



University
of Piraeus

SPOUDAI
Journal of Economics and Business

Σπουδαί

<http://spoudai.unipi.gr>



Recent Developments in the Institutional Framework of Ship Recycling and the Positive Impact on International Ship Dismantling Practices

Georgios Samiotis^a, Konstantinos Charalampous^b, Vasileios S. Tselentis^c

^aUniversity of Piraeus, Department of Maritime Studies, 21 Gr. Lambraki & Distomou Str., 185 32, Piraeus, Greece, Email: samiotis@unipi.gr

^bUniversity of Piraeus, Department of Maritime Studies, 21 Gr. Lambraki & Distomou Str., 185 32, Piraeus, Greece, Email: konstantinos_charalampous@yahoo.gr

^cUniversity of Piraeus, Department of Maritime Studies, 21 Gr. Lambraki & Distomou Str., 185 32, Piraeus, Greece, Email: tselenti@unipi.gr

Abstract

Ship construction today requires a wide variety of materials, which on the one hand have environmental impacts and on the other, are economically valuable. This introduced ship dismantling, which after the '70s, when ship scrapping was common practice, developed further, due to significant influences from free market practices which focused solely on price competitiveness. This situation created a geographic shift of ship scrapping activities from developed countries ('70s) to Far East countries (1970-1990) and after 1990, to Third World countries. In addition this geographical reallocation and the ever increasing competitiveness in ship breaking services brought about serious negative impacts on the marine and coastal environment, while at the same time dramatically affecting occupational health and safety. Recent years reveal a slow, but promising process of change both in environmental terms, as well as in safety and human life protection. A key element of this change seems to be the improvements brought about by complementing existing national but mainly international (IMO) and European Community (EU) regulatory regimes. This institutional framework in combination with the perceived political will to implement change, form the basis for positive developments in the ship dismantling sector focusing on health, environment and welfare matters.

JEL Classification: K332; Q530.

Keywords: Ship recycling; Ship dismantling; Institutional Framework; Basel Convention (BC); Hong Kong Convention.

1. Introduction

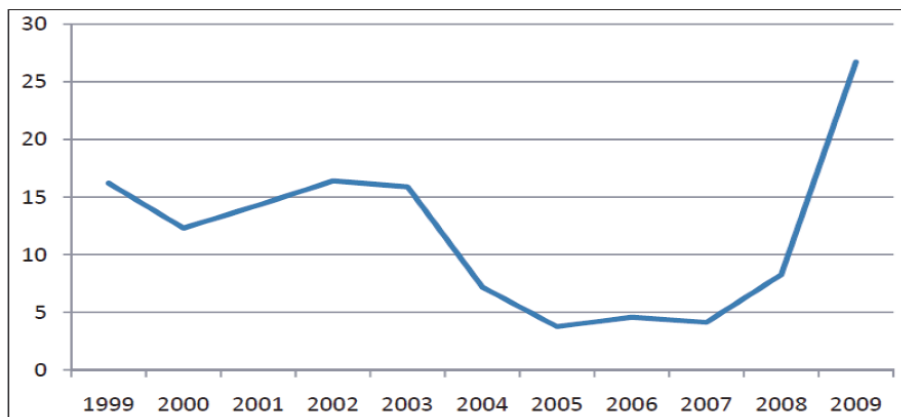
The market of scrapping is an integral part of the maritime industry, while playing an important role in balancing the shipping industry. In times of crisis, the international trade decreases, thus affecting this balance. This leads to the limited construction of new vessels and the increase of the number of ships sent to scrap yards. A recovery of the glo-

bal economy increases the demand for maritime transport which brings better prices for second hand vessels and reduces the number of vessels sold as scrap metal, which actually increases the purchase price for dismantling. Almost every part of the ship can be reused and almost anything is wasted. So, ship recycling is considered as an element of a growth strategy with multiple economic benefits (Stopford, 2009). Ships at the end of their life cycle usually between 30 to 40 years, or when their continued operation becomes unprofitable due to their technological obsolescence, are sold in ship dismantling facilities. This article initially presents the global shipbreaking industry and the consequences of the marine and the wider environment including the adverse effects on occupational healthy and safety. It analyzes the international legislation developed to protect the environment and human life in the area of ship dismantling and the positive effects brought about by the global desire for a clean environment and safe working conditions which are expressed in the recent convention of Hong Kong (Moen, 2008).

