



PROPOSED VIABLE SHIP RECYCLING PROCESS FOR SOUTH EAST ASIAN RECYCLING YARDS ESPECIALLY FOR BANGLADESH

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ABSTRACT

Usually ships dispose hundreds of tons of garbage from day to day operations. At the same time, the disposing of a ship after its end of operational life also leaves a huge amount of waste, posing a potential hazard to the environment. In recent decade ships are beached in mainly in few South East Asian countries; such as Bangladesh, India, and Pakistan, allowing locals to dismantle the vessel with less preventing measures. Actually those countries are doing a great job as they are in fact doing recycling of obsolete old ships end of their life with good efficiency, but with moderate professional manner. In fact, perfect green ship recycling in dry docking method is a costly affair. At the same time, viable green ship recycling with the merging of present usual practice (beaching method) in South East Asian countries is very much possible. It is possible to develop an environmentally friendly, sustainable and sound ship recycling plan (SRP) and provide required training to both employee and employer of local yards in South East Asian ship recycling yards to achieving sustainable ship recycling process. If most of the yards of South East Asian countries can achieve that standard and ensure the quality of ship recycling practice and process, it is possible to complied HKC in modified way keeping beaching method of ship recycling intake. It is a research paper which will briefly describe international convention responsible for viable ship recycling process, Bangladesh initiative for achieving viable ship recycling process, and achieving viable ship recycling process for South East Asian recycling yards.

Keywords: *ship recycling, beaching, dry docking, compliance*

1. INTRODUCTION

Today the rise in the disposal of waste materials in the globe is at an alarming rate. These waste materials polluting the land, air and water severely as never before. Recent studies have stated that forty percent of the waste worldwide ends up in huge rubbish tips, and also the oceans will see more plastic in it than fish by 2050 [1]. However, the tangible efforts in the past few decades have made remarkable changes in our disposable culture and also opened doors for a number of alternatives to waste disposal. It is well accepted that, recycling is one of the fruitful methods for waste management and environment friendly way of pollution handling. The ships and the shipping industry as like any other industry, indeed world's biggest polluters, also create a huge amount of waste every day.

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Usually ships dispose hundreds of tons of garbage from day to day operations. At the same time, the disposing of a ship after its end of service life also leaves a huge amount of waste, posing a potential hazard to the environment. The improper disposal of the ships in earlier days, especially when they were left unattended after discontinuation from the service, has created several graves of abandoned ships around the world. In the last century, ship owners have also tried several other techniques; including scuttling the deliberate sinking of a ship, deep water sinking and ship-breaking, to get rid of their old vessels. While ship-breaking has emerged as the most common method of ship disposal among them. The harsh ship-breaking or ship-recycling practices have resulted in the dumping of dangerous toxic materials such as asbestos, insulation materials, bilge water, paint and PBCs on beaches and other open spaces. However, in recent decade ships are beached in mainly in few South East Asian countries; such as Bangladesh, India, and Pakistan, allowing locals to dismantle the vessel with less preventing measures but with minimum environment pollution. Actually those countries are doing a great job as they are in fact doing recycling of obsolete old ships end of their life with good efficiency, but with moderate professional manner.

Ship dismantling, also commonly referred to as ship “recycling”, is an inherently sustainable activity, the benefits of which are felt at the global level. As the term ship “recycling” implies, value is derived from the materials and equipment comprising end-of-life (EOL) ships: the scrap steel is melted down and is commonly used in the construction industries of ship recycling countries, and equipment (plates, engines, generator, pumps, cranes, machinery, equipments, mechanical parts, different materials, electrical cables, furniture, etc) is refurbished and reused in other industries [1]. Actually ship recycling is an engineering process [2] and more particularly a reverse engineering process of dismantling obsolete ship to recover reusable materials in a safe and environmental friendly way [3]. It is almost possible to complied HKC or modified standard of compliance and achieved approved standard by EU regulation by adopting viable and sustainable ship recycling process keeping beaching method intake. In this research paper there will brief description about the international convention responsible for viable ship recycling process, important national bodies in Bangladesh working for viable ship recycling process, viable option for ship recycling process of South East Asian Countries, ship recycling methods for South East Asian ship recycling yards, road to viable ship recycling process by global major players.

