of hazardous waste with the quantity disposed to the central TSDF system. This is to keep track of the quantity of HAZMAT handled.

Conclusion:

The composition of yard structure and methodology applied through the current Rule seems to bring more discipline in the working environment. It is understood that a large number of manpower is engaged through various sources into the process. The involvement of various categories of workers under different working conditions and experience should be reviewed in order to improve transparency and to establish lines of responsibility to protect workers' health, safety and environment.

Appropriate education and training can transpose this workforce to more reliable resources. They can be better utilized towards management of safety and ultimately reduce the vulnerability.

Chapter V

Existing conditions of SBRI – Observations and remarks

This chapter will give an overview of the existing facilities in SBRI and will describe the real life scenario in and outside the yard. This will also cover the training infrastructure development. This description merges the visit of three sites in the Chittagong shipbreaking area. Numerous pictures are available in **Annex 9(A~E)** to make this yard visit easier to understand. The intention of this chapter is to shortly describe breaking yards operations in order to provide a general idea of such location and to observe the workers conditions particularly their relationship with hazards and safety.

5.1 Remarks on the observed yard infrastructures

It is currently difficult to enter a yard without prior notification. To overcome this difficulty the author interacted with some yard owners and was helped by BSBA. Finally, three yards visits were conducted between 17 May to 7 June 2012. Despite the limitations and lack of extensive on-site visits, some key elements became visible, which are described in the following discussion.

Observations:

Chittagong SBRI is situated along the coast between Fauzdarhat and Kumira comprising 125 registered yards. To reach the location and yards, author had to take a narrow strip road of 2-3 km in length from Chittagong highway to the yard premises. This road passes through local villages.

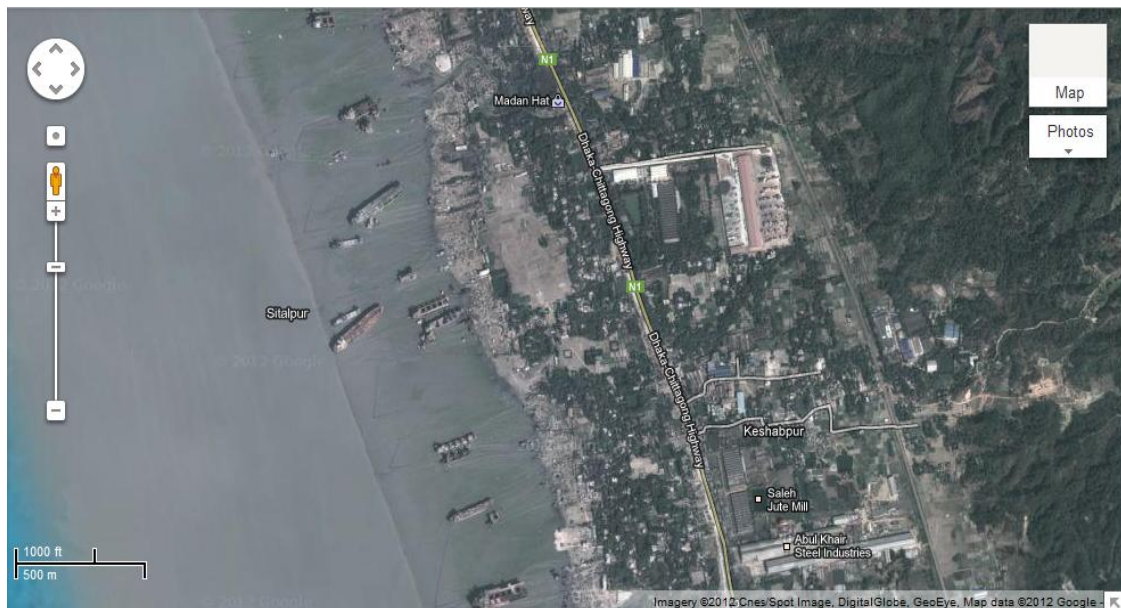


Figure 21: Showing location of shipbreaking yards in Chittagong beside Main Highway, (Photo Google Map).

These narrow roads are the only available connecting road to the shipbreaking yard. They are used for general road communications as well as transportation and the delivery of goods to and from the yards.

Most of the yards are restricted premises with fencing at the outskirts with an individual yard/company name. The general layout of the yards are of similar pattern with little variance according to the size and configuration of the land.

Description along the passage:

As the author was going along from the main city, purposely took a road through the Pahartali area which is the main stock pile area of various traders. They are mainly retailers of scrap metals and machineries after resizing and overhauling machineries. Hundreds of such retailer shops can be found on both sides of the roads.

On reaching the highway, along the main road on both sides many furniture shops could be seen in a few kilometers. Close to the Bhatiyari area and onwards on both sides numerous shops could be found with paints, chemicals, kitchen utensils, LSA

and FFA items, ships equipment and antiques. This amount of equipment, material and items for sale demonstrates the magnitude of the activity and its importance for the area. Pictures of some vendor shops and materials for onward utility can be found in **Annex 9(A)**.

From the main highway it is not identifiable which yard someone is heading for as there is no sign board on the leading roads. However on all the occasions the author was accompanied by a guide.

While passing through the narrow strip road author could see some areas where people were manually extracting copper from electric cables without any equipment. Only after being close to the yards industrial sounds could be heard, otherwise it was calm along the road.

Description of yard infrastructure:

On reaching one of the yards author encounter a manned security gate with an archway. Anyone could clearly identify them as security guards with specific uniform. Identifying author and explaining the purpose of visit led me passing through. Having registered in a visitor's book author was provided with a pass card. Looking around, could see the general layout of the yard is painted on a wall or on large frame. Various safety posters in Bangla and emergency contact telephone numbers were posted or hanged on the walls around the main gate. **(See picture gallery in Annex 9(B)).**

Observation: A preliminary sign of security & safety measures seen in place.

The general atmosphere of the yards was busy. The breakers pile up ships before the monsoon (June-August) to take advantage of the weather. During the monsoon shipbreaking is a dull season. However, in all three yards there were ships in different stages of the dismantling process. All the yards were active with 2 ships

each in two yards and 1 ship in other yard. Delivery of scrap metals was simultaneously and continuously in progress with number of trucks in the queue.

Observation: A rush of local demand for scrap metal was observed and workers were found busy.

A yard office was adjacent to the main gate. The manager of the yard met me and introduced me to some other office staff members. While discussing with the yard manager author was given an introduction of their safety and welfare policy in general as well as their future plans for improvement.

Observation: Gives impression on the realization of past practices and intentions for future improvement.

In the office a few staff members were busy with their day to day jobs while one was sitting in dedicated computer room monitoring weighbridge of the trucks. Besides the office materials there were a daily rooster and attendance board showing the number of peoples engaged in different categories, and their spot of work. This way to record the workers seems common to the yards that author visited.

Observation; A system of work force attendance record seen in place.

After this short presentation close to the office location, a further guided tour around the yard was given.

The physical infrastructure development was visible within the yards. In all three yards they had portable generators for backup power. An electrician and a fitter with minor maintenance capacity look after the generator. There are a number of electric poles fitted with flood lights visible around the yard. I was told the lights are collected from scrap ships.

In addition to the needed installations as office, entrance gate and storage place, it was visible to see the development of infrastructures associated with workers utility (See picture gallery in Annex 9(C) such as:

Dormitory for living: In one yard author saw a two story building and another two with 3 stories as a dormitory complex. General appearance gives an impression that

the construction was not that long ago. Inside arrangements were with a number of beds side by side as well as bunk beds. All the rooms were not furnished completely.

Toilets and bathrooms: Separate toilets and bathrooms were found adjacent to the dormitory complex. Author was given the impression of a ratio of 1:5. A separate pond was also found in two yards for those not comfortable with showers in enclosed bathrooms.

Mess room with cooking facilities: Common mess rooms were found with cooking facilities with a mini grocery shop attached. Author was talking with some of the workers while they were having afternoon tea and it looked they were happy having a mess inside where they can relax and share their joys and sorrows. In one yard there was a separate mess for office staff and supervisors.

Recreation room: In all three yards a common recreation room was seen with TV and VCD player and some indoor games. With my visual estimation they were not spacious enough to accommodate more than 30 people.

First aid room: All three yards were found with a medical first aid room manned by a medical assistant. They were equipped with stretcher, a bed and medicine chest board which looked collected and installed from scrap ships. I was told they can only provide preliminary first aid but for serious injury they have to send the patient to hospital facilities either in BSBA hospital or any other hospital nearby. Currently they shift those serious patients to Chittagong city as BSBA hospital's in-house facilities are under construction. None of the yard has an ambulance. They need to seek help from a general ambulance service or a private vehicle.

Medical Facility outside yards: On the way back author travelled to Bhatiary station road to see the status of BSBA hospital. It was late in the afternoon. On reaching to the site there was no responsible personnel except a security guard who said that construction of a 5 story hospital was nearly completed. They have arrangements for 150 beds with in-house facilities, which are yet to be equipped.

Presently BSBA have appointed a doctor with an outdoor facility opened for limited period of time during the day. They still do not have an ambulance.

Drinking water facility: Separate drinking water facilities were seen with temporary plastic tanks. In one yard they also had water purification plant. During authors visit, numbers of workers were found using them and collecting water in small bottles.

Safety officer's room: A compulsory safety officer in every yard is a new concept under SBRR. They are appointed by SBSRB but paid by the yard owner. In two yard safety officers were found. Author was told engagement of safety officers in other yards are in progress. There were limited PPE and some fire extinguisher in one of the safety officer's room.

In an interview they both mentioned they are retired personnel from BN and did not have working experience on board merchant vessel. However, they are trying to cope with the industry and at the same time trying to improve the working system. They also mentioned the role of safety officer in the organogram still not clear to them. They also lack in logistics, resources and supporting hands as they mentioned.

<i>Observation: A transparent role for safety officer is apparently absent.</i>

Fire fighting facility: All three yards had a fire pump connected to a deep well. The hydrants were seen around the yard, which are mostly used for fire fighting in the yard. On board fire fighting is limited with a number of ships extinguishers and buckets of water as was intimated. Sometimes they use portable submersible pumps but that is limited during high tide only. In case of a big fire they seek assistance from the nearest fire brigade station situated in Fauzdarhat and Kumira which is within 5-10 Km range.

In-house training: In one of the yards author saw an in-house training center. The room was about 200 sq. feet with a few safety poster and some hand gloves and rubber boots. A VCD and some ships publications were found, which looked not touched in the near past. In interviewing some staff they mentioned this will be used

by safety officers in the future. In the other two yards the safety officer's room is used for mini conference/meeting.

Observation: A good arrangement and ideas in place but effectiveness yet to come.

In addition, separate prayer room and barber shop in the dormitory complex was also seen in one of the yards.

General observations/remarks: Physical infrastructures developments are more visible than in the past. Most of the developments give an impression of newly construction in the recent past probably after the legislative requirements. However, a sign of improvements is visible with regard to workers welfare, health and safety matters.

In addition to the above installations, waste management facilities were also observed as described below:

HAZMAT handling facility: In all three yards author could see the physical installation of negative chamber room for asbestos, separate room for battery, heavy metals, glass wool, well for oil and oily sludge, sorting and separating room. Almost all the rooms were found closed except the oily sludge room with a portable pump outside for transfer to lorry. In an interview it was understood no one really knows the operation and handling of asbestos room. Author was told almost all the yards have similar facilities with few exceptions as these have become mandatory requirements under SRFP.

Observation: Facilities developed gives an impression of recent additions under the requirements of SBRR but less effective use of them were seen, probably due to lack of adequate knowledge and training in this aspect.

General overview of the Yards:

Around these facilities, workers were seen having various types of clothing. Very few of them had complete industrial dress with appropriate PPE but some cutters and welders had. Many were absolutely with no PPE other than traditional clothes. Seeing the visitors, some workers were busy in collecting hard hats.

Observation: The impact of observer shows the urgency to follow safety procedures. Because of not having PPE in work place, certain inspector's visit can impose penalty under current penalty provision in SBRR. It is an indication of either sufficient PPE not in place or workers are not aware of their use and importance. They rather seem more respectful to the penalty provision.

After this short view of the yard entrance and surrounding facilities, the visit continued on the location of the operations.

5.2 Observation on the present operational practices

Reality of the operation procedures:

This will give a general overview of the yard operational practices involving workers. This observation is solely based on the author's personal visit to three yards, which may not reflect the overall practices of this industry:

Unfortunately, it was not possible to see on board operations. However, visual inspection of the cutting, loading, waste management facilities, workers accommodations, mess room, safety officers' room and areas surrounding was conducted to grasp the working reality within yards.

Dismantling, cutting, removing and delivery were simultaneous operations involving hundreds of people working in different stages. A vast majority of general workers were observed wearing traditional clothes and partly or without proper PPE except cutters and fitters. General body language of the workers was hurried and busy (**See Annex 9C for pictures**).