2. The Ship Breaking Industry

There are several options for ship breaking. Ships if not dismantled, must be sunk, disinfected and sunk in a carefully selected location. However, the sinking may lead to increased decontamination costs and there is always the possibility of indirect non-obvious risks to ecosystems. This highlights ship breaking as an initially acceptable way for the withdrawal of a ship. In the early stages of the industry development scrapping had little knowledge of the true nature and properties of hazardous and carcinogenic substances used in shipbuilding. The shipping industry was not aware of the problems arising during the decommissioning of a vessel. Consequently, huge amounts of asbestos and other hazardous materials were used in the construction of ships primarily between 1960 and early 1980. These materials are now the biggest obstacle in the proper management of waste from the dissolution. Asbestos was used in a large scale in the past as a material for insulation and fire safety, until the hazardous and harmful properties became known (Puthucherril, 2010).

Decommissioned ships -generally when their exploitation is no longer cost effective or when there is no interest for second-hand purchase- are bought in order to be dissolved in yards, which extract and recycle materials derived from the dissolution, mainly steel from the hull. The difficulty to make ship recycling economically viable while respecting ecologically appropriate standards is due to several reasons: the freight market volatility (using mainly tankers and bulk carriers), variety of materials present on the vessel and the fact that some of the materials are reused with difficulty (composite materials) or are no longer used or even prohibited (such as asbestos), the often costly process associated with the recycling of certain materials, the lack of a market for recycling of steel construction and purchase of used marine equipment in Europe. Globally, between 200 and 600 large ships at the end of their life cycle, are scrapped each year for as iron, steel, other scrap metals and equipment which are considered valuable raw materials (Shipping Consultants Ltd.; Silberston, 2001).

Figure 1. Scrapped tonnage 1999-2009 (million gross tonnage)

Source: Mikelis, 2007 and Fairplay, 2010 (Sarraf *et al.*, 2010).

3. Impacts

Most vessels contain large amounts of hazardous materials, such as asbestos, oils and muddy residues of hydrocarbons, and heavy metals in paints and equipment. Most recycling facilities in South Asia have no isolating device procedures to prevent contamination of soil and water by these substances. The result is severe pollution of coastal waters and beaches as well as significant damages to the affected ecosystems.

Moreover, the casual nature of conditions in terms of health and safety in the South Asian yards, causes a high risk of accidents (due to explosions of hydrocarbon residues or lack of lifting systems and protective equipment) and incurable diseases associated with exposure to hazardous substances (Hadjistassou, 2004). Scrapping and the production of scrap iron (scrap) have significant impacts on marine pollution today, being more severe than the previous two decades. This is mainly due to the high concentration of no-value materials, which normally end up in the sea. The dissolution process of a ship also produces gases, liquids and solid waste, all of which contribute to water pollution. The cutting of iron using oxygen also contributes to atmospheric pollution with high levels of smoke and dust, in addition to metal parts which inevitably find their way into the marine environment. Liquid wastes are resulting from the washing spaces of the ship in order to rid themselves of waste oil, inert slag etc., from waters of the fire sprinklers used to extinguish fires and from the washing waters from the premises of the dissolving unit to avoid leakage contaminants to land. Solid residues resulting from the accumulation of significant amounts of rust, mud, iron filings, wood and plastics. The pollution caused by liquid and solid waste depends on the sizes of ships dismantled, the degree of purity of residues and by the way the work will be done. Finally, one of the most serious problems in the dissolution procedure is the large amount of heavy metals that are dispersed without cause in the sea environment. The bioaccumulation of materials from different parts of the ship intensifies the phenomenon of pollution (Greenpeace and FDIH, 2005).

Table 1. Waste components that may be on board of the vessel

Wastes	Products where waste may be found
Unsorted waste batteries	Portable radios, torchers
Waste non-halogenated organic solvents	Solvents thinners
Waste halogenated organic solvents	Solvents thinners
Wastes from the use of pharmaceutical products	Miscellaneous medicines
Wastes from the use of biocides and phytopharmaceuticals, including waste pesticides and herbicides which are off – specification, outdated or unfit for their originally intended use	Insecticide sprays
Wastes from the production, formulation and use of inks, dyes, pigments, paints lacquers, varnish	Paints and coatings
Waste consisting of or containing off specification or outdated chemicals	Consumables
CFC (R12-dichlorodifluoromethane, or R22-chlorodifluoromethane)	Refrigeration devices such as water coolers and small freezer units, styrofoam
Halons	Final fighting equipment
Radioactive material	Liquid-level indicators, smoke detector, emergency signs
Microorganisms/sediments	Ballast water systems
Fuel oil, diesel oil, gas oil	Ballast water systems (including tanks)

Source: UNEP, 2002; ILO, 2003; OSHA, 2001.