2. METHODOLOGY

It is a research work to finding option for viable and sustainable ship recycling process for major players particularly for Bangladesh by analyzing on ground data of local ship recycling yards of Bangladesh and available information around the globe; which has collected by author physically and from secondary method since last seven years (2010 to 2017). Information and results have based on original on ground data and take considerable help/guideline from the methodology followed in available literature. Primary and secondary data has been collected by the author from the local and international industry and from literatures available. In case of missing or unreliable data, benchmarks available in literature and contemporary development in this field were used for calculations of average annual reusable material output.

3. INTERNATIONAL CONVENTION RELATED TO VIABLE SHIP RECYCLING PROCESS

Environment pollution and hazardous waste issues are the purview of three international Multilateral Environmental Agreements (MEAs), namely the Basel Convention, Stockholm Conventions and the recently adopted Minamata Convention on Mercury (which has not yet entered into force). The Hong Kong Convention that specifically relates to ship recycling is also important given the number of hazardous components in end-of-life ships [7], although it has not yet entered into force.

- a. **Basel Convention (Trans-boundary Shipments of Hazardous Wastes).**
The “Basel Convention on the control of trans boundary movements of hazardous wastes and their disposal” came into force in 1992. It has been ratified by 184 member countries (Parties) and aims at reducing hazardous waste generation at source, environmentally sound management of these wastes, and reducing and regulating trans-boundary movement of hazardous wastes. The Convention was ratified by Bangladesh on 1st April 1993.
- b. **Stockholm Convention (POPs).** The “Stockholm Convention on Persistent Organic Pollutants” entered into force in 2004 with 179 member countries (Parties) ratifying the Convention. It aimed at eliminating or restricting the production and use of Persistent Organic Pollutants (POPs), which are "chemical substances that persist in the environment, bio-accumulate through the food web and might have adverse effects on human health and the environment". Nine of the POPs are pesticides. The Convention was ratified by Bangladesh on 12th March, 2007.
- c. **Minamata Convention (Mercury).** The Minamata Convention is a global treaty that aims at protecting human health and environment from the adverse effects of mercury. It has 128 signatories as at 19 January 2013. As of today, only 23 member countries (Parties) have ratified the Convention. Bangladesh signed the Convention on 10th October 2013; but is yet to ratify the Convention.
- d. **Hong Kong Convention.** The HKC for the Safe and Environmentally Sound Recycling of Ships, 2009 was adopted at a diplomatic conference held in Hong Kong, China, from 11 to 15 May 2009, which was attended by delegates from 63 countries. The Convention is aimed at ensuring that ships, when being recycled after reaching the EOL; do not pose any unnecessary risks to human health, safety and to the environment. The Hong Kong Convention intends to address all the issues around ship recycling, including the fact that ships sold for scrapping may contain environmentally hazardous substances such as asbestos, heavy metals, hydrocarbons, ozone-depleting substances and others. An appendix to the Convention provides a list of hazardous materials the installation or use of which is prohibited or restricted in shipyards, ship repair yards, and ships of Parties to the Convention. Ship recycling yards will be required to provide a "Ship Recycling Plan", specifying the manner in which each ship will be recycled, depending on its particulars and its inventory. As ships contain several hazardous substances and are sent for dismantling across borders, the Hong Kong Convention is closely related to the Basel Convention (IMO Recycling of ships, 2016).

- e. **EU Ship Recycling Regulation.** Anticipating the entry into force of the Hong Kong Convention, the European Union adopted its own legislation on ship recycling (EU Ship Recycling Regulation) in December 2013. The objective of the Regulation is to reduce the negative impacts linked to the recycling of EU-flagged ships, especially in South Asia.