While taking a tour around author tried to take a short interview of workers in different groups:

Author saw about 40-50 people in a wire group that were arranging a cable on a large winch in order to pull a ship in the next tide which was beached a day before. Most

of these workers were found without PPE and boots. Author had the opportunity to talk with a few of them in a group. They said that they rather feel comfortable without boots in this clay/muddy and slippery condition. In addition, they mentioned there are not many in the yards to provide such large number of workers and personally to buy them is expensive.

Another group was in charge of carrying electric cables in round coils. Each coil was carried by two individuals working in pairs. They were travelling to and from the ship and were stacking the coils in a single location. The load was lying on their shoulders that they protected with 'hand-made' pads. They had basic rubber slippers and no PPE.

Observation: Not all workers wear PPE because of either availability or affordability.

There were at least 10 cutter groups found working in different places. They were busy in resizing the plates in truckable size. Most of the plates come as a big chunk in the secondary cutting area which needs to be resized as per customers demand. All the cutters were having proper PPE including safety goggles. They were assisted by 3-5 helping hands in each group. These assistants were rarely wearing any sort of PPE. In addition, there was no fire fighting appliances nearby the cutting areas; and even less designated precautionary area or warning signs around.

Observation: Lack of safety/precautionary measures for hot work. Unskilled workers seem not aware of the use and importance of PPE.

One of the groups author saw two workers were working on a bulkhead which still had the insulation materials attached, probably glass wool or asbestos. However, the workers seemed not disturbed by this material and no additional precaution was taken.

*Observation: Lack of knowledge about identifying hazardous materials and their associated health risk.
May be due to lack of awareness and training.*

Sorting group: In one of the yard, an eight member group was found in the designated room for sorting out various small parts of the machineries. They usually disintegrate some small parts of machineries to separate the precious metals such as stainless steel, copper, nickel, nuts and bolts for better economic return. They were completely without any PPE, not even gloves. Some of them were just wearing jeans and T shirts. In the other two yards a group of a few people were seen busy with sorting items on the yard and also doing some activities in housekeeping. A few of them were found with helmets.

Observation: Lack of knowledge about the general concept of wearing PPE (probably not trained), a housekeeping procedure seen around the yards.

Machine shop: In one yard a designated machine shop with Lathe machine and other repair tool kits were seen. The workshop seemed like recovered from a ship and installed. Very few workers were seen involved in this workshop. They were welding and machining some parts. In an interview they said they support their in-house mechanical machineries with minor repairs as and when required. In addition, they conduct overhauling of some machineries for better selling price. They were seen with PPE and welding screen/goggles.

Observation: Most of the skilled workers seem aware of the use and importance of protective gears.

Yard Equipment/Mechanization: In all three yards some mechanical equipment such as magnetic crane loader, mobile cranes of two types both hydraulic and mechanical, multipurpose lifters and tractors were seen. In all the yards both magnetic loader and mobile cranes were found loading trucks and shifting/sorting big plates. During the visit, yards were found with clay and mud because of the previous rainfalls. Big steel slabs were used for walkway and truck mobility. None of the truck helpers were seen with PPE.

Observation: Use of more mechanized equipment was seen. Outsiders such as truck drivers and helpers seem not aware of the workplace safety.

5.3 Comments and perception on safety awareness after the yard visit and interviews

After this short tour in the yards, it is clear/obvious that the industry is passing through a transitional phase with construction stage. Under the current regulatory regime the industry seems to be putting more efforts for transformation towards green recycling as the state suggests.

However, the general body language of most of the workers indicates they lack safety awareness and are unable to identify or realize the risks they are exposed to. The lack of PPE also deemed related to the cost of such equipment for the workers and/or the owners. It seems that the equipment is either not available in numbers or the workers do not use the existing equipment properly. It is difficult to understand why?

However, in the authors' opinion the change of behavioral pattern of the long persistent practices is crucial in this transitional stage. It requires lots of motivational training emphasizing the importance of using proper PPE which does not seem to reflect in the operational environment. Mostly the cutters fitters and welders do use their PPE. Nevertheless, the vast majority especially the unskilled (migrant) workers who are engaged through contractors lack safety awareness and are not provided with PPE. Understandably they are still out of the training umbrella.

Conclusion: It is clear that due to the Hon'ble Court intervention and subsequent formulation of new regulations (SBRR) have compelled the industry to develop various infrastructures with regard to workers accommodation, safety and waste management facilities. These physical infrastructure developments are more visible. But regarding occupational health and safety measures much needed afford yet to be in place with positive aptitude of all stakeholders. The effective implementation of the OSH policy up to the grass root level needs to be further emphasized through enforcing and proper monitoring.

Chapter VI

Present development of capacity building and training infrastructure

This chapter will highlight the importance of capacity building in terms of human resource development through necessary education and training and its importance for sustainable growth.

Introduction:

Capacity building refers to strengthening the skills, competencies and ability of the people so that they can improve the performance, reduce the vulnerability of occupational risk and overcome the cause of their exclusion and sufferings. Capacity building as an individuals or a group of people within the organization can enhance the organizational ability to achieve the desired goal and perform in an effective manner. It can be described as the strategies or actions that an organization takes to ensure that it has the resources needed to succeed and that these are properly allocated and used.

These actions can include resource management, organizational learning, human resource development, leadership development and other activities. In other words, capacity building is any set of actions that an organization takes to improve its ability to perform successfully in its chosen area. Knowledge is the foundation of capacity. Knowledge comes through proper education and training. For sustainability of this industry, capacity building could be one of the important measures involving allocation of resources for education and training of workers.

6.1 Legal background and sustainable requirements

The competent authority of Bangladesh has spotted the education and training of the shipbreaking workers to be at the fore front for sustainable development.

Legal background

Prior to 2011, there were no legal requirements to train SBRI workers. Since the High Court Verdict in 2009 and enforcement of the new Law in 2011, clear directives (both from the Hon'ble High Court and SBSRR) were issued in order to provide education and training to SBRI workers. Therefore, education and training of shipbreaking workers became a mandatory requirement. Among nine other Court directives, the first directive was with regard to education and training as follows:

A system of comprehensive training must be introduced to impart training to those who shall be employed for ship breaking activities.

An Institute will be set up for the training purposes by BSBA at their cost for training such persons. The training period shall be at least 3 months duration. First 20 days shall be allocated for theoretical training, while the rest of the period shall be involved in practical vocational courses. No workers shall be allowed to be employed in the ship breaking yards without certificate showing completion of the course (Hon'ble High Court Verdict on 6/4/11, regarding workers training).

Also Ch.IV, Para. 17.1 Of SBRR, 2011 states that “Only the trained workers shall be employed in the breaking yard. The workers must undertake theoretical and on job

training from a designated training institute supervised by SBSRB. It also states that unskilled workers supplied through contractors also have to undergo training”.

In short, no person should be allowed to be employed without training and certification.

Sustainable requirements

Sustainability is the capacity to endure. To achieve that, all training needs longitudinal reinforcement. In the context of shipbreaking workers’ training in Bangladesh, the following few parameters described gives an idea of the existing conditions.

Execution of Training

Following the Hon’ble High Court directives in March 2009 the trade body ‘BSBA’ undertook the responsibility to establish a training center, and later they delegated the job to a group of marine professionals under their control and administrative authority. BSBA considered the professionals would be in a better position to deliver the necessary training to the workers. It was the starting point to establish a SBRI workers’ training center.

However, it is understood the training institute started with not many preparations and foundation studies with regard to identifying the stakeholders and main audience group. It is also understood there had been no such institute existing in the past, particularly for SBRI workers’ training. As such the training institute did not have ready materials/aids to execute the training effectively. Nevertheless, it was needed at the time to establish a training center under the current regulatory regime. Henceforth, the training continued with the aid from their professional knowledge and experiences. At the same time the institute was trying to develop training curriculum and organize the staff for effective training delivery.

To make the training effective and sustainable, a good foundation studies are important to identify and understand the various stakeholders and main audience group considering the local environment and working conditions.

Control and monitoring:

Since the intervention by the High Court and until today the control and monitoring of the training institute came through two phases. Since the inception of training institute in February 2011, the training activities were controlled and supervised by the Director of Environment, Chittagong under MOEF. Later from 12 December 2011 the authority shifted to SBSRB situated in Dhaka, under MOI. It may be difficult on the SBSRB part to effectively monitor the training processes because of the distance apart. Moreover in the author's understanding all the members of SBSRB are yet to be recruited following government procedures which may take some time.

However, under the current legislative requirements, control and monitoring criteria are in place but the effectiveness yet remains as a challenge in this transitional stage.

Record keeping:

Transparent records of all training activities including record of accidents and injuries are very important for further improvement in the system. Currently, this job is mostly done by the training institute itself. Understandably, only few workers have been trained since the inception of the institute. However the directives on training are compulsory for all the workers in SBRI. Because of no particular record of workforce engaged in this industry, it is difficult to trace who is yet to undergo training. Yard owners also do not have complete records of trained personnel engaged in their premises other than those of their regular employees.

Further there is no central database for the records of workplace accidents/incidents. The accident analysis is very important to find the causal effects, gaps, loopholes and lacks in the current system. As such review for further improvement is currently limited. Training Institute has recently opened a dedicated accident analysis and prevention cell. The aim is to investigate all forms of accidents/incidents for root cause analysis in order for future prevention and transfer of information across the industry.

However, under SBRR Ch.VII, Para-30.4,5 and 6, ship recyclers are required to report, record and notify work related injuries and diseases, ill health and incidents to SBSRB. Also under Ch.IV, Para 17.22 of SBRR 2011 a record of attendance register is required for the workers engaged in the yards to be maintained in accordance with the provision of BLL2006.

However, the author's practical visit to the yards suggests that not all of the people engaged in the yards are trained (**See Figure 22**). A proper record keeping system and effective monitoring of all training activities is expected to demonstrate more transparency under the current Rule.

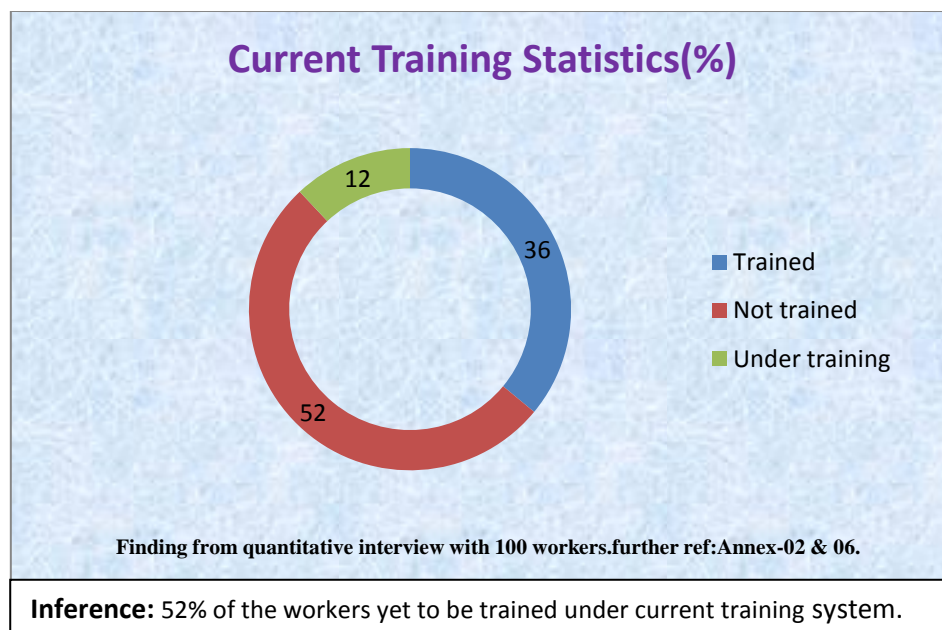


Figure 22: shows the current training statistics (source: author's quantitative research)

Financing:

Financial support is a big factor in the equation for sustainability. A training institute with such a huge task cannot just be born. It requires extensive research primarily to understand the working environment and conditions. It also requires a lot of infrastructure developments, especially in the preparatory stage and henceforth to the training delivery. The process should be continuous for further review and development with the trending demand, which may require continuous financial support.

In a qualitative interview, the training coordinator mentioned “We have all positive intentions to develop the training institute from current state to a proper institute which require huge financial involvement. Since inception in nearly two years we could not make any significant progress in developing the training materials/aids other than procuring some safety posters locally”. He also mentioned unlike the initial stage the flow of trainees also is reducing with the time and the institute has monthly fixed overhead costs which they still need to maintain even if there is no training. With such financial burden the existence of the training institute is matter of a question.