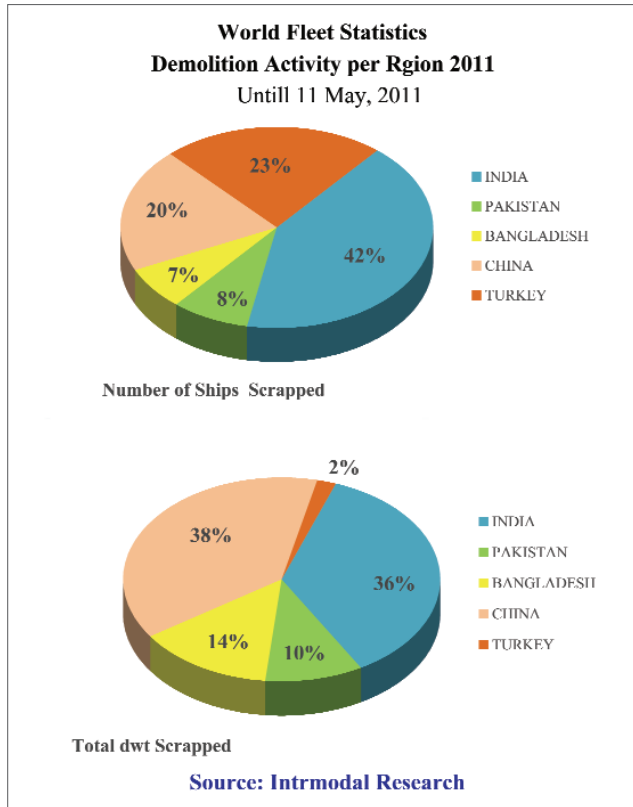
4. History of Ship breaking: From Europe and USA to East and South Asia

The majority of ship dismantling nowadays takes place in South Asia. Initially it developed in developed countries like the U.S.A, England and other European countries but gradually operations were transferred to countries of the so-called Third World. This shift of the sector has two main causes. The first has to do with the costs of the sector. All sectors are labor intensive and this began to be unprofitable in developed countries which had high labor costs. The search for other markets with low wages was a priority for business disciplines whose work shift would reduce the operating cost and this was the case of the ship dismantling industry. The second reason has to do with the danger of the dismantling operations. The increasing use of technology in ships which were built in the mid-20th century made the ship dismantling a complex process with specific mechanisms of disassembly in order to prevent harming the environment. The Western countries unwilling to bear such an economically and environmentally costly process shifted these specific activities around the early '70s to developing countries which saw the market break as an opportunity for immediate employment to a large part of their population generating high profits (Krause, 2005).

By the early '90s the countries holding the reign's ship dissolutions were Taiwan, China and Korea. China entered into the market for scrapping in early 1980, due to the increased demand for iron which had led to the import of large quantities of ore and processed steel. The decade of 1980-1990 can be characterized as a period of transition as the dominant market forces began to lose their domination, which gradually passed into the

hands of Bangladesh, Pakistan and India, which until today carry the bulk of the work regarding ship dismantling. For example, Bangladesh supplies 80-90% of its steel needs from ships. The prices paid for these ships by dissolution companies now exceeds U.S. \$ 400/ton per lightship displacement (ldt), significantly higher than those in other countries. The situation in the market seems to have stabilized today, as these three countries represent the largest percentage of the shipbreaking sector worldwide (Mikelis, 2007).

Figure 2. Demolition Activity per Region



Source: YPSA, 2011.

Reports indicate that the dismantling is carried out by many countries which ignore risks not care about the environmental cost and do not implement in legislation on environmental protection. The lack of environmental protection and safety measures, results in high accident rates, health dangers and extensive pollution of coastal areas. Many ships flying the flag of the European Union and others owned by European companies use these facilities and the situation is particularly worrying for the E.U., since Community legislation prohibits the export of hazardous waste to developing countries. On the issue of ship scrapping the IMO in collaboration with the World Labor Organization

(ILO) led to the adoption of directives on ship dismantling highlighting concerns about the environmental impact, safety and health of workers. At the international level there is little data on environmental regulation issues for ship scrapping, but many international documents, instructions or contracts for the management of hazardous materials, significantly affect this sector of shipping (COM, 2007).