4. IMPORTANT NATIONAL BODIES IN BANGLADESH WORKING FOR VIABLE SHIP RECYCLING PROCESS

Ship recycling in Chittagong started accidentally through the dismantling of Greek ship M D Alpine that was brought to shore near Fauzdarhat by the 1960's cyclone. It was dismantled in 1965 by Chittagong Steel House [7]. Subsequently, the Pakistani ship Al Abbas was salvaged, beached at Fauzdarhat and dismantled in 1974 by Karnafully Metal Works [4]. These incidents draw the attention of a few entrepreneurs on the suitability of the coast line near Fauzdarhat for beaching. Over the years, the ship recycling industry in Chittagong has gone through lean and boom periods, to become the world's largest ship recycling industry in 2015 and now the ship breaking and recycling industry (SBRI) spans over 18 km coast of the Bhatoary- Fauzdarhat- Baroiyawia area [10]. SBRI consists of 150+ ship recycling yards in register, of which about 40 are in regular operation, the industry directly employs over 200,000 laborers and accounts for the supply of half of all the steel products in Bangladesh. A number of factors have pushed the growth of this sector over time which include the favorable beaching condition, the proximity of the beach to the industrial hub of Chittagong mainly the steel rerolling mills which consume most of the output from the industry, the availability of risk-taking entrepreneurs, access to abundant labor from the northern districts of Bangladesh, the weak legislative framework allowing the operation of the industry for decades even without it being considered as an industry, the high demand in the local market for scrap ferrous and non-ferrous metals and other cheaper items recovered from the industry [5], access to finance from the formal financial institutions and informal money lenders, and the growth of a swarm of upstream and downstream industries forming an informal industrial symbiotic and inter-dependent network, etc.

However, there is a list of objections against SBRI. The main objections are poor labor management due to the harsh work environment for the manual laborers, the lack of protective clothing and equipment, predominance of manual processes and a high rate of accidents along with environmental damages caused by poor hazardous waste management, coastal contamination, air pollution, the spread of hazardous materials into the environment, forest destruction etc. Based on these objections, the Bangladesh Environmental Lawyer's Association (BELA) filed a petition to the High Court in 2008. This resulted in the order by the Bangladesh High Court directing the expert-supervised removal of hazardous wastes from ships before dismantling [9]. It also ordered ship recycling yards to obtain Environmental Clearance Certificates (ECC) from the Department of Environment (DoE) in order to be allowed to import ships and the Government to formulate regulations to control SBRI. Due to the ruling by the High Court, in 2010, the import and dismantling of ships in Bangladesh was stopped. Ship recycling activities resumed a few months later. In 2011, the Ministry of Industry (MoI) issued the Ship Breaking Waste Management Rules. Currently, the SBRI is bound by the Ship Breaking and Ship Recycling Rules 2011 under the MoI along with Environmental Protection Act 1995, and Environmental Protection Rules 1997 under the supervision of Department of Environment (DoE) under of the Ministry of Environment and Forests (MoFE). The labor safety and the environmental management standards in the yards are showing signs of improvement.

There is few important national and local bodies those are responsible for ship recycling process. Those important organizations have the power and authority to provide guidelines, create regulation and implements roles for safe and environment friendly ship recycling process. Those national and local bodies are includes MoI, SBSRB, MoFE, DoE, Ministry of Commerce (MoC), Customs Department, Chittagong Port Authority (CPA), National Board of Revenue (NBR), Federation of Bangladesh Chambers of Commerce and Industry (FBCCI), Bangladesh Ship Breakers Association (BSBA), Academic Organizations, NGO Ship breaking Platform, Bangladesh Environmental Lawyer's Association (BELA), etc .