According to the High Court directive, it was the trade body (BSBA) who was to establish a training center and the expenses to be borne by them. However, ultimately the fees/expenses are borne by the yard owners for their regular staff and skilled laborers. In a qualitative interview with two yard owners and a senior consultant to BSBA (see details in Annex 3 and 4), it was understood from their opinion that the job seekers should have certain pre-qualification like in any other job sector. However, still for their mutual benefit and reputation of the industry, they are bearing the expenses for their regular staff that are limited in numbers. They also mentioned that unskilled workers engaged through contractors are mostly floating and not consistent in the industry. Moreover, it is the contractor who engages them, so the question of training expenses should lie on to them or through other patronization or even from ship owners under corporate social responsibility (CSR).

To conclude, providing education and training for SBRI workers is currently a legal requirement. The execution of this requirement is just in place which seem passing through developing stage. For sustainability of the process more supervisory and control, financing and record keeping mechanism is expected to effectively demonstrate under current legal system. In both cases for sustainable development of the training institute and training expenses especially for migrant workers, probable technical and financial support is likely absent in the existing facilities which need to be further explored.

6.2 Evolution of training infrastructure and Current developments

Background:

Formerly there had been no training scheme for ship breaking workers other than a few workshop organized in the past by BILLS in collaboration with ILO, UNDP and NGO's.

Following the Hon'ble High Court order in March, 2009, among other directives, providing education and training for the SBRI workers became compulsory. It also became one of the pre-requisite for the yards to apply for environmental clearance in order to resume their business.

Establishment of First training center and location:

The first formal training institute came in effect on 21 April, 2011 in the name of "BSBA Training Center" with no particular infrastructure as such.

The training program was guided and supervised by the Director of Environment under MOEF. The resource personnel of that institute are composed of a group of master mariners, marine engineers and some retired naval personnel.

In a qualitative interview with the chief training co-coordinator while he mentioned "we indeed kicked off the training program almost empty handed with no ready or approved training curriculum in hand. Eventually we had to develop our own training

curriculum based on our ship board experience and following various guidelines such as ILO, IMO and industrial best practices”.

Having no designated premises of their own, the institute initially started the training program in JUBA Bhaban, Halishahar in Chittagong city far away from breaking yards.

Method of enrollment and training package:

Workers had to register through BSBA under the banner of associated yard owner. The same list was then forwarded to the training institute for necessary training. In the beginning there was rush of workers queuing for the training as it was one of the requirements to obtain cutting permission. Under such pressure the Institute had to run two parallel courses in the morning and afternoon sessions.

Initially the training package started with duration of 20 days as general class room teaching and additionally on the job training program in the yards. The delivery of the training was mainly on the basis of situational and safety awareness with regard to various health and safety issues such as personal, professional and physical safety of the workers, knowledge on management of hazardous waste and conservation of the environment. The composition of the program was supplemented with lectures from relevant govt. entities such as labor office representative, a representative from the environmental department, representative from the national fire and civil defense, representative from the maritime academy and community doctor to highlight various relevant issues involved in ship breaking activities.

The first batch of BSBA training ended in May 2011 with a total of 571 workers mainly cutter foremen, supervisors, leading foremen, fitter foremen, shift-in-charges, cutter men and riggers of different ship breaking yards. Two hundred and fifty other workers were enrolled to receive training under the second batch and so the training program continued (Daily Sun., 2011).

Shifting of Authority and Transition:

In the meantime shipbreaking was declared as “Industry” on 13 February 2011 which was Gazette on 20 October 2011 under the Ministry of industry (MOI). Following the declaration, the new SBRR was published and came in effect from 12 December 2011. This new rule demands that the training institute should be recognized and approved by SBSRB.

The same former ‘BSBA training institute’ with its existing set up was renamed as AESL Safety Training Institute (ASTI) under the AESL Company. It was relocated at KadamRasulPur under shitakunda Upazila. The present institute started in a new rented house almost midway between the yards. The same institute was finally approved by SBSRB.

Visible Developments

Since 25 March 2012 this is the only approved and recognized training institute by SBSRB to undertake Education and Training for SBRI workers. Author visited both the institutes in April 2011 and May 2012 while training activities were in progress.

It has been seen, the BSBA training institute class room was full with more than 100 workers participating in training program (**See Annex 9D**). The delivery of training was mostly based on the theoretical lectures with safety videos used for shipping industry. No formal class routine and segment of program was in printed form. No books, handouts or safety posters were available in the class. Few PPE were available for practical demonstration. The chief training coordinator was responsible for the organization and distribution of classes according to the availability of resource personnel.

Class room activities were seen enthusiastic. For example, most of the workers were keen on sharing their various experiences and they were asking many questions with curiosity. It was observed the lecturers were trying best to explain them verbally without any supporting teaching aids. Workers were seen sometimes not able to

visualize and follow the lecturer even though the workers looked very proud of acquiring knowledge. Author heard some workers were saying “If we were given some awareness before provably we could avoid lots of accidents”. At the end of the course a certificate was issued to all the participants’ there were no particular evaluation criteria.

Author also visited the new training institute (ASTI) from 29 May to 7 June 2012, while a training program was in progress with 15 participants. The course duration has been squeezed to one week. The enrollment process has been modified; participants can directly enroll through the yard owner.

There were various safety posters seen hanging inside the class room. No other visible development could be seen, especially the structuring of training curriculum and teaching aids. The mode of training delivery still remained the same (**See Annex 9D**).

The chief coordinator claimed that the majority of the workers are yet to be trained. Especially workers engaged through various labor contractors are not in the enrollment list. Since the inception of training program so far they trained only about 2700 workers (From April 2011 to May 2012), they are mostly skilled laborers employed in various yards.

There is currently only one common course for all category of workers at a cost of Taka3500 (equivalent to \$40). There is no further course developed for different working groups. The education and training program is limited to one time only. There are no particular student evaluation criteria and no provision for a refresher course.

To conclude, the establishing of a training institute currently satisfies the national legal requirements. For sustainability of the institute and the training program, appropriate logistics and support seems insufficient in this transitional stage. The institute needs to be more formalized and composed for effective delivery of the training program. Therefore, a comprehensive plan of

action should be undertaken identifying all stakeholders and finding possible financial and technical support to strengthen the institutional capacity.

6.3 The voices and comments about the current training system

As mentioned in Methodology, author has conducted qualitative interviews of 35 workers from different age and experience groups. Details can be found in **Appendix A & Annex 1**. Author also conducted quantitative research on 100 workers randomly chosen from different groups (Details can be found in **Appendix A, Annex 2 & 8**). Most of the interviews were related to OHS training which is highlighted in the following discussion.

Needless to mention that due to resources and time constraints, this is limited research. The author's personal effort to collect data may not necessarily reflect the whole industry. In order to preserve the anonymity of the interviewers, the names stated below were altered.

Findings in Quantitative interviews: 100 workers were given with various questionnaires relevant to the following is furnished below (**Table of contents can be found in Annex 2 & 8 for further reference**).

First set of data about workers basic information:

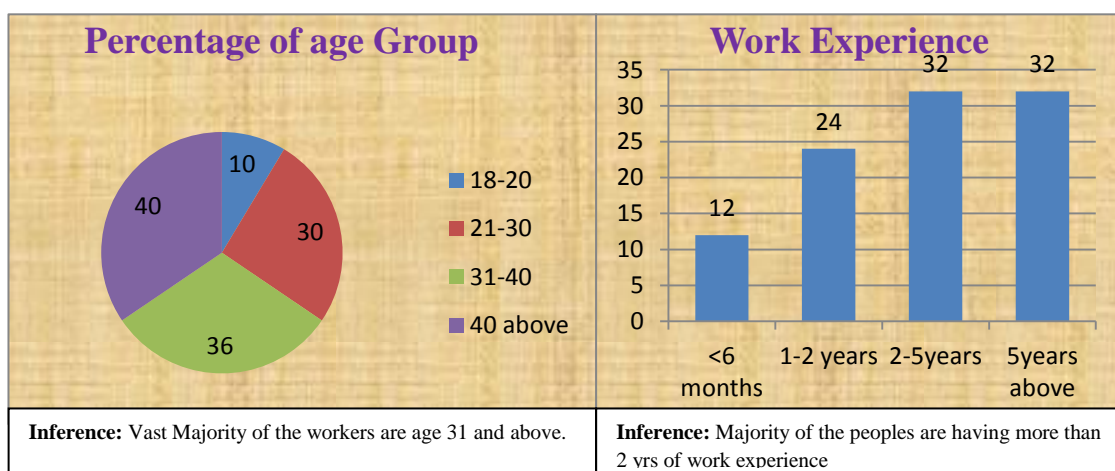


Figure 23: shows %age of workers age group and experience

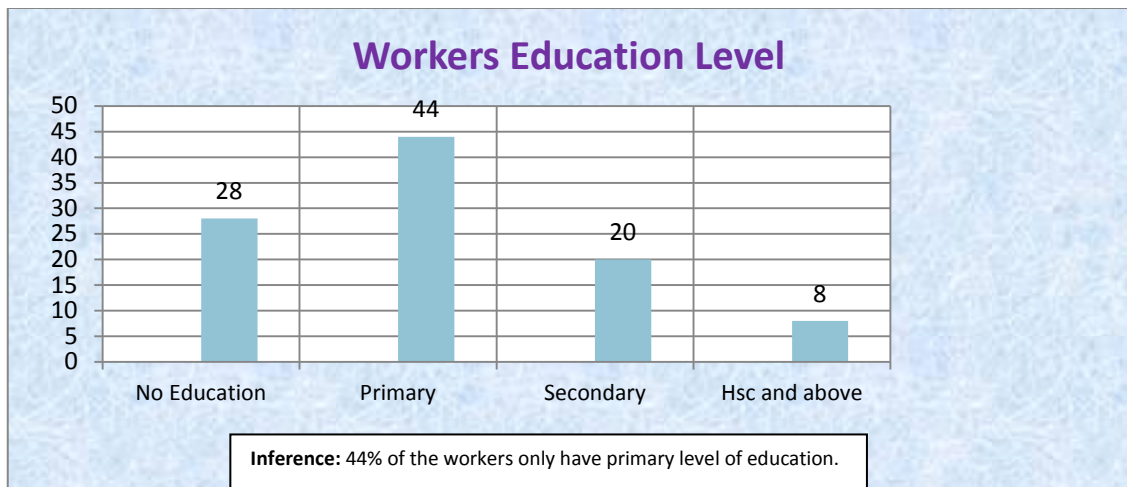


Figure 24: shows %age of workers education level.

On the age and education of group statistics, it can be noticed a small discrepancy between my data and data shown previously (Ch-4.3, fig-20). This discrepancy can be explained by the fact that my data were mainly collected inside the training institute in which the trainees are often skilled and experienced workers with higher experience and age.

In the above basic information it shows that the majority of the workers are aged above 31 with more than 2 years of working experience while a two third majority of the workers have no or very low level of education.

Second set of data concerning the training content:

100 Workers were given various questionnaires regarding their comments on current training facilities such as:

- i) Is the current training understandable to them?

The results are shown in **Figure 25**.

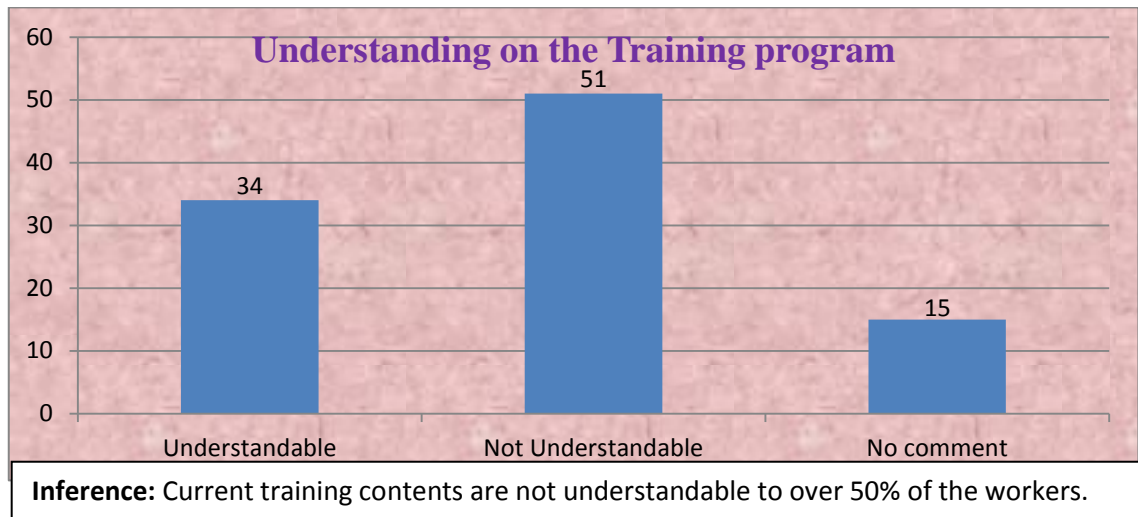


Figure 25: shows percentage of workers comments on training contents

Is the training structure sufficient?

iii) Do they know all the hazards?