5. Institutional Framework

5.1 The Basel Convention on the control of transboundary movements of hazardous wastes and their disposal

The Basel Convention on the control of transboundary movements of hazardous wastes and their disposal of 1989, recognizes and introduces measures to reduce the threat on human health and to the environment, caused by the transboundary movements of hazardous waste. This waste is usually transferred from developed countries to less developed countries of the world. The convention, which was signed under the auspices of the United Nations Environment Program, entered into force in 1992 and until today has been satisfied by 172 partners. It aims to protect, by strict control, human health and the environment, against the direct or indirect effects that may be caused by the production or management of hazardous waste. This convention is based on the principles governing the functioning of the E.U. such as the principle action and the principle of “the polluter pays” (UNEP, 2000). This is achieved by upgrading the control in the “transboundary transfer” of hazardous and other waste, to an incentive for an environmentally sensitive management. Furthermore, the contracting parties must adopt appropriate measures to reduce the production of hazardous waste and to ensure the implementation of appropriate infrastructure disposal, at the country of production expecting that these measures will reduce the incidence of transboundary movements of waste. Good environmental management requires the implementation of practical issues to ensure that waste is managed in a manner that does not pose a risk to human health and the environment. In 2002, “Technical Guidelines” on “Environmentally correct management of the full or partial dismantling of ships”, were also issued. The Basel Convention establishes a control system of import and export of hazardous waste, it since banned the export or import of hazardous wastes and from non-contracting States parties. The Convention entitles one partner, unilaterally, to prohibit the import of waste and there is the obligation of the other partners to respect this right. In all cases the responsibility of ensuring good environmental governance is high for the exporting and can not be shifted to the state receiving the waste. The Convention on the transboundary movement of hazardous wastes introduces two documents that have to do with updating the state which receives the waste with the notification document the sender state informs about the intention to export and obtains written consent from the receiving state. The second movement document contains information about the transport carriers, may guarantees for truthful information and provides a general description of the waste. Hazardous or other waste intended for transboundary transport must be packaged, labeled, and transported in compliance with generally accepted international standards. The Basel Convention also esta-

blishes rules and procedures for the compensation of damages that may incur during transportation. A further requirement is that only authorized people nationwide have the right to transport and dispose hazardous and other waste (UNEP, 2003).

5.2 United Nations Convention on the Law of the Sea

In 1982 the United Nations Conference of the Law of the Sea (UNCLOS III) adopted the Convention on the Law of the Sea. The Convention on the Law of the Sea includes almost all aspects of managing the oceans and for this is known as the “constitution for the oceans”. By entering the Treaty obligations such as the preservation and protection of the marine environment, member-States which have signed and have shipbuilding and scrapping infrastructure must implement measures and ensure that ship breaking does not affect the marine ecosystem and environment. In addition to Article 194 of the Treaty, members are required to take steps to minimize as much as possible leaks of toxic harmful ingredients from land sources. Land activity of ship scrapping includes toxic waste and products that passed on to marine ecosystems. It also includes many clauses on ship scrapping describing the obligations on the part of the state to control pollution from land-based activities and correlating this to the right of “harmless passage” of ships at the end of their life cycle when towed to recycling yards. Of course, the right of navigation under the Treaty on the Law of the Sea exists that it is “innocent”. Under Article 19 (2) the Convention enumerates a list of activities that can make a pass not “innocent”. So the question is whether towing the rusty old vessels with dangerous substances falls into any of the prohibited acts set out in the Convention. So while ships at the end of life cycle have the right of innocent passage through the territorial waters of coastal States, these States taking into account the condition of the ship may require these ships to pass only through designated sea lanes or impose terms and conditions to which the ships must comply. For example, Article 23 of the Convention States that certain ships carrying radioactive or other inherently dangerous or noxious substances, exercising the right of innocent passage, must carry documents and observe “special precautions” (Drel’, 1988). In addition, Article 194 of the Treaty calls on its members to take specific measures to reduce to a minimum the leakage of toxic, harmful ingredients from land-based sources. Finally, Part XII of the Treaty States the right to exploit natural resources and the obligation to protect and preserve the natural marine environment. When this obligation conflicts with ship scrapping then States that have signed the treaty should implement measures to ensure that ship breaking facilities do not affect the marine ecosystem and environment. With this in mind the Convention on the Law of the Sea is the most important international convention that introduces commitments on marine pollution from land-based facilities (Andrianov, 1990; La Fayette, 2000).

5.3 International Labor Organization

The ILO since its establishment in 1919, has tried to protect employment through the law of the sea. The ILO has examined the legal regime for occupational safety and health in connection with the ship dissolution in order to ensure occupational safety and

health in shipbuilding. As a specialized organization of the United Nations that seeks to promote internationally recognized human and labor rights in the workplace, ILO has played a vital role in the development of “international guidelines” for occupational safety and health in ship breaking yards. In November 2000, the 279th session of the governing body of the ILO took the decision to develop a collection of best practices for ship scrapping adjusted to local conditions in the yards. In 2003, the ILO further established the safety and health in ship breaking and specifically issued guidelines for Asian countries and Turkey. Directions are given to those who are responsible for occupational safety and health in the yards. Although not legally binding, these guidelines aim to gradually transform this “informal nature” of the activity in a more formal economic activity. Separated into two parts, it defines the parameters for a Completed National Framework for “responsible” shipbreaking and identifies measures to improve the safety and health of workers. During the formulation of national legislative and regulatory provisions, the ILO guidelines describe the requirement that the legal framework must be ‘sufficient’ and suitable for ships to be scrapped and yard’s working regime (ILO, 2003). It also foresees the creation of administrative structures, management systems of occupational safety and health, reporting and monitoring systems, the responsibilities of employers, the rights and obligations of workers and the rights and responsibilities of clients / owners. With regard to safe ship breaking practices guidelines call on ships to adopt a ship dismantling safety culture. It thus, becomes easier to identify hazardous and harmful parts of the process, so that the dissolution can be done in a controlled way as well to improve the safety of workers and to protect their health. These proposals are connected to other issues such as prevention and protection measures, management of hazardous substances, measures of physical, biological dangers, the safety requirements for machines, tools and equipment, and personal protection issues and apparels (IMO, 2011).