5. SHIP RECYCLING METHODS FOR SOUTH EAST ASIAN SHIP RECYCLING YARDS

The world-wide ship recycling industry dismantles around 1,000 large ocean-going vessels per year, such as container ships, cargo & bulkers, oil & gas tankers (LNG, LPG), passenger ships and other types of ships, in order to recover steel and other valuable metals or recyclable items. However at present almost all ship recycling activities are concentrated in five countries: the three South East Asian countries (India, Bangladesh, and Pakistan), China, and Turkey. Further capacity is available in North America (US, Canada, Mexico) and within the European Union (amongst others Denmark, Belgium and UK). At present, South East Asia is undoubtedly the global centre for ship recycling activities. South East Asia contributes to more than ninety percent of global ship recycling activities. Countries such as Pakistan, India, Bangladesh and China are the major ship recycling player and centers of the world.

Beaching method can be viable for South East Asian countries. It can be conclude from method of recycling that beach based ship recycling method is being followed in all the major ship recycling countries except China. Ship recycling becomes economically viable in the developing countries only when the actual operations are carried out in beaches. There are number of guidelines in ship recycling which, when applied to the respective fields would improve the status of the industry as safe and environment friendly. Considering these two observations, both operations in beach based activities and guidelines, a set of viable roles and procedures for the industry can be formulated. If these viable roles and procedures are implemented through a user friendly knowledgebase system, it is possible for useful, competent and viable ship recycling by applying beaching method.

6. VIABLE OPTION FOR SHIP RECYCLING PROCESS OF SOUTH EAST ASIAN COUNTRIES

The recycling of end-of-life vessels in an environmentally friendly and safe manner has been a major challenge faced by ship owners and ship recycling facilities in recent years and it is not a subject that will subside any time soon. In fact, it is estimated that as of today, globally around 20,000 ships over 500 Gross Tonnage are more than 23 years old and will soon be sent for recycling. There are many reasons for an owner to recycle his/her ship: due to its increasing age, an uneconomic cost of repair, the current oversupply in the market, specific regulatory requirements such as double-hull specifications for tankers or very occasionally due to the introduction of innovative technology and important changes to trading patterns. On an average, vessels tend to go for recycling at around 25 to 30 years; however this can be a few years later if they are on long charters, or earlier in periods of economic recession with fewer charters available, as we are seeing at present.

For the last twenty three years, ship recycling yards in Bangladesh, China, India, Pakistan and Turkey have been recycling 97% to 98% of all the recycled tonnage in the world. The increase in demand for ship recycling has rightly led to an increase in regulatory pressure at both national and international levels. This regulatory pressure resulted in the development of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC) by IMO in 2009, to mandate safety and environmental protection standards at yards. Although discussions are at an advanced stage, the HKC has not been ratified yet by the majority of the countries involved. This means that for the time being, the growth of responsible ship recycling is reliant on market dynamics between ship owners and recycling yards. However, the scrutiny that the development of the HKC brought to the yards has been driving change [6]. The shipping industry has become increasingly aware of its responsibility to improve its sustainability and the ship recycling industry has been developing its best practices accordingly. And all those are continuous process.

The demand for responsible ship recycling now exceeds supply in South Asia. Yards that have invested in achieving the standards of the HKC are now seeing growth in demand for their services based on the good health, safety and environmental practices they follow. This has in turn incentivized other yards to improve their own standards and consider ISO and OHSAS and HKC Statements of Compliance Certifications. But the key question remains, what does “option for viable green ship recycle” in the ship recycling industry look like? It is needless to emphasize that recycling is the sustainable option for handling EOL vessels. When we look for “option for viable green ship recycling” in recycling, it means recycling activity with viable available techniques and viable environmental friendly practices in use. In other words, option for viable green ship recycling is the systematic prevention and the mitigation of safety and environmental risks at yard facilities, in procedures and operations, supported by preparatory work by the ship owners, flag states and classification societies.