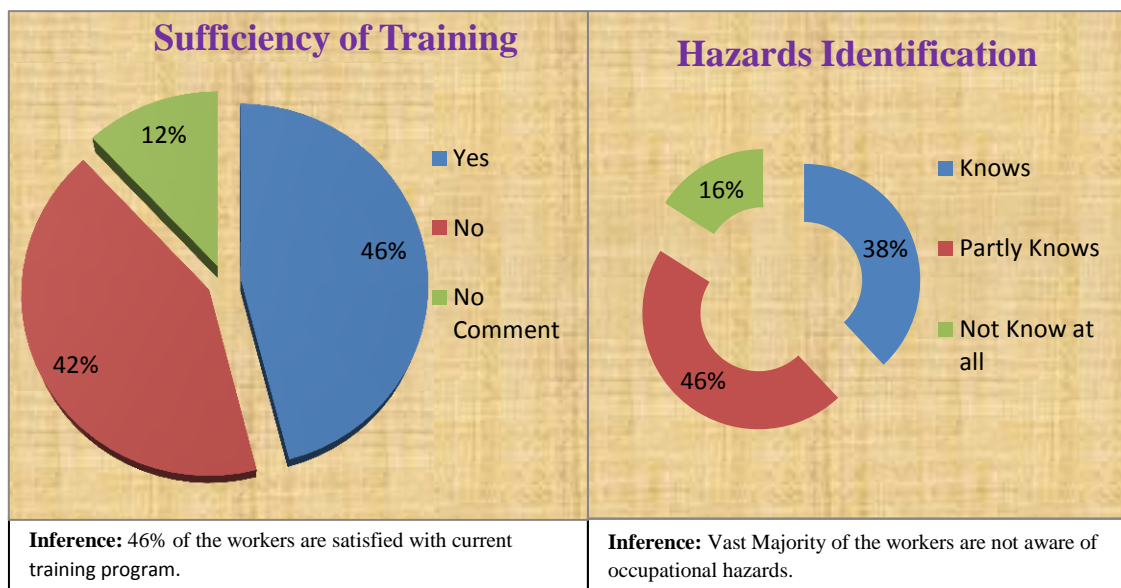


Figure 26: Shows percentage of workers comments on current training program and ability to identify hazards.

iv) Workers comments for improvement if any.

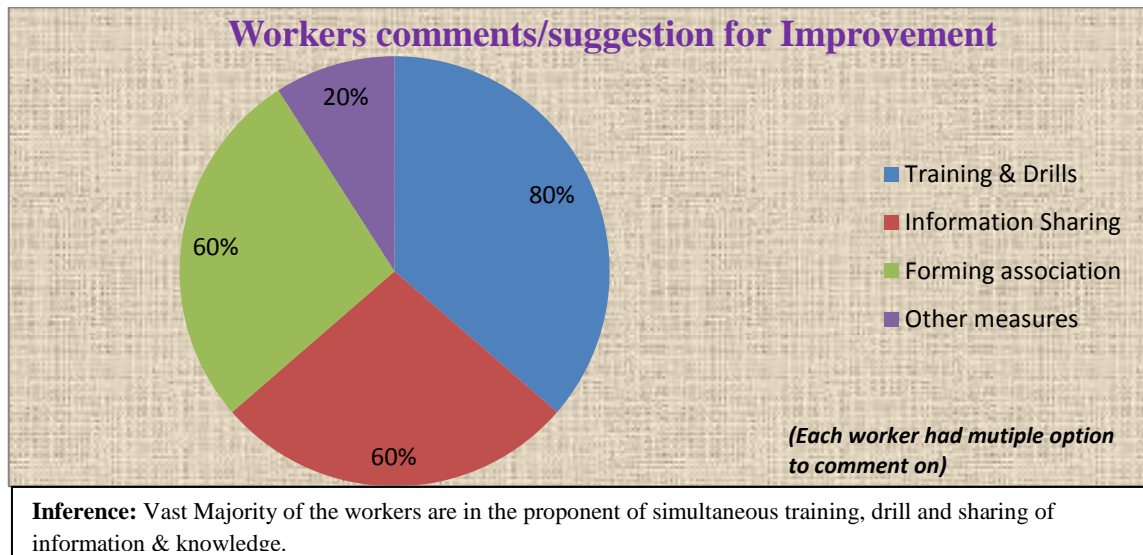


Figure 27: Shows percentage of workers comments on further improvement in current training program.

From the figures above it may be said that, the current training content is insufficient to meet the demand of the workers. Most of the workers either do not understand the teaching pedagogy or the contents. Supporting teaching materials/aids may not be appropriate to reach up to their knowledge level. To make the training program effective further improvement is required which may demand in depth study to find out the possible solution with a pragmatic approach.

Main findings from qualitative interviews with workers:

- Appreciation towards changes was expressed by the workers. Almost all the workers admitted that they had benefitted from the training. They all appreciated the intervention by various agencies and government steps towards OHS. Mr. Ali generally comments on behalf of many workers “We are very happy that authority is looking after us. Recently lot of changes has come for us and we started to use those facilities in the yards, we expect to have better life than in the past”.

- The close relationship between workers and trainers was highlighted. This link was deeply appreciated because now, the workers have some contact points. Mr. Salim was exited, he says “Beside what we are taught, we have the contact number of training co-coordinator and other teachers; we can directly phone them for any suggestion. Before nobody could tell us which was right way of doing things. We are very happy to have a training institute, it is opening our eyes”.
- Workers expressed their concerns about the current training program. The majority of the workers consider that training should be more customized and delivered to different groups in relation to the nature of their jobs. Mr. Kashem with 12 years of experience in this industry said “I work mostly in cutting operation, I must know more on the cutting safety”. It seems the training provided is very generic and not sufficient precise for some workers that require more specific and adapted knowledge. Mr. Rashed, 32yrs said “I work with bulkheads and dismantling of pipes, I would prefer to know more on the hazards associated to my work but other knowledge is also good for me”. The minority of the workers did not have any comment on that.
- Workers expressed concerns about the take home training materials. All of them mentioned they are not provided with hand books, no leaflets, no take home materials. They expect the above materials should be made available to them for better understanding and sharing information and knowledge.” this comment made by Mr. Kolimollah expresses the general view of the workers. The lack of supportive material was clearly highlighted by a lot of trainees as well as the course coordinator. “The teachers are very good but they do not have supporting materials to show us. For us it is difficult to visualize what they are saying” (Mr. Karim).
- Language issues: It is understood that the education level of the workers is very low, such as not being able to understand the video contents that are shown. Mr. Rahim said “The video they are showing is in English which

make no sense to us, we prefer to have video materials in Bangla and more on job specific”.

- Lack of education needs adaptive pedagogical material, Mr. Jabbar said. “Most of us cannot read and write, we prefer to have many posters which can be understandable for us”.
- Practical and specific pedagogical training material seems absent in the training program. Workers do prefer to have a practical model of ships or sections to visualize along the lecture. Mr. Alam said. “This is a new training scheme, the teachers try very hard to make us understand but if they have a model ship we could go close and learn better”.
- Size of the classroom needs to be adapted. The number of trainees in the classroom looks overcrowded and student teacher ratio is not optimal. Mr. Rauf said “There are too many peoples in the class room, very hard to follow lecture from back bench”.
- Workers preference towards practical training. A small majority of the workers were in support of more practical oriented training and drills while a minority stated the program should be a combination of both class room and practical teaching. Mr. Yasin with 3 years of experience in this industry mentioned “For us it is easy to understand onsite training while we are working, teacher can observe and explain the safety matters”.
- All of them also appreciated the involvement of visiting lecturers from the local ILO office, community doctor, environment department, national fire brigade, Marine Academy which they feel has amplified their knowledge in different areas. Mr. Abideen said “We found the combination of various knowledge is fruitful for us, because we are facing injuries and small fire almost frequently. We do most of the things from our common sense but with current knowledge we will be able to operate some extinguisher and be able to give some better first aid, this is good for our personal life also”. He also mentioned “there are plenty of extinguishers on the ship, instead of selling them right away they can be kept for use till the dismantling process is over”.

**Main Findings from a qualitative interview with chief training coordinator
(Further ref to Annex 5):**

A qualitative interview was conducted with the training coordinator to understand the existing training facilities and their ongoing process.

- From the interview it is clear that the training institute is recognized as ‘ASTI’ and approved by SBSRB. The training curriculum is still under construction and yet to be approved. Currently, they are following ILO, IMO and GOB guidelines pertaining to training delivery. The teaching pedagogy is mostly class room lectures sessions with audio visual aids in English used by the shipping industry. No customized audio visual aid is currently available to them. On completion of theoretical sessions a supplementary on the job training is also provided for a day.
- The training coordinator mentioned, “We have all positive intention to develop the institute but we are facing challenges with appropriate training materials and resources which are not readily available in this context. The institute has just begun without much background preparations and logistic supports. This might require some time to establish as a proper institute. It is also subjected to the availability of financial & technical support. I feel there is lot of rooms for improvement”.
- He also mentioned, “We are also planning for additional courses for various stakeholders and special category of workers but these are our future plan. We are also looking for a special course for the HAZMAT handling peoples. Currently we are lacking in technical support and logistics.”

From the above research it is understandable that the industry is actively working on the workers training issues. Workers looked happy and morally boosted finding the opportunity to gather information and knowledge. However, it seems the establishment of the training institute was needed at the time and was hastily set up without much primary research.

The use of Training materials/teaching aids looks insufficient and not adapted in accordance with the workers knowledge level and understanding capacity. Transfer of knowledge and information should reach the grass root level in an adapted manner to have better industrial output. Also it looks the general perception and demand of the workers is more than the existing training facilities. A general common course alone does not reflect to satisfy the different category of workers. In these circumstances the purpose and effectiveness of the training program may not contribute sufficiently towards enhancement of workers knowledge and competence.

The data collected from different methodology suggests that the purpose and objective of the training program may not been appropriately adapted in the current context. The teaching pedagogy and the contents deem not satisfying the demand of the main audience group. Most of the workers demand for more practical oriented program either onsite or using various models which shows lack in the current facilities. Moreover training for one time without further refreshing may not sustain for longer period of time.

To make the training program effective further improvement is require in the current system. The structuring of the training program and delivery materials should be tailored made considering trainees level of knowledge and experience. They should be constructed as such so that they are easily understandable to the audience group. In the above circumstances the institute may redefine the program introducing basic and advance courses according to the different level of workers considering specific nature of their jobs under local circumstances and conditions.

Chapter VII

The road for improvement

This chapter will highlight some similarities and possible correlation between maritime training and shipbreaking workers' training to support the ideas. It will also give recommendations how to improve.

7.1 A maritime-inspired training system to support SBRI

Ship breaking is recognized as one the most hazardous occupations (ILO, 2004). It involves a wide range of activities which encompasses OHS and environmental issues. Therefore the workforce engaged in these activities should know the associated hazards and its implication on the environment in order to avoid hazardous exposure. Appropriately the shipbreaking activities largely involve ships as main focal point and a portion of its related hazards.

Findings in the interviews:

The author interviewed a number of experienced workers to understand the industry practices and to grasp the workers' knowledge in relation to the identification of safety and hazards and their way of approach. Some of the interviews are highlighted to show how callously they used to work in this industry because of not having education and training in the past.

One of them Mr. Rafiq, a cutter foreman with eight years of experience in the industry described an accident while a worker was suffocated in empty ballast. Before he witnessed this accident, to his understanding water ballast tank cannot contain gas inside. Therefore, his perception made him confused. Following the argument I asked him: "Have you ever heard about depletion of oxygen that may happen even in ballast tank if it was kept closed for long period of time?" The accident may still happen even in the ballast tanks if not sufficiently ventilated and

the atmosphere is tested for safe entry. This was surprising for him as he never thought of such conditions neither was he educated with such information before.

It is obvious they have very limited knowledge of hazards and confined spaces in particular. They are not aware of safe entry procedures and the use of testing equipment.

Another very experienced worker Mr. Karim, fitter foreman was interviewed to know about the tanker and the tank cutting procedure. He also has witnessed many accidents before. He was describing the entry and hot work procedure in a tanker where they rely solely on the gas free and hot work certificate issued by DOE. Once that certificate is made available to the yard, the cutting operations start. But to the author's understanding the explosive certificate is valid for a limited period. In addition, specific conditions are highlighted such as proper procedures to follow regarding ventilation and periodical measurement of the tank atmosphere. Therefore, the certificate does not guarantee the tank will remain safe for entry and hot work if the tank atmosphere is changed for any reason and proper procedure is not maintained.

Moreover, most of the tankers are not absolutely clean and there remain sludge/sediments in various corners which can emit toxic vapors while heated up during the day. In questioning Mr. Karim, he further described a dangerous and cruel method of testing a tank atmosphere:

- Use of short spark of a lighter in the upper level of the tank and;
- Lowering a live chicken in the bottom half to estimate the tank atmosphere.