5.4 The European Union

The Council of the E.U. on 20 November 2006 stated that the priority for the E.U. is an environmentally friendly practice of ship scrapping. Targets were set to develop a strategy on ship dismantling, strengthening the application of community law and the development of international law by working on the possibility of additional guidance to member States of the E.U. for environmental and health safe ship recycling facilities, as well as a better cooperation between member States and also between them and third countries. The committee proposed to provide technical and financial support to improve the operating conditions of ship dismantling facilities in countries such as those in South Asia (COM, 2007).

The main European Union institutional tool is Regulation 1013/2006 of the E.U., under which it seeks to protect the environment during the process of ship dismantling and minimize the production of hazardous and noxious substances. This regulation implements and integrates, at a community level, the provisions of the Basel Convention, by limiting the transfer of waste to developing countries within and outside the European Union. The Regulation specifies that quantities of waste shipped from Europe to third countries, must have strict standards for public safety, health and environmental protection for their transportation, as well as for their processing disposal and especially

addressing issues of worker safety and public health, and this regulation applies to those cases where ships are classified as “waste” in accordance with E.U. directive 98/2008 on waste, since the European waste framework covers the management of waste at all stages and covers all kinds of facilities to manage these. If a ship at the end of its life cycle has waste which belongs in Annex V to Regulation, then all restrictions are applied concerning the export of such materials (COM, 2008).

Table 2. Common hazards that tend to cause workers’ injuries, death, health disorders, diseases and incidents

Frequent Causes of Accidents		Mechanical hazards	
<ul style="list-style-type: none"> • Fire and explosion: explosives, flammable materials • Falling objects • Trapping or compression • Snapping of cables, ropes, chains, slings • Heavy objects • Access in progressively dismantled vessels (floors, stairs, passageways) • Electricity (electrocution) • Poor illumination 	<ul style="list-style-type: none"> • Falls from height inside ship structures or on the ground • Moving objects • Wet surfaces • Sharp objects • Oxygen deficiency in confined spaces • Lack of PPE, housekeeping practices, safety signs • Shackles, hooks, chains • Cranes, winches, hoisting and hauling equipment 	<ul style="list-style-type: none"> • Trucks and transport vehicles • Scaffolding, fixed and portable ladders • Sharp-edged and other tools • Power-driven hand tools, saws, grinders and abrasive cutting wheels 	<ul style="list-style-type: none"> • Failure of machinery and equipment • Poor maintenance of machinery and equipment • Lack of safety guards in machines • Structural failure in the ship
Hazardous Substances and Wastes		Biological Hazards	
<ul style="list-style-type: none"> • Asbestos fibres, dusts • Heavy and toxic metals (lead, mercury, cadmium, copper, zinc, etc.) • Organometallic substances (tributyltin, etc.) Lack of hazard communication (storage, labelling, material safety data sheets) 	<ul style="list-style-type: none"> • Batteries, fire-fighting liquids • PCBs and polyvinyl chloride (PVC) (combustion products) • Welding fumes • Volatile organic compounds (solvents) • Inhalation in confined and enclosed spaces Compressed gas 	<ul style="list-style-type: none"> • Toxic marine organisms • Risk of communicable diseases transmitted by pests, vermin, rodents, insects and other animals that may infest the ship 	<ul style="list-style-type: none"> • Animal bites • Vectors of infectious diseases (TB, malaria, dengue fever, hepatitis, respiratory infections, others)
Physical hazards		Ergonomic and Psychosocial Hazards	
<ul style="list-style-type: none"> • Noise • Extreme temperatures 	<ul style="list-style-type: none"> • Vibration Radiation (ultraviolet, radioactive materials) 	<ul style="list-style-type: none"> • Repetitive strain, awkward postures, repetitive and monotonous work, excessive workload • Long working hours, shift work, night work, temporary employment 	<ul style="list-style-type: none"> • Mental stress, anti-social behaviour (aggressive behaviour, alcohol and drug abuse, violence) • Poverty, low wages, under-age workers, lack of education and social environment
		General Concerns	
		<ul style="list-style-type: none"> • Lack of safety and health training • Poor work organization • Inadequate housing and sanitation 	<ul style="list-style-type: none"> • Inadequate accident prevention and inspection • Inadequate emergency, first-aid and rescue facilities • Lack of medical facilities and social

Source: International Labour Organization, 2004. Safety and health in shipbreaking: Guidelines for Asian countries and Turkey, Geneva (Yasuhiro, 2012).