The standards of the HKC and its guidelines are designed to reflect this best-practice approach in ship recycling and although it is yet to enter into force, it defines the basis of what we mean when we talk about responsible ship recycling [6]. Therefore, responsible ship recycling starts when both the ship owner and the recycling yard comply with the standards and guidelines of the HKC. Major ship recycling player need to develop an environmentally friendly and sound ship recycling plan (SRP) and provide advanced training to their local yards in areas such as: the handling of hazardous wastes/materials, working in confined spaces and at heights, fire prevention and control, use of proper protective equipment (PPE), cutting and removing paint from plate on hard standing floor, adequate and safe rest recreation shower and accommodation facility for worker, emergency evacuations and rescue plans, safe handling, inventory and storing of hazardous waste, preventive environmental practices through environmental awareness in regular basis, make viable plan for worker good health, welfare and future, employ naval architect and technical personal in every recycling yards, ensure regular training and updated worker knowledge about modern technology and regulations (detail report shown in author’s Ph D thesis paper).

The yards and company need to be produced safety and health reports with proper guidance and supervision by respective ministry and academic bodies and also in collaboration with the ship-owners, for the identification, removal and safe disposal of hazardous materials. Moreover, a HKC-compliant ship recycling yard will produce a Ship Recycling Facility Plan (SRFP), documenting the yard’s systems, facilities and processes to ensure safety and environmental protection. Each recycling project is then planned out in advance and managed according to an individual and specific Ship Recycling Plan (SRP). The SRP is developed by the yard management under the guidance of GMS Green Team, using the SRFP, design particulars of the vessel and its Inventory of Hazardous Materials to plan a safe and environmentally friendly recycling sequence. The GMS

Green Team along with the yard management also develop and implement a system of standard operating procedures for each work activity practiced during the recycling of vessel: from beaching to complete recycling, including the safe removal and temporary storage of hazardous wastes with proper training on PPE and recycling yards activates, [8], emergency evacuations and rescue process, safe handling, inventory and storing of hazardous waste and so on. Some of South Asian recycling yards from all three major players are already achieved such standard.

7. CONCLUSION

At present a number of yards from the South East Asia that have already achieved the standard of Statements of Compliance (SoC) with the Hong Kong Convention. South East Asian yards sincerely hope that these yards will be accepted, putting to bed this potential “beaching ban” and committing the European Union to supporting the ideal of raising standards at yards, wherever in the world they happen to be. Legislation that reinforces viable practice standards in the industry and drives progressive change, such as the HKC, should be welcomed by all parties. High levels of safety and environmental standards are being introduced and achieved in a good number of the yards in South East Asia [6]. Ship recycling is an essential part of the shipping industry and part of every vessel’s lifecycle, but it can easily be overlooked in the day-to-day discussion of operations. However, viable ship recycling process and practice will continue to progress and achieve standard ship recycling at HKC certified yards will become the custom for all ship-owners, not the omission. To make viable and sustainable ship recycling standard, all three South East Asian ship recycling major players (India, Pakistan and Bangladesh) need to be work together jointly and effectively. It is however possible to complied HKC in the modified name of Statements of Compliance (SoC) and achieved approved standard by EU regulation by adopting viable and sustainable ship recycling process keeping beaching method intake.

It is possible to develop an environmentally friendly, sustainable and sound ship recycling plan (SRP) and provide required training to both employee and employer of local yards in South East Asian ship recycling yards to achieving viable ship recycling process. This can be done by giving training and ensuring to achieve required standard in some areas such as: the handling of hazardous wastes/materials, working in confined spaces and at heights, fire prevention and control, use of proper protective equipment (PPE), cutting and removing paint from plate on hard standing floor, adequate and safe rest recreation shower and accommodation facility for worker, emergency evacuations and rescue plans, safe handling, inventory and storing of hazardous waste, preventive environmental practices through environmental awareness in regular basis, make viable plan for worker good health, welfare and future, employ naval architect and technical personal in every recycling yards, ensure regular training and updated worker knowledge about modern technology and regulations. If most of the yards of South East Asian countries can achieve that standard and ensure the quality of ship recycling practice and process, it is possible to complied HKC in modified way keeping beaching method of ship recycling intake.

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