It is needless to mention how suicidal and heart throbbing this attempt could be. He has also witnessed many small and big tanker explosions causing loss of many lives. To his experience he has also seen workers fainted inside cargo tanks. However, Mr. Karim is fortunate to survive in many accidents and near misses.

To the author's understanding, tanker operations are considered as highly sophisticated and particularly dangerous. Therefore, international standards require specific training for the crew working on such ships. Not all general seafarers can serve on board a tanker unless they receive additional courses on tanker operations and procedures despite the fact that a scrap tanker is a dead operational ship. Such vessels require safe dismantling procedures because they might not be properly cleaned and de-sludged which may create explosive atmosphere and toxic vapors. Additional training and information on tankers should be included in the training schemes in order to avoid tanker explosion and enclosed space casualties.

A recent accident on 16 September 2011 caused 4 lives (Daily Purbakone, 2011) while workers were dismantling ship's fixed CO₂ installation. This accident happened well after the High Court directives were in place and training activities were underway. The author learnt from the course coordinator of the training institute that out of 4 casualties involved in that accident, one was a trained worker from his institute and the 3 others were unskilled labors without training. Nevertheless the accident happened because of someone's mistakes in the group.

The voices and comments depicted above show a clear necessity of transferring knowledge and information to improve the working atmosphere.

The SBRI workers did not have any formal training in the past other than learning through their experiences. The complexities and nature of the industry is such, if the people are not aware of the associated work hazards and do not know how to analyze and manage the risk there is every chance of encountering serious accidents and injuries. Despite the lack of accurate statistics, the accidents are supposed to be numerous in this industry.

Training presents a unique opportunity to expand the knowledge base of all employees in any industry. It brings benefits for both individuals as well as for the whole industry. Individuals are expected to raise their situational awareness and therefore could protect themselves in hazardous environments. The industry should

benefit from fewer accidents which can be disruptive for the working processes and should benefit from the higher skilled worker who may improve the overall productivity of the yard and enhance the working conditions. These hypotheses seem to be verified by the statistics provided by ASTI.

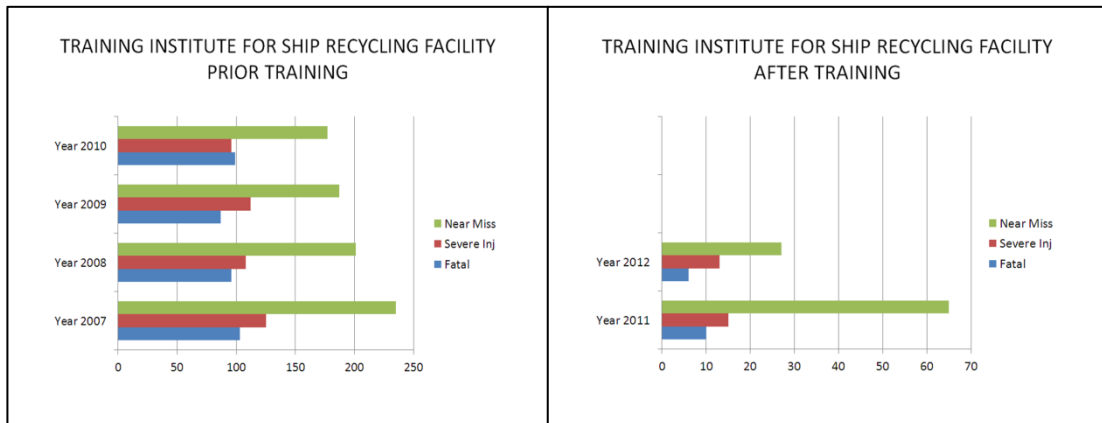


Figure 28: A Comparative data of accidents/incidents prior and after training. Prepared by ASTI accident investigation cell based on information received from workers /trainees. (Courtesy: Training coordinator).

However, a proper education and training scheme for such hazardous industry needs to encompass a large variety of components likewise in the shipping industry. The wishful list is based on the training system developed in the maritime field to enhance safety system on board and ashore.

Shipping is a global business and shipboard atmosphere is multicultural with various nationals with different knowledge and background. But for the safe operation of ships, seafarers' knowledge is blended to a common consensus for smooth conduct and operations. IMO has extensively worked on this issue and implemented the STCW Convention for common knowledge and understanding of shipboard safety. Similarities can be found in the shipbreaking industry with workers under various levels of knowledge, skills and background. The most important link between seafarers and breakers is the vessel. A systematic approach with such maritime education and training model can be followed in SBRI to enhance safe working

practices. The following discussion will try to find some correlation between seafarer based maritime training and SBRI workers' training.

Improve general knowledge:

Such element is clearly perceptible in the STCW Code and its numerous tables describing the basic knowledge and skills of seafarers.

As discussed in the previous chapters, the work force involved in this industry is varied in skilled, semi-skilled and unskilled laborers. 95% of whom are migrant workers with no or low level of basic education. They probably never saw a ship and its structural components. Therefore, they do not have any idea of the hazards they will have to face. They mostly rely on the group leader's work and guidance. But ultimately everyone in a group is working at the sharp end.

Also a vast majority of the workers are engaged through labor contractors and immediately placed for the job without even having opportunities to understand work place ethics. Unlike other industries, shipbreaking is unique because of its nature and multiple functions in different stages.

Training will enhance the general knowledge and skills of workers at each level. It will also help them to expand their horizons of human intellect and an overall personality while increasing their morale. The improvement in knowledge will encourage them to exercise safe working practices while they would be much more aware of safeguarding their personal safety.

In this context a basic foundation course like seafarers' basic training may be adopted for the SBRI workers with necessary changes in the contents. Also a system of familiarization can be introduced like the ISM Code for the new entrants/new joiners, also for different types of ships.

Identify hazards:

The shipping industry developed the Formal Safety Assessment (FSA) which could help to support hazard identification in the shipbreaking context.

As discussed earlier there are number of hazards involved in Shipbreaking processes. Workers are more often exposed to these hazards because of the nature of this industry. This exposure poses both health and safety at risk. Workers suffer from various illnesses and chronic diseases as they lack knowledge about the HAZMAT and their effects on health. Moreover, the vulnerability of workers because of not being able to identify the hazards has caused many lives through explosions, trapping inside tanks, confined spaces, falling and tripping which is common and a day to day phenomenon in this industry. This has stigmatized the image of this industry. A formal safety assessment (FSA) tool can be used for this industry for the need of risk reduction.

However, with proper education and training, workers would be able to identify the common hazards and the risk associated in it. Accordingly workers would be able to analyze and manage risk. Knowledge on such hazards will also encourage them to take precautionary and additional protective measures to mitigate such risks.

Safety awareness:

Maintenance of equipment, training and drills, and numerous safety devices are described in the various IMO conventions and particularly SOLAS.

A good variety of workers with different behavioral pattern work in this industry. Appropriate training will help to grow safety awareness amongst workers. The perception of the workers will gradually transform towards safe industrial practices. This will help to develop a safety culture within the industry; eventually the quality of work will be improved and a learning culture will develop within the organization.

Seafarers' participation in various drills as well as use and maintenance of shipboard safety equipment has vastly contributed to the safe and efficient running of ships, which may also be introduced in the SBRI. The different methods of research in this study also support such ideas of practical oriented training and drills.

Understand the Use and Importance of PPE:

Both, IMO and ILO instruments promote the use of personal protective equipment to reduce personal injuries.

In order to avoid occupational health related accidents and injuries, using PPE is most important in any industry. The workers involved must understand the use and applicability of such PPE. In SBRI it seems the majority of the workers are not aware of such use and importance. Probably they never saw and are not used to this equipment. With education and training workers would be able to practically see the equipment and learn about the importance to avoid occupational injuries. Safety is paramount and that can be achieved through workers' safe practices and encourage them to use proper PPE.

Industrial safe practices, pictures, photos, illustrations, shipboard safety videos on PPE and safe working practices can be introduced in SBRI.

Understanding and use of safety equipment:

As a general principle, seafarers are expected to know the generic safety equipment on board. In addition, through a familiarization process, they learn to use the equipment specifically designed for the ship. Ships operate remotely away from land resources and an operational emergency may still occur which the seafarer mitigates using on board safety equipment.

Likewise the applicable beaching method in Bangladesh makes the fire safety and other logistics difficult to be made readily accessible especially on the beach yard. In these circumstances the workplace safety largely depends on the skills and

competence of workers involved at the sharp end. For instance, if there is a small fire in the cutting process, which may easily be extinguished with the use of a fire extinguisher provided somebody knows how to operate it. Training can demonstrate such knowledge to the workers to effectively extinguish such fire before escalating. This in turn will reduce the number of fire incidences at the work place and may prevent fatal accidents.

STCW fire prevention and fire fighting course module can be useful in this context.

Teamwork spirit:

Bridge and engine resource management training exists in the maritime industry and is considered important tools to develop teamwork spirit.

In SBRI the workforce involves comes from various backgrounds and skills. They have linguistic & cultural problems amongst them. There are a number of groups that work simultaneously on board and in the yards. Any mistake by one in the group may affect others. So an effective workplace communication is important in this complex situation. The work place safety does not solely rely on one individual. Therefore team work and coordination is vital in such hazardous environment because even the most skilled and experienced worker may find himself in danger due to other unskilled workers' acts, mistakes, mishaps or omissions.

Knowledge of understanding the safety sign and symbols and knowing the safe working procedure can be a common language in the first place. Education and training can help in inculcating the sense of team work, team spirit, and inter-team collaboration. It will help in inculcating the zeal to learn within the employees and thus help to create a safe team working environment.

The bridge and engine resource management course idea may be useful to guide some courses in the SBRI context.

Knowledge of first aid:

In order to keep with the isolation of ships at sea, the seafarers must demonstrate medical skills to support their colleagues in case of emergency. In the context of present ship recycling methods, the distance from shore support may request such basic training.

Understandably, accidents and injuries are common in this industry. The use of basic first aid tools/techniques may in the first instance increase the chances of survival of a critically injured person. With proper Education and Training workers can receive such information on how to use the first aid techniques and tools, giving lifesaving support such as artificial respiration, cardiac massage and stoppage of bleeding prior getting to shore medical facilities.

STCW training on elementary First Aid may be introduced in this context.

Contribution to Management safety:

The ISM is considered a way to involve the management in the safety of ships. Therefore, such formal system may be useful in the shipbreaking context to develop safety awareness at all levels. The Hong Kong Convention also promotes such an idea.

According to SBRR Ch-vii.Para-30 expressly mentioned that all recycling facility must implement occupational health and safety management system to improve the working condition to reasonable standards. If considering the management structure of any yard, it is ultimately the majority and vital people at the cutting edge who may contribute a lot to the management safety.

Management responsibility is to set up a well-balanced transparent policy with particular goals which in this case is accident prevention and preservation of workers health and the environment. To achieve this common goal top down responsibility

must be in place clarifying what is expected from the work force. This approach will allow the workers to clearly understand the organizational health and safety policy. The workers will feel more responsible towards their job. This will also help the organization to develop a safety culture within a reasonable time. A safety culture promotes continuous improvement, efficiency and effectiveness (O'Neil, 2002).

Such a move is highly beneficial because it will reduce the vulnerability of the workers and most probably will enhance their productivity. This should improve organizational efficiency and mitigate various issues such as occupational health, safety and environmental damage through an awareness campaign. This should also enhance the livelihood, security, health care, wellbeing and empowerment of the disadvantaged.

In order to achieve the above organizational goals workers need to be effectively involved in the management safety system. Workers need to understand the management strategy and learn how they can contribute to the safety system by their safe working practices and quality of work. With proper education and training program both institutional and in-house training, workers will gather knowledge about the management safety system and will be more encouraged and participatory to achieve desired goals.

The role and responsibilities of individuals prescribed in ISM code may support the idea to establish a safety management system for SBRI.

Training Program/Institute:

The current education and training scheme for Chittagong shipbreaking yards seems to focus only on workers, but others stakeholders of this industry also need information and to some extent training for effective implementation of management system towards common understanding of workplace safety. Analyses and identification of correct stakeholders, selection of the target audience groups with understanding of their characteristics and behavior, local working conditions and environment needs to be considered prior design, development, and delivery with

further scope for evaluation and review which in this system seem absent. For effective and sustainable training program, a more systematic and methodological approach needs to be in place for which further research and in-depth studies are required.

A budget allocation/financing needs to be explored for sustainable development which may be supported through key stakeholders and or donor agencies.

Safety officer position in Occupational Health and Safety policy

The introduction of safety officers' position in SBRI is a positive step to enhance workplace safety. Role of such position has been emphasized in the current regulation. However, management commitment should clearly define such position empowering him to work independently.