5.5 The Green Paper on better ship dismantling

The Green Paper on better ship dismantling published in 2007 highlights the concern of the European Union on this issue. This paper entered into a comprehensive consultation and the Commission proceeded in 2008 to an announcement to the community governing bodies. In this announcement the Commission noted the improvements in the institutional framework of the IMO by improving standards of some dissolution facilities, but stated that the majority of these facilities do not meet the required standards for the protection of the environment and workers. A significant number of ships led to scrap, fly the flag of the countries of E.U. and this is what makes the issue of ship dismantling a subject of Community interest. In the South Asian region where most shipbreaking facilities are located reports indicate that environmental specifications are not respected, including safety measures for workers. Studies describe the low labor cost facilities in South-Asian countries, coupled to the lack of the environmental protection and safety of workers, as a competitive advantage of these yards against the European scrap industry, since Europe can not produce such a competitive service (COM, 2007; COM, 2008).

To improve the management of ship dismantling at the European level, the Commission proposes better the effective application of Community legislation by Regulation 1013/2006, and provides the possibility for additional guidance to Member States for environmentally safe ship recycling facilities, as well as a better cooperation between European and third countries, especially government ships.

At international level, the Commission considers that the existence of an international binding system of rules for the protection of the environment and the protection of workers. The Commission considers that it can be necessary improved under the IMO with a new contract which will contain clear obligations for all involved parties, under IMO supervision (IMO, 2006).

The Commission also emphasizes that although for ships that are considered hazardous “waste”, due to toxic contents, legislation according to Basel Convention, on the transportation and recycling of ships is inadequately applied. Many recycling countries are reluctant to follow the process described by the above mentioned Convention on information and consent of ships imported for scrap. Community legislation on the ban of exports becomes inapplicable when vessels are not characterized as “waste”. According to the Commission, the strategic target of the E.U. is to ensure that the ship recycling is to be done at facilities with strict environmental infrastructures and with systems for the protection of life and health of the workers, by preventing the export of ships to countries that do not apply high specifications. The Commission attaches great importance to the negotiations of the Convention on ship recycling and emphasizes that vessels excluded by the Convention, should follow the specified procedures. Priority is put on the timely implementation of the Convention on ship recycling, incorporating aspects of Community Law on maritime transport of waste (COM, 2008).

6. The recent Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009

The Hong Kong International Convention for the Safe and Environmentally Sound

Recycling of Ships, adopted on 15 May 2009 and is still open for signature and ratification by countries that are members of the IMO.

The Convention considers ship recycling not only as a process of dismantling and material recovery but also incorporating additional activities such as reprocessing of materials. "Ship recycling" is defined as the activity of total or partial dismantling of a ship, in a specific port infrastructure of ship recycling with the purpose to retrieve data or materials for further processing or use them, while simultaneously care is taken to hazardous or other materials, while including relevant tasks such as storage and processing of materials. Previously further processing or disposal of materials at separate facilities was not addressed, so the scope of the Convention is not limited to activities such as dismantling and storage in the field of recycling but considers other steps of the chain. It applies to both ships as well as facilities for ship dissolution. Ships below 500 tons gross tonnage (GT), warships, naval auxiliary vessels or ships used exclusively by government services and ships operating throughout their life in the territorial waters of the state they belong, if recycled in the same country they operate, are exempted from the terms of the Convention of Hong Kong. Member States are called not to create conditions of discriminatory treatment in the countries which have not ratified this international agreement (Chang, Wang and Durak, 2010).

This Convention is an important achievement for the international community, since it adopts a "holistic" approach to tackling pollution from ship dismantling by introducing a system of control and enforcement of regulations throughout the ship's life up to the stage of dissolution. It introduces at international level commitments and requirements of mandatory character with the purpose to ensure the safety and environmentally correct management of ship recycling / dismantling.

The Convention addresses all parties including the ship, the dismantling facility and the States as follows: the ship owners are required to establish a list of hazardous materials in their ships as well as have their ships surveyed and inspected. The ship recycling facilities to establish a ship recycling program, and the States to conduct the final inspections to provide an international certificate of readiness of the ship which is going to be dissolved. The ships can be recycled in ship recycling facilities that have been approved by the Contracting States of the Convention while the authorized ship recycling facilities only accept ships that comply with the requirements of the Convention on Ship Recycling. The ship recycling facilities can only accept ships for which have been certified to recycle. In some cases the vessels of non-contracting States can be recycled at approved sites. It is also forbidden at practice the sale of abandoned ships between the Contracting States or not.

