

Establishment of Ship Recycling Industry at the Iran Southern Ports which Causes to Improve Iran's Economic Growth

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Abstract - At the first segment of this paper, the author endeavors to describe about the required Conventions related to the safe and sound ship recycling activities. The IMO has in 2009 adopted the Hong Kong International Convention in this regards, the Hong Kong Convention needs to be ratified by at least 15 major flag and recycling countries in order to enter into force. In March 2010, the Parties of the Basel Convention adopted the assessment which was submitted by the EU as "An assessment of the link between the IMO Hong Kong Convention for the safe and environmentally sound recycling of ships, the Basel Convention and the EU waste shipment regulation". After reviewing the related Conventions, the next part of this article is designated to evaluate the creation of a ship recycling yard at the Iran Southern Ports with a focus on the Arvand Free Zone in order to increase the Iran's economic growth. It should be noted that in this research, the Kolmogorov – Smirnov test was used to test for normality of the distribution, samples are standardized and compared with a standard normal distribution. As result of that for the statistical hypothesis test which the test statistic follows a Student's t-distribution under the null hypothesis, therefore the research variables verified by the Binomial test.

Keywords—Ship Recycling, Arvand, Iran's Economic, Recycling Convention

I. INTRODUCTION

This paper describes about the life cycle for most ships, similar to the health service phrase from "womb to tomb", gives a life span of operation up to 25 years, or more. The vast majority of ships are taken to India, Pakistan or Bangladesh to be scrapped on the beach. There is something quite wrong and unsafe for the workers on beaches who not wearing safety shoes,

clothes, helmet, gloves, and goggle and also no safety gear while taking apart massive cargo ships with hand tools is simply wrong. The steady withdrawal of older ships and their replacement by new tonnage is a natural commercial process which provides the opportunity for the introduction of safer and more environmentally friendly designs, greater operating efficiency and a general reduction in marine risk. It should be noted that ship recycling on beaches must end now. In general, recycling is one of the basic principles of sustainable development. The real answer to the problem is global regulation that raises the legally acceptable minimum standard for ship recycling. In 2009, the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships was adopted. Yet in 2013, only two countries have ratified it.

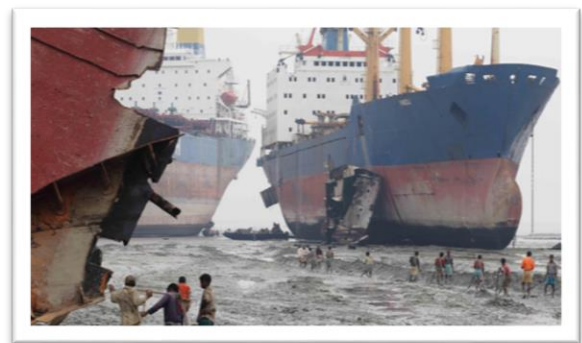


Fig.1 In India, Pakistan or Bangladesh ships to be scrapped on the beach

Source: MAERSK LINE Site

II. ROLE OF THE INTERNATIONAL MARITIME ORGANIZATION ON SHIP RECYCLING CONVENTION

The IMO has in 2009 adopted the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships. To enter

into force, the Hong Kong Convention needs to be ratified by at least 15 major flag and recycling countries to enter into force. These countries should represent at least 40 % of the world fleet and a significant part (almost 50 %) of the recycling capacity available worldwide. The Convention takes a “cradle to grave approach” and will regulate: 1). The design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling, without compromising their safety and operational efficiency. 2). the operation of ship recycling facilities in a safe and environmentally sound manner; and 3). The establishment of an appropriate enforcement mechanism for ship recycling (certification / reporting). Guidelines supporting the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships are being developed by the IMO, as follows:

- 1) Development of the Inventory of Hazardous Materials (adopted and available here)
- 2) Survey and certification (adopted and available here)
- 3) Inspection of ships / Port state control (adopted and available here)
- 4) Authorization of Ship Recycling Facilities (adopted and available here)
- 5) Safe and environmentally sound ship recycling (adopted and available here)
- 6) Development of the Ship Recycling Plan (adopted and available here).