In a complex situation like SBRI in Bangladesh where many small groups work independently under no central supervision but a safety officer role can bridge them together for better performance towards OHS. All activities in the yards may be centrally controlled and managed by a safety officer ensuring all precautionary measures and necessary resources are available. He may be assisted by a group of trained staff to co-ordinate all shipbreaking activities while onsite monitoring and enforcement can be done effectively. A small group on site may co-ordinate him as central focal point/control room. However, such position needs adequate resources and trained staff to support such idea.

The idea of such safety officer exists in the shipping industry under safety management system (SMS) on board. The definition and job scope clearly describes his position and importance in relation to safety matters. He/she remains independent who regulate safety matters, conduct safety meetings and conduct risk analyses prior undertaking any job. He has the freedom to intervene any unsafe practices and exercise his empowerment in order to restore safety.

Such idea under ISM can be helpful for establishing safety management system in the yards defining roles and responsibilities of safety officer in the organogram.

To conclude, training has multidimensional positive impact in any organization. A pragmatic and effective training program can reduce the number of injuries and deaths, property damage, legal liability, illnesses, workers' compensation claims, and missed time from work.

A knowledge based supportive workplace is the key especially in the SBRI where most of the workers lack or have limited basic education. With proper education and training the vulnerability of workers can be minimized. Workplace accidents and injuries can be reduced to a reasonable level if not eliminated completely. This will also help strengthen those who are skilled and others to enhance their knowledge regarding work place safety as well as to help achieve organizational goals. Appropriate and effective education and training programs under local circumstances will certainly improve workers common skills and competence which eventually will contribute vastly towards sustainable development of this industry.

Relevant training existing in the maritime training field which may be perceived for the Shipbreaking industry to improvise safety standards.

7.2 Conclusion

Shipbreaking is considered to be the most sustainable way of disposing end of life ships. Almost every parts and machineries of the ships can be recycled or reused. More importantly for Bangladesh, the industry generates hundreds and thousands of direct and indirect job opportunities for the disadvantaged.

With significant amount of market shares Bangladesh has been upholding this industry locally over decades. However, the conditions of the shipbreaking yards

pushed the regulators to intervene in the industry. The Bangladesh government recently undertook various initiatives to enhance safe and environmentally sound manners of recycling of ships. In August 2011, high level Bangladeshi delegates accompanied by industry representatives and other stakeholders visited other shipbreaking nations such as China, India and Turkey. They gathered information and ideas prior to formulating a pragmatic rule for this industry.

"Since we're newcomers in the global market, we prefer to share ideas and experiences with leading shipbreaking nations to put the shipbreaking industry on a firm footing," We want to move forward in a transparent way, and won't compromise with anything that might pose threat to environment" Mr. Dilip Barua, Hon'ble Minister for MOI, BD, (AKM Moinuddin, 2011)

This move demonstrated the commitment of government and showed the breaking industry about the new possibilities towards green and safer recycling.

"We are moving in the right directions, just wait and see. Bangladesh shipbreaking industry will soon be recognized as global example for its environment- friendly growth and expansion. We will take a pragmatic as well as an environment and workers friendly policy to ensure the sector's sustainability which is a must for the country's economic development" Mr. Dilip Barua, Hon'ble Minister for MOI, BD (The Daily Star, 2011)

The above statement from the government gives a clear indication of how the industry should look in the future. Subsequently, SBRR was framed and enforced from December 2011. Coincidentally SBRR has been formulated just after the adoption of the Hong Kong Convention, 2009 (HKC). Interestingly, though Bangladesh did not ratify HKC but most of the requirements for 'safe and environmentally sound recycling of ships' under HKC was reflected in Bangladesh Rule 'SBRR, 2011' (Government Gazzete, 2011).

Since the implementation of the SBRR regulations, the industry is showing positive transformation towards green recycling which is more visible in the recent past. The changes may not be established overnight but may require some time.

Moreover, the process has to be promoted and continued in order to cope with the future demand and requirements of the regulators, industry and its clients.

It could be steps to the beginning towards green recycling. The future trend might also demand further modernization under local circumstances and conditions. It is evident that many local players are also proponent to further mechanization and modernization of this industry for an accident and pollution free environment. However, the technologies and resources are lacking locally. Therefore, innovative technologies and ideas have to be explored and shared in order to support the industry acknowledging the local conditions.

Bangladesh shipbreaking industry has both challenges and opportunities with numbers of advantageous parameters specially abundance of cheap laborers, technical know-how, shipping experience and expertise, local steel demand and second hand market utility. With such potentials for better sustainability, the industry needs logical support both internally and externally in various aspects such as technical, human oriented, organizational and financial.

Ship recycling should be looked into with an international perspective. Much needed international co-operation with transfer of technology and information and sharing of responsibilities from various stakeholders is equally important with ongoing local efforts.

In addition to a global ship breaking policy in Bangladesh, local initiatives have to be promoted and particularly those aiming to improve the working conditions in the breaking yards by training the workers.

Bangladesh has shipping experience and good expertise in Maritime Education and Training. For example the Bangladesh Marine Academy, a center for maritime

excellence has long 50 years of reputation in the maritime training field where they can support the enhancement of the industry through the training in collaboration with existing SBRI training facilities in a joint venture project.

References

- The Daily Star. (2011, August 13). Shipbreaking to go green as policy underway. *The Daily Star*, p. Metropolitan.
- First Extension order, 7260 of 2008 (Bangladesh High Court April 6, 2011).
- M.T Enterprize, 7260 of 2008 (High Court Bench of Bangladesh April 6, 2011).
- Agency, C. I. (2011). The world factbook 2011. New york, United states.
- AKM Moinuddin, U. S. (2011, August 9). Shipbreaking to be global leader 'within 5 years': Barua. *United News Bureau*, pp.
<http://www.unbconnect.com/component/news/task-show/id-55386/format-raw>.
- ALAM, A. K. (2011, February 10). Round Table on . *Harmonization between Industrial Development and Environment Perspective Bangladesh*. Conference Center, FBCCI , Dhaka, Bangladesh: FBCCI, PETRONAS AND MOI.
- Awesome,inc. (2012, 15 August). *Shiprecycling*. Retrieved sptember 15, 2012, from Shiprecycling Blog: <http://recyclingships.blogspot.se/2012/08/something-about-shipbreaking-industry.html>
- BELA. (2004). *Bangladesh Environmental Layers Association*. Retrieved september 9, 2012, from BELA,public interest litigation: <http://www.belabangla.org/about.htm>
- Captain Anam Chowdhury, M. E. (2012, June 4). No of ISO certified Yard. (Author, Interviewer)
- Chowdhury, C. A. (2010, october). Power Point Presentation. *Ship>Breaking?Recycling?or Reusing in Bangladesh*. London: Captain Anam Chowdhury.
- Chowdhury, I. u. (2011). Changing trend in the shiprecycling situation in bangladesh,an overview. *The 2nd International Ship Recycling Symposium"* (p. power point presentation). Muroran city, Hokkaido prefecture, Japan on 22th November 2011.: Retrieved from: <http://shimizu-kazumichi.com/symposium20111122/en/>.
- Daily Purbakone. (2011, september 17). Four Workers death in shitakunda shipyard. *Daily Purbakone*, p. 9.
- Daily Sun,. (2011, May 12). Ship breaking workers' training ends today. *Daily Sun*, pp.
http://www.daily-sun.com/details_yes_12-05-2011_Ship-breaking-workers'-training-ends-today--_217_1_10_1_0.html.

- Dao, R. (2005). *End of Life Ships, The human cost of breaking ships*. Amsterdam: Greenpeace.
- DNV. (2001). *DECOMMISSIONING OF SHIPS,SHIP-BREAKING PRACTICES/ ON SITE ASSESSMENT*. Norway: DNV.
- Dr. Md. M. Maruf Hossain, M. M. (2006). *Ship Breaking - Towards Sustainable Management*. Chittagong: Young Power in Social Action (YPSA).
- Government Gazette, u. M. (2011, December 12). The shipbreaking and recycling rules 2011. *Government Gazette, under Ministry of industry*. Dhaka, Tezgaon, Bangladesh: Bangladesh gazette.
- Greenpeace. (September, 2002). *The continuous evasion of the "Polluter pay principle"*. Netherland, Amsterdam: Greenpeace.
- Greenpeace. (2000). *Shipbreaking a global environment, health and labor challenge, a report to IMO MEPC 44 session*. Amsterdam: Greenpeace.
- Greenpeace, FIDH and YPSA. (2005). *End of life ships*. Amsterdam: Greenpeace.
- GREY, M. (2012, March 26). The pros and cons of the shipbreaking industry. *Lloyd's list*, p. 1.
- Haroon, J. U. (2010). Non-ferrous metal emerges with export potential. *Bangladesh Economic News*.
- Hossain, D. M. (2006). *Ship Breaking Activities and its Impact on the Coastal Zone of Chittagong, Bangladesh: Towards Sustainable Management*. Chittagong, Bangladesh: YPSA.
- ILO. (2004). *Safety and Health in Shipbreaking, Guidelines for Asian countries and Turkey*. Geneva: ILO.
- IMO. (2011, May 15). *The Hong Kong international convention for the safe and environmentally sound recycling of ships, 2009*. Retrieved August 19, 2012, from International Maritime Organization:
<http://www.imo.org/about/conventions/listofconventions/pages/the-hong-kong-international-convention-for-the-safe-and-environmentally-sound-recycling-of-ships.aspx>
- Index Mundi. (2012). *IndexMundi*. Retrieved August 27, 2012, from Index Mundi:
<http://www.indexmundi.com/g/r.aspx?c=bg&v=69>

- Islam, P. D. (2011, May 27). Impact of Ship Breaking on environmental pollution,energy and national economy of bangladesh. *Seminar on 'Ship Breaking and Its Impacts on Steel Sector of Bangladesh'*. Dhaka, Bangladesh: BUET.
- Kh. Akhter Hossain, I. K. (2010). SHIP RECYCLING PROSPECTS IN BANGLADESH. *The International Conference on Marine Technology,2010* (p. 300). Dhaka: Department of Naval Architecture and Marine Engineering,BUET,Dhaka.
- Khan, J. U. (2010, March 6). Steel exports shine. *The daily star*, pp. <http://www.thedailystar.net/newDesign/news-details.php?nid=128986>.
- Khan, S. (2011, October 11). Let Ship-Breaking Industry Survive Protecting Nature. *The Financial Express*., pp. <http://vlex.in/vid/let-ship-industry-protecting-nature-324991475>.
- L.Jones, S. (2007). *A CHINA ENVIRONMENTAL HEALTH PROJECT FACT SHEET,A Toxic Trade: Ship Breaking in China*.
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CDUQFjAC&url=http%3A%2F%2Fwww.wilsoncenter.org%2Fsites%2Fdefault%2Ffiles%2Fshipbreaking_feb1.pdf&.
- LEANDER, T. (2012, April 4). A tsunami of scrapping. *Lloyds list*, p. insight.
- Lloyds. (2012, May 22). *Lloyds List*. Retrieved September 21, 2012, from www.lloydslist.com:
<http://www.lloydslist.com/ll/sector/containers/article398834.ece>
- MAHR, K. (2010). *Bangladesh Cracks Down on Shipbreaking*.
<http://science.time.com/2010/08/25/bangladesh-cracks-down-on-shipbreaking/>:
Time Science and Space.
- MCCARTHY, L. (2012, March 8). Ship recycling firmly on 2012 agenda. *Lloyd's List special report on shiprecycling*, p. 2.
- O'Neil, M. W. (2002). World Maritime Day 2002,SAFER SHIPPING DEMANDS A SAFETY CULTURE. *IMO NEWS*, p. Issue 3rd.
- Platform on Shipbreaking, N. (2009). *Off the Beach*. Brussels: NGO Platform on Shipbreaking.
- Prabal Barua, A. p. (2012). *Shipbreaking Activities in Bangladesh and collision of Marine Biodiversity*. chittagong: YPSA.
- Sarraf, M. (2010). *Ship Breaking and Recycling Industry in Bangladesh and Pakistan*. New York: World Bank.