For those States which have port infrastructure for dissolution, recycling companies, owners and employees are obliged to comply with the commitments of the Convention. Member States are obliged to prevent any violation of the Convention at the limits of their jurisdiction and to lay down penalties to discourage violations of the Convention. A ship which is in port or terminal station of a member of the Convention may be inspected to determine if its certificates are in force and in accordance with the requirements of the Convention. If found to have serious violations of the Hong Kong Convention, then the State which makes the inspection may take several actions, i.e. warning steps, detention or refu-

sal to dock the ship in its ports while informing the state flag of ship and the IMO. States that have not signed the Convention may operate only between ports and facilities located at limits outside of the Hong Kong agreement (Kojima and Michida, 2011).

The Convention of Hong Kong enforces the ban on recycling in non-signatory States, so it is the interest of these countries to join the Convention and then create a domestic legal regime in that meets the Convention on ship recycling requirements (IMO, 2011).

7. Current Situation

There is no doubt that the need for a clean environment and safe working conditions has become first priority. The International Organizations and the cooperation between States to adopt stricter legislation and stricter control mechanisms have achieved significant progress in the area of environmental protection as well as at the protection of human life in workplaces. This desire of States is evident in the Hong Kong Convention but also in the guidelines of ILO for Asian countries and Turkey, where the requirement is to ensure safety and environmentally based management of ship dismantling (Sundelin, 2008).

For instance, Yasuhiro Urano (2012, page 99) from World Maritime University (Malmö, Sweden) in his article mentions: *“Japan is playing an active role as a major maritime power in developing effective international regulatory regimes under the Hong Kong Convention and implementation systems for ensuring sustainable, safe and environmentally sound recycling of ships in cooperation with its class society and other stakeholders. Furthermore, its fundamental policies on ship recycling not only aim at facilitating the early ratification and effective implementation of the Hong Kong Convention by itself and other countries such as India, but also target the establishment of its own ship recycling business competitive with major ship recycling countries”*.

The European Union supports the provision of technical assistance and support to developing countries for education programs in the field of security and development of the basic infrastructure for environmental protection, by intensifying the cooperation and information exchange between authorities of the EU and encouraging voluntary action and cooperation with environmental organizations, such as Greenpeace.

The ecological consciousness is now universal. A typical example is the case of the French aircraft carrier *Clemenceau*. *Clemenceau*, one of the most famous aircraft carriers of the French Navy was built in 1957 and was decommissioned in 1997. In 2003 was sold by the French Government to the Spanish company Gijonese. It was decided to be dismantled in India, a decision that provoked strong reaction, mainly by Greenpeace, because of the lack of facilities at the Indian yards to handle the hazardous materials on board (asbestos, PCB, lead, mercury etc.). India finally refused the vessel and after the refusal of Egypt to allow passage through the Suez Canal, the Supreme Administrative of France and President Jacques Chirac ordered the return of the ship to French waters. Eventually the ship was sold to Able UK company for scrapping in the installation TERRC at Graythorpe which completed in summer 2010 (Nijkerk, 2006).

8. Conclusions

As can be seen there are three main institutions involved in regulating the recycling of ships, the International Labor Organization (ILO), the International Maritime Organization (IMO) and the EU. The three institutions had been cooperating to form a joint working group since 2005. The main purpose was to promote international cooperation for effectively promoting the recycling of ships. The ILO and BC contributed to the formation of the Hong Kong Convention of the IMO.

What is needed is the existence of an international legal regime to harmonize commercial interests while ensuring the rights of workers and to monitor the compliance of environmental parameters. This regime should include measures for proper management of hazardous waste and substances, encouragement of the transportation of technology and support to the developing countries, sufficient training of staffs and equipment. The environmentally friendly culture must be adopted by ship owners and at ship dismantling infrastructures, while the laws of environmental protection should apply without exceptions even in areas close to dismantling facilities (Krause, 2005).

These proposals are incorporated in the Hong Kong Convention and it is now important to enrich national laws as well as the daily practice of the sector of shipbreaking with these novel approaches. Governments have the responsibility to ensure that within their borders the recycling facilities to operate safely and in compliance with international regulations. Informing and raising awareness about the dangers presented by the materials and the derivatives of dissolution can enhance the effectiveness of the environmental dimension in the management of harmful materials.

Developing EU strategy on an environmentally friendly ship dismantling industry is one of the axis of the Action Plan of the European Commission included in the Integrated Maritime Policy for the European Union. Considering the positive role of shipbreaking in the national economy of any country, it is obvious that ship dismantling cannot be stopped. However a sustainable approach should be taken in order to minimize the negative consequences of ship recycling activities in all coastal zones.

References

- Andersen, A. B., 2001. Worker Safety in the Ship-breaking industries. Geneva: The International Labour Office.
- Andrianov, V. I., 1990. The role of the International Maritime Organization in implementing the 1982 UNCLOS. Marine Policy, pp. 120-124.
- Nijkerk, A., 2006. Clemen-soap: a shipbreaking saga, Recycling International.
- Commission of the European Communities, COM (2001). Technological and Economical Feasibility Study of Ship Scrapping in Europe. Report No. 2000-3527, Revision No. 01, Det Norske Veritas - Appledore International.
- Commission of the European Communities, COM (2007). Green Paper on Better Ship Dismantling. Brussels: 269 final.
- Commission of the European Communities, COM (2008). Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions. An EU strategy for better ship dismantling. 767 final.

- Drel', M. I., 1988. Enforcement measures against pollution of the sea. *Marine Policy*. 12(3), 297-305.
- Greenpeace and FDIH, 2005. *End of Life Ships: The Human Cost of Breaking Ships*. Amsterdam: Greenpeace International.
- Hadjistassou, C. K., 2004. *International Maritime Organization: Rethinking Marine Environmental Policy*. Unpublished Master Thesis, Massachusetts Institute of Technology.
- IMO, 2011. Joint ILO/IMO/BC Working Group on Ship Scrapping. Available at <<http://www.imo.org/OurWork/Environment/ShipRecycling/Pages/JointILOIMOBCWorkingGroupOnShipScrapping.aspx>> [accessed: 15 February 2013].
- IMO, 2006. *IMO Guidelines on Ship Recycling: Consolidated Edition*. London.
- Kojima, M. and Michida, E., 2011. *Ship breaking to Ship Recycling: the Relocation of Recycling Sites and the Expanding International Approach*.
- Krause, K., 2005. End-of-life ships - linking European maritime safety to occupational safety on Asian scrap yards. IN Allsop, R., Beckmann, J. and Mackay, M. (eds.) *Safety and Sustainability*. Brussels: European Transport Safety Council. pp. 76-80.
- La Fayette, L., 2000. The protection of marine environment – 1999. *Environmental Policy and Law*. 30 (1-2), 51-60.
- Sarraf, M., Stuer-Lauridsen, F., Dyoulgerov, M., Bloch, R., Wingfield, S. and Watkinson, R., 2010. *The ship Breaking and Recycling Industry in Bangladesh and Pakistan*. Report No 58275-SAS.
- Mikelis, N., 2006. Developments and issues on recycling of ships. The East Asian Sea Congress, Hainan, China, December 2006.
- Mikelis, N., 2007. *Security and Environmental Protection. A statistical overview of ship recycling*. International Symposium on Maritime Safety, Athens, Greece. September 2007.
- Moen, A. E., 2008. *Breaking Basel: The elements of the Basel Convention and its application to toxic ships*. *Marine Policy*. 32, 1053-1062.
- Puthucherril, T. G., 2010. *From Shipbraking to Sustainable Ship Recycling: Evolution of a Local Regime*. Leiden-Boston: Martinus Nijhoff Publishers.
- ILO, 2003. *Safety and Health in Ship breaking: Guidelines for Asian Countries and Turkey*. Bangkok, 7-14 October 2003.
- Shipping Consultants Ltd., and Aubrey Silberston, 2001. *The European and Worldwide Shipbuilding Market: An Economic Analysis on the Comparative Strengths and Weaknesses of EU and Korean Shipyards*. Seoul: Korea Shipbuilders' Association.
- Stopford, M., 2009. *Maritime Economics (3rd Edition)*, New York: Routledge.
- Sundelin, O., 2008. *The Scrapping of Vessels - An Examination of the Waste Movement Regime's Applicability to Vessels Destined for Scrapping and Potential Improvements made in the IMO Draft Convention on Ship Recycling*. Unpublished Master of Thesis, University of Gothenburg.
- UNEP, 2003. *Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships*. Secretariat of the Basel Convention.
- Vedeler, K. V., 2006. *From Cradle to Grave - Value Chain Responsibility in the Ship Scrapping Industry*. Unpublished Master Thesis, Norwegian School of Economics and Business Administration.
- Yasuhiro, U., 2012. *The current picture and the future vision of the ship recycling industry*. World Maritime University, Malmö, Sweden.
- Chang, Y. Ch., Wang, N. and Durak, O. S., 2010. Ship recycling and marine pollution. *Marine Pollution Bulletin*. 60(9), 1390-1396.
- YPSA, *Ship Breaking in Bangladesh*. Available at <<http://www.shipbreakingbd.info>> [accessed: 22 February 2013].