- Shaber, M. U. (2009). The prospects of the recycling industry. *The Financial Express*.
- Sharma, M. A. (27-28 February, 2009). IMO's 2nd regional seminar on safe and environmentally sound recycling of ships., (p. Power point presentation). Shanghai, China.
- The Daily Azadi. (2011, October 4). *The Daily Azadi*.
- The Daily Star, S. C. (2011, November 23). Ship-breaking training institute on cards. *The Daily Star*.
- The World Bank. (2011). World Data Bank. Washington, DC, United States, <http://databank.worldbank.org/data/Views/VariableSelection/SelectVariables.aspx?source=World%20Development%20Indicators%20and%20Global%20Development%20Finance#>.
- The World Bank. (2012, February 28). *The World Bank*. Retrieved September 9, 2012, from The World Bank: Retrieved: <http://www.worldbank.org/en/news/2012/02/28/faster-growth-needed-to-create-15-million-jobs-annually-in-bangladesh>
- UNCTAD. (2011). *Review of maritime transport*. New York: UNCTAD secretariat.
- World Bank. (2010). *Ship breaking and recycling industry in Bangladesh and Pakistan*. New York: World Bank.
- World Bank. (2010). *Shipbreaking and recycling industry in Bangladesh and Pakistan*. New York: World Bank.
- World Bank. (2010). *World Bank*. Retrieved September 5, 2012, from www.worldbank.org: http://databank.worldbank.org/ddp/home.do?Step=2&id=4&hActiveDimensionId=WDI_Ctry
- YPSA. (2005). *Workers in shipbreaking industries, A base line survey of Chittagong (Bangladesh)*. Chittagong: ICO, 1CDA C/A, Momin Road.
- YPSA. (2005). *Workers in shipbreaking industry, A base line survey in Chittagong*. Chittagong: Young Power in Social Action (YPSA).
- YPSA, FIDH and International platform on shipbreaking. (2008). *Childbreaking Yards – Child Labour in the Ship Recycling Industry in Bangladesh*. Submission to the United Nations Committee on the Rights of the Child: FIDH.

Appendix A

Details of research conducted in Chittagong

Qualitative Interview of 35 different workers on random basis from various working groups as below:

- 08 from cutter group.
- 02 from winch group,
- 12 from general working group/helper,
- 02 from foreman group,
- 01 yard supervisor, 01 yard manager,
- 01 office manager,
- 02 from sorting/grading group,
- 01 safety officer,
- 02 from wire group,
- 02 from security guard,
- 01 from oil group.

A set of questionnaire on the above qualitative research can be found in **Annex 1**.

Author also conducted a Quantitative interview of 100 workers from different working groups randomly selected within yards, training institute & outside yard in local tea stalls. (**Ref. Annex 2**)

In addition to workers:

- Interviewed two yard owners, one in Agrabad and one in Khatunganj location (**Ref. Annex 3**).
- Interviewed a technical representative from BSBA, at his office located in Sk. Mujib road (**Ref Annex 4**).

- Interviewed Chief training coordinator and one instructor from Training institute located at Kadamrasul, Bhatiary (**Ref Annex 5**).

Data collection and conducting survey was not easy as the industries are very restricted for general entry. However Author managed to convince BSBA representative, some of the leading yard owners who extend their help in this regard. Training provider was kind enough to take me to some of the yards while conducting on job training helped author to understand the real life scenario. Since there is no central data base of this industry some of the data collected from various print media, NGO reports, and private and government organizations.

Appendix B

List of Hazards identified by ILO in “Safety and Health in Shipbreaking, Guidelines for Asian countries and Turkey”

Table 1. Common hazards that are likely to cause work-related injuries and death, ill health, diseases and incidents among shipbreakers

Frequent causes of accidents	
■ Fire and explosion: explosives, flammable materials	■ Falls from height inside ship structures or on the ground
■ Being struck by falling objects	■ Struck by moving objects
■ Caught in or compressed	■ Slipping on wet surfaces
■ Snapping of cables, ropes, chains, slings	■ Sharp objects
■ Handling heavy objects	■ Oxygen deficiency in confined spaces
■ Access in progressively dismantled vessels (floors, stairs, passageways)	■ Lack of PPE, housekeeping practices, safety signs
■ Electricity (electrocution)	■ Shackles, hooks, chains
■ Poor illumination	■ Cranes, winches, hoisting and hauling equipment;
Hazardous substances and wastes	
■ Asbestos fibres, dusts	■ PCBs and PVC (combustion products)
■ Heavy and toxic metals (lead, mercury, cadmium, copper, zinc, etc.)	■ Welding fumes
■ Organometallic substances (tributyltin, etc.)	■ Volatile organic compounds (solvents)
■ Lack of hazard communication (storage, labelling, material safety data sheets)	■ Inhalation in confined and enclosed spaces
■ Batteries, fire-fighting liquids	■ Compressed gas under pressure
Physical hazards	
■ Noise	■ Vibration
■ Extreme temperatures	■ Radiation (UV, radioactive materials)
Mechanical hazards	
■ Trucks and transport vehicles	■ Failure of machinery and equipment
■ Scaffolding, fixed and portable ladders	■ Poor maintenance of machinery and equipment
■ Impact by tools, sharp-edged tools	■ Lack of safety guards in machines
■ Power-driven hand tools, saws, grinders and abrasive cutting wheels	■ Structural failure in the ship
Biological hazards	
■ Toxic marine organisms	■ Animal bites
■ Risk of communicable diseases transmitted by pests, vermin, rodents, insects and other animals that may infest the ship	■ Vectors of infectious diseases (TB, malaria, dengue fever, hepatitis, respiratory infections, others)
Ergonomic and psychosocial hazards	
■ Repetitive strain injuries, awkward postures, repetitive and monotonous work, excessive workload	■ Mental stress, human relations (aggressive behaviour, alcohol and drug abuse, violence)
■ Long working hours, shift work, night work, temporary employment	■ Poverty, low wages, minimum age, lack of education and social environment
General concerns	
■ Lack of safety and health training	■ Inadequate accident prevention and inspection
■ Poor work organization	■ Inadequate emergency, first-aid and rescue facilities
■ Inadequate housing and sanitation	■ Lack of medical facilities and social protection

Appendix C

An example of soil contamination found in sites in Bangladesh and estimated Accumulated hazards.

Soil contamination found in sites in Bangladesh and Pakistan:

- Cadmium from 0.6 to 2.2 mg/kg
- Chromium from 2.42 to 22.12 mg/kg
- Lead from 11.3 to 197.7 mg/kg
- Mercury from 0.078 to 0.158 mg/kg
- Oil from 485 to 4,430 mg/kg

Table ES 3. Accumulated hazardous material amounts from ship breaking and recycling in Bangladesh and Pakistan, 2010-30

Hazardous material	Unit	Bangladesh	Pakistan
Asbestos	t	79,000	5,200
PCBs (mainly cables)	t	240,000	16,000
ODS (mainly polyurethane foam)	t	210,000	14,000
Paints (metals, tributyltin (TBT), and PCBs)	t	69,200	4,550
Heavy metals	t	678	45
Waste liquid organic	m ³	1,978,000	130,000
Miscellaneous (mainly sewage)	m ³	107,000	7,000
Waste liquids inorganic (acids)	t	775	51
Reusable liquids organics	t	675,000	44,200

(Source: World Bank report, 2010)

Appendix D

Amount of hazardous materials per million GT on merchant and navy vessels

Table 3.1. Amount of hazardous material per million GT on merchant and navy vessels

Hazardous Material	Unit	Merchant Vessels**		Navy Vessel**	
		Material/ million GT	Panamax tanker 40,000 GT	Material/ million LDT	Destroyer class 5,000 LDT
Asbestos	ton	510	20	17,000	86
PCBs					
PCB liquids (transformers, etc.)	kg	0	0	No info.	available
PCB solids (capacitors, ballasts, etc.)*	kg	1.7	0.07	5,500	28
Hydraulic oil	ton	110	5.0	1,600	8.0
Ozone-depleting substances (ODS)					
ODS liquids (CFC, Halons, etc.)	ton	7.0	0.3	No info.	available
ODS solids (e.g., polyurethane (PU))	ton	1,800	70	No info.	available
Paints					
Paints no info	ton	420	17	39,000	200
Paints containing tributyltin (TBT)	ton	14	0.56	No info.	available
Paints containing PCBs	ton	No info.	available	No info.	available
Paints containing metals	ton	No info.	available	25,500	130
Heavy metals					
Cadmium (merchant); lead (naval)	ton	1.9	0.08	34	0.17
Mercury	kg	44	1.8	75	0.38
Radioactive substances	kg	No info.	available	No info.	available
Waste liquids organic	m ³	5,650	230	1,900	9.0
Reusable liquids organic (HFO, diesel)	ton	3,200	130	23,000	110
Miscellaneous					
Ballast water (C-34)	ton	60,000	2,400	280,000	1,400
Sewage (C-35)	m ³	660	26	No info.	available
Garbage (C-42)	ton	2.3	0.09	No info.	available
Incinerator ash (C-41)	ton	1.9	0.08	No info.	available
Oily rags (C-45)	ton	3.1	0.12	No info.	available
Batteries nickel/ cadmium	units	170	7.0	No info.	available
Waste liquids inorganic (acids)	m ³	0.28	0.01	430	2.0
Reusable liquids organic (other)	m ³	620	25	1,500	7.0
Equipment					
Batteries lead (C46)	ton	2.2	0.09	34,000	170

*Merchant vessel does not estimate PCBs in cables due to lack of data.

**For both categories an example is given for a typical-size vessel. The underlying IHM datasets include 14 merchant and 13 navy vessels.

**All figures are rounded to two significant figures.

Source: World Bank Report'2010, page 29.

Annexes (1 to 5)

Details of sample questionnaires used for interviews with different stakeholders.

Annex 1

A set of questionnaire to the workers group as a qualitative approach:

1. What is your age? -----
2. Which part of Bangladesh you are from? -----
3. What formal level of education you have in the past? -----
4. How long you are working in this industry and under what capacity? -----
5. Are you employed directly or by contractor? -----
6. Are you aware of the hazards associated with this industry?
7. Have you witnessed any accident before (follow up Questions)?
8. Do you have any background knowledge about the industry?
9. Have you undergone any form of training?
10. Do you think the training you have undertaken is understandable to you?
11. .Who pays for your training and how much? -----
12. To your opinion how the overall safety situation may be improved. -----

Thank you very much

Annex 2

A set of questionnaire to the workers group as a quantitative approach:

1. What is your age?

20-29 Years

30-39 Years

40 years & above
2. Marital Status?

Married

Unmarried
3. How long and under what capacity you are working this industry?-----
4. What level of formal education you have:

No Edu	Primary	SSC	HSC& above
5. Have you received any form of training so far?

YES

NO
6. Was the training understandable to you?

Yes/No/No comment
7. Do you think the training you received is sufficient?

Yes/No/No opinion
8. Have you any idea about the associated work hazards?

Yes/No/Not at all
9. Have you witnessed any accident before?

Yes/No
10. What kind of accident you witnessed
11. Are you provided with your protective gears?

Yes/No/I don't know
12. To your opinion how the overall safety situation can be improved:

Proper training	Drills	Knowledge Sharing	Forming Association	Others

Thank you very much

Annex 3

A set of questionnaire for the Employer/Yard Owners as a qualitative approach

1. You are owner of how many yards?
2. Do you realize the importance of ship recycling industry in Bangladesh?
Yes/No
3. What makes the industry stop and re-open over the past?
4. Do you recognize this industry has declined in the recent times due to poor working conditions and of environmental issues? Yes/No
5. Do you recognize the organizational safety mostly depends upon Decent working cond.?
Yes/No
6. Do you realize the capacity building through proper Education and Training will bring more productivity and efficiency for the industry? Yes/No
7. Do you face any challenges to educate your peoples? Yes/No
8. Do you feel the training providers are adequately equipped to offer suitable training? Yes/No
9. With your experience and ideas what form of training would be most suitable for the workers?
10. How do you employ your workers? By direct employment/ via contractor?
11. Do you feel to set up a safety management system by bridging your workers and staffs?

Thank you very much

Annex 4

A set of Questionnaire for the representative of Bangladesh Ship Breakers Association

1. Over the past this industry has played an important role in global context, why currently it is suffering from frequent stop and re-opens?
2. Do you think that the yard owners, managers and the officials do recognize these issues?
3. You being in the lobby with Government and other international bodies, with your opinion what best possible approach can be made to mitigate the issues?.....
4. With your opinion how this industry can be made a future viable industry.....
5. With your opinion how the OHS and other labor related issues can be addressed.....
6. Understandably most of the labors are migrant workers, with your opinion how they can contribute to the organizational safety.....
7. Do you realize that among other factors capacity building through appropriate education and training can play a significant importance in the safety aspects?
8. To your opinion considering the workers level of education and work experience which form of training could be most suitable for them?
9. Do you think the current training providers are well equipped for this purpose?
10. In line with HKC, How the industry is looking forward to face the future challenges?

Thank you very much

Annex 5

A set of questionnaire for the training institute as a qualitative approach

1. As a training provider are you been approved by SBSRB? Yes/No/In process
2. Is there any qualification criteria set out for the training provider? Yes/No
3. Do you have a dedicated training institute? Yes/No/Rental basis
4. Is there any guideline to develop a training curriculum? Yes/No
5. What form of training guidelines you are currently following? -----
6. Understandably most of the workers are illiterate, what methodology and training tools you are using pertaining to their Education and
7. Do you think you have appropriate teaching materials? Yes/No/May be
8. Are they understandable to the workers? Yes/No/May be
9. Do you have any evaluation criteria prior issuing any certificate? Yes/No
10. Are you facing any challenges in providing Education and training? -----
11. With your opinion how the training could be improved? -----
12. Do you feel any external resources/investment could make the program more sustainable? Yes/No
13. Do you feel the industry has all the expertise and technical ability to handle Asbestos, PCB's, POP's etc? Yes/No
14. Is there any particular course for the peoples dealing with the special hazardous waste management? Yes/No
15. Do you recognize the training package should comprise of all the aspects of occupational safety and health, environmental and other human rights related issues? Yes/No
16. Is your training program is supervised by any Govt. Authority? Yes/No

Thank you very much

Annex 6

Employment generation in shipbreaking linkage domain.

SL	ORGANIZATION	NUMBER OF FIRM / INDUSTRY	MATERIALS SUPPLIED	WORKERS EMPLOYED	FINISH PRODUCTS
1	RE-ROLLING MILLS	525	MS PLATES & GIRDERS	2,62,500	RODS,ANGLE,FLAT BAR
2	STEEL MILLS	15	MELTING SCRAP	21,000	ROD/BAR ANGLES
3	SHIP REPAIRER	70	PLATES, GIRDER, CABLE, ENGINE	4,000	SHIP REPAIR
4	FURNITURE INDUSTRY	2300	CARDBOARD, DOORS	2,30,000	OFFICE & HOUSEHOLD FURNITURE
5	ELECTRIC & CABLE	575	COMPUTER, FRIDGE, ELECTRIC CABLE ETC.	28,750	OFFICE & HOUSEHOLD EQUIPMENTS
6	DOCK YARD	69	PLATE, GIRDER, CABLES, EQUIPMENT, ENGINE ETC	40,000	INLAND SHIP BUILDING & REPAIR
7	TRANSPORT ORGANIZATION	300		9000	CARRIAGE OF GOODS
8	TRANSPORTS	4000		12,000	TRUCK, COVER VAN, PICKUP ETC
9	ACTIVE SHIP BREAKING YARDS	80	SHIP DISMANTLING & RECYCLING	1,60,000	ACTIVE
10	UPCOMINGSHIP BREAKING YARDS	39		7800	UNDER DEVELOPMENT
11	ROD SALER	3000		1,50,000	BUY/SALE
12	FOUNDRY & MOLDING SHOP	2100	CUST IRON	2,10,000	TUBEWELL, MANHOLE COVERS
13	ROPE SHOP	230	ROPES	2300	FISHING NETS & HOUSEHOLD CRAFT

14	HARDWARE SHOP	1500	MACHINERY & TOOLS	2,25,000	INDUSTRIES, HOUSEHOLD, SHOPING MALLS ETC
15	WORKSHOP	2000	LATHE, WELDING MACHINE	40,000	EQUIPMENT MAKING & FABRICATION
16	ALUMINIUM & COPPER FACTORIES	1020	ALUMINIUM & COPPER	1,02,000	COOKING UTENSILS
17	PIPE SHOP	203	MULTI DIMENSIONAL PIPES	10,150	EQUIPMENT MAKING & FABRICATION
18	BRONZE/COPPER SALER	160	ALLOY PROPELLOR	800	EARN FORIEIGN CURENCY BY EXPORT
19	BLACKSMITH	20,000	SUPPLY OF IRON BAR	1,00,000	KNIVES, CHOPPER, SICKLE
20	OXYGEN FACTORY	35		3000	OXYGEN SUPPLY FOR SHIP BREAKING
21	EQUIPMENT TRADERS	345	GENERAL/MA RINE PARTS	34,500	GENERATORS SUPPLIED TO GARMENTS, FISHERIES, HATCHARY, FILLING STATION & ELECTRIFICATION OF ISLANDS
22	IRON DEPO	2500	CAST IRON	2,50,000	RAW MATERIAL FOR REROLLING & STEEL MILLS
23	PLASTIC FACTORY	880	RUBBER & PVC	79,200	BALLPEN,BATHROOM FITTINGS,HOUSE HOLD PLASTIC MATERIALS
24	COMMISSION BUSINESSMEN	2500		12,500	SALE/PURCHASE NEGOTIATION
25	BOILER BUSINESSMEN	100	BIOLER SUPPLY	500	TEA,TEXTILE,DYEING,PAPE R,OIL REFINERY INDUSTRIES
26	YARD OFFICE STUFFS	80		1,600	
27	SECURITY GUARDS	80		3,600	
28	BOATMEN	80		800	
29	LIGHT ENGINEERING	7000	LEATHE, WELDING	4,40,000	EQUIPMENT MAKING & fabrication
			Total	2,441,000	

(Source: FBCCI/MOI,BD, Courtesy: BSBA)

Annex 7

Showing the market share of five major shipbreaking nations in
%age GT & DWT

Global Statistics %age (GT)

Year	Bangladesh	China	India	Pakistan	Others
2000	20	21	49	6	4
2001	35	18	33	12	2
2002	30	19	41	6	4
2003	18	35	37	5	5
2004	47	21	23	3	7
2005	56	4	30	1	9
2006	63	6	19	4	9
2007	44	8	32	9	6
2008	51	11	30	3	5
2009	38	15	36	10	1

Data By: Lloyds Fairplay

Global Statistics %age (DWT)

Year	Bangladesh	China	India	Pakistan	Others
2000	22	28	39	6	5
2001	32	22	28	15	3
2002	28	25	38	5	3
2003	17	37	34	4	8
2004	53	20	16	2	9
2005	54	7	19	1	19
2006	68	4	21	2	5
2007	47	8	27	11	7
2008	54	12	28	3	4
2009	38	15	36	10	1

Data By: EA Gibson

(Courtesy: Captain Anam Chowdhury, BSBA)

Annex 8

Table showing the analysis from the quantitative research on 100 workers.

Age group	Work experience	Education level	Training status	Was training understandable	Was the training sufficient	Do they know all hazards	Whether provided with PPE	Comments on improvement: (One worker had multiple comments)
10% in age group 18-20	12% less than 6 months	28% no education	36% obtained training	34% said understandable	46% said yes	38% said knows	23% said provided	80% comments both with proper training and practical drills
40% in age group 21-30	24% between 1-2yrs	44% primary	52% no training	51% said not understandable	42% said no	46% said partly knows	52% said not provided	60% said information exchange/sharing
36% in age group 31-40	32% between 2-5yrs	20% Secondary school	12% under training	15% had no comment	12% no comment	16% not at all	25% said partly provided	60% said formation of association
14% above 40	32% above 5yrs	8% above SSC						20% said by other measures

(Source: Authors' Own Research)

Annex 9(A)

Pictures showing various equipment and machineries usability in the local market (pictures taken by the author between 17 May to 7 June 2012)



Pix (left) showing scrap plates in a vendor shop.



Pix (right) pipes collected from scrap ship on sell.



Pix (left), ship's furniture shop beside highway.



Pix (right), ship's electrical panel board refurbished.



Pix (left) Ships motors in vendor shop



Pix (right) ships electric cable and rope shop



Pix (left) ships woods piled up for sell



Pix (right), ships kitchen utensils in vendor shop



Pix (left) ships electric machineries in vendor shop



Pix (right) ships generators stock pile by vendor



Pix (left) paint and chemical shop beside highway.



Pix (right) most wasted metals for melting shop



Pix (left), ships valves overhaul and on sell



Pix (right), ships bathroom fittings and kitchen cutleries



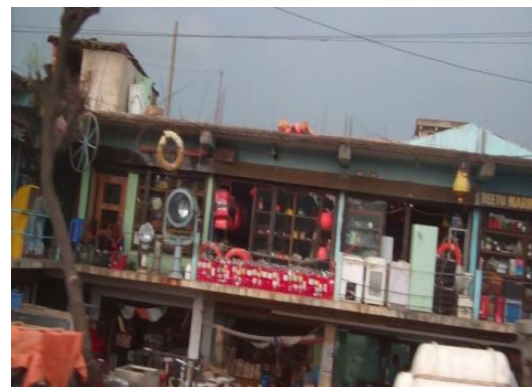
Pix (left), ships ladder shop



Pix (right), ships lifeboat stock for sell



Pix (left), LSA and FFA items' shop



Pix (right), Souvenirs and antique shop.

Annex 9(B)

Picture gallery of the current yard infrastructure developments

Main approaches to the Yards:



Picture above showing main approach to the yards with security arrangement.



Lay out plan of a yard,



Security check and entry procedure,



Board of Emergency Telephone numbers



Safety Warnings



Safety Poster

Yard site office:

দৈনিক কার্যবিবরণী বোর্ড
এস কে ফীল, মধ্যসোনাইছড়ি, বারআউনিয়া, সীতাকুন্ড, চট্টগ্রাম.

তারিখ:- ০২-০৬-২০২২

১। ডেসেনের নাম:-
কার্যের বিবরণ:-

(ক):-	আটটি (সীল)	নিয়োজিত লোকবল
(খ):-	জিটি	
(গ):-	জিটি (দ্বিধ)	
(ঘ):-	হ্যাট	

ফোরম্যান:-

(ক):-	আঃ ওয়াজেদ ইসলাম	২৫ + ৪৪
(খ):-	আঃ নাসির - গার্ড	
(গ):-	আঃ হুসেইন (আঃ হুসেইন) একজন মিস্ট্র	
(ঘ):-	আঃ হুসেইন (আঃ হুসেইন) একজন মিস্ট্র	

মোট লোকবল:- ৩২২

২। ডেসেনের নাম:-
কার্যের বিবরণ:-

(ক):-		২৫ + ৪৪
(খ):-		
(গ):-		
(ঘ):-		

ফোরম্যান:-

(ক):-		২০ + ২০
(খ):-		
(গ):-		
(ঘ):-		

মোট লোকবল:-
দৈনিক মন্তব্য:-



Daily workers list with spot of job (Top) in local language and yard site office (Bottom)

Annex 9(C)

General Overview of a Yard and yard structures with current working practices:



A front view of a yard (left) and a back view (right)



Generator and workshop Room

Real Life Scenario in the yard:



Above pictures shows the current working practices in the yards,

Workers accommodation, recreation, mess room and welfare facilities:



Pictures showing workers living complex.



Inside view of dormitory/workers living space.



Workers mess room with cooking facilities



Workers recreation room



Drinking water facility for workers



A designated prayer room on top of living complex



Barber shop inside a yard

Medical Facilities:



A first Aid room inside a yard, with medical assistant.



A First aid room under construction



BSBA Hospital outside the yards with indoor and outdoor facilities.

General housekeeping:



Above pictures showing some form of housekeeping within the yards.

HAZMAT Handling Facilities:



An Asbestos storage negative pressure chamber (left) and various other hazmat storage room (right).

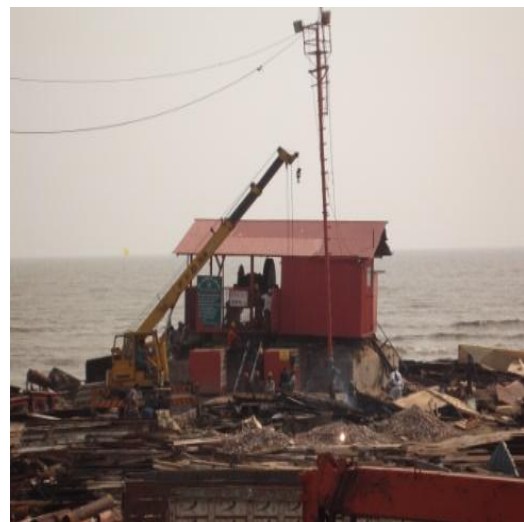


Oil and Oily sludge storage well

Firefighting facilities:



Mechanization of the yards:



Above pictures showing the transformation of mechanization in the yards

Annex 9(D)

Training infrastructure development

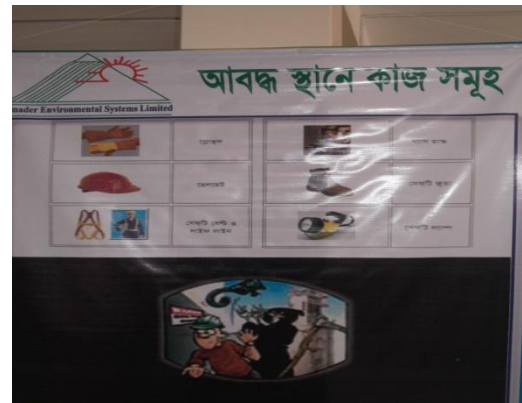


Showing BSBA training center set up at JUBA Bhaban, Halishahar in April'2011, (pix courtesy from training center).



Training center renamed as ASTI from March'2012, Relocated at KdamRasulpur,(A batch under class room training, pix by author june'12)

Teaching Aids currently used by Training Institute:



Above pictures showing various safety methods in different working conditions. Same are currently used as teaching aids and supplemented with lectures.

Annex 9(E)

Qualitative and Quantitative Interview by Author



Qualitative interview with cutters, shift in charge and safety officer (left). Qualitative interview with welder and fitter (Right),



Picture showing quantitative interview with workers (left) and qualitative interview with cutter foremen (right).