A. Review of the Basel Convention on Ship Recycling Activities

The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal is relevant for ship dismantling, as a ship that is sent for scrapping usually contains hazardous materials and may be (hazardous) waste as well as a ship under other international conventions. The Conferences of the Parties (COPs) of the Basel Convention have adopted Technical Guidelines and various decisions on this issue, and the Secretariat has collected information on ship dismantling. For further information see the website. The EU has contributed to the assessment of the levels of controls and enforcement established by the Basel and by the Hong Kong Convention with several submissions: in January 2008, January 2009 and April 2011.

B. Control and listing of hazardous materials

It should be noted that objectives of the Guidelines for the development of the inventory of hazardous materials – 2015 are to provide ship-specific information on the actual hazardous materials present on board, in order to protect health and safety and to prevent environmental pollution at ship recycling

facilities. This information will be used by the ship recycling facilities in order to decide how to manage the types and amounts of materials identified in the Inventory of Hazardous Materials of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009. J. R. De Larrucea et al (2012) stated in his article that in accordance with this Convention, each State shall:

– Prohibit or restrict the installation or use of hazardous materials listed in Appendices 1 and 2 of the Convention on ships under their flag or jurisdiction, whether in ships, ports, shipyards or off-shore platforms.

– New ships carry on board an inventory, verified by the Administration or any person or body authorized, Hazardous Materials. This inventory will be specific to each vessel and indicate the amount and location. Existing ships must comply with all possible with this list no later than 5 years after entry into force of the Convention, or before going to scrap if before this period.

– Vessels that are to be recycled only be recycled Ship Recycling Facilities authorized by the Convention and will be one in which doing a Ship Recycling Plan. Before entering the waste loading facilities, fuel and waste on board should be the minimum. Fuel tanks and cargo tanks that have contained any toxic or flammable substance shall be designed to enter and / or work in them.

– A Ship Recycling Plan must be carried out by the Facility where it will be recycled boat before starting any recycling process taking into account the guidelines developed by the Organization and the information provided by the owner of the boat. Information on the establishment, maintenance and monitoring of working conditions and the amount and type of hazardous substances to be treated, including those listed in the Inventory of Hazardous Materials.

– Vessels must pass an initial review before being put into service or before the International Certificate in Hazardous Materials is issued. In addition, inspections at intervals as the administration but not exceeding 5 years. If repairs are carried out or any significant change in the structure will pass a special review to ensure that it continues to comply with the provisions of the Convention.

III. LITERATURE REVIEW

Ebrahim Idani (2015), director general of Hormozgan Province Ports and Maritime Department, said Shahid Rajaei is currently Iran's biggest commercial port, which is directly and regularly visited by major shipping lines frequenting the Persian Gulf. He said that “Offering bulk discounts to shipping companies, has reduced the final cost of entry of commodities into Iranian port, making it more economical compared to other Persian Gulf ports. The Iranian official further noted that offering fast loading

and offloading services, and providing bunkering services to big vessels has turned Shahid Rajaei port into a major portal of entry into Iran's economy. According to the Trade Winds Ship Recycling Forum 2016 in Dubai Effectively dragging ship-breaking into the mainstream, environmental NGOs continue piling pressure on Europe's ship-owners to stay off the beaches, national ship-owner organizations are going public with divergent views on beaching, Trade-Winds Ship Recycling Forum 2016 offers a very special opportunity for the industry's leaders to discuss the present and future direction of the industry, discuss real-world solutions with key stakeholders and further the advance of economic and environmental ship-breaking sustainability. It should be noted that the Biggest Marine event in Iran as Iran Sea Expo and Summit (ISES 2016) is supported by Port Maritime Organization and Ministry of Road and Urban Development of Iran. The Summit will showcase exciting investment opportunities in the following field by concentrating on the second items which is related to Ship Repair and Ship Recycling as important item in Iran:

1. Port Modernization and New Port Shipbuilding
2. Ship Repair and Ship Recycling
3. Port-based Industrial Development, Port-based Smart Cities and Maritime Cluster Development
4. Inland Waterways and Coastal Shipping for Cargo and Passenger movement
5. Dredging
6. Lighthouse Tourism and Cruise Shipping
7. Renewable Energy Projects in Ports
8. Other Maritime Sector related services (Financing, Legal, and Design)

A. *The Concordia Ship Recycling*

The project of dismantling and recycling of the wreck of the Concordia is the most challenging ship dismantling operation ever carried out in Italy and, in all likelihood, worldwide, in terms of both the size of the vessel and the condition in which the wreck is afloat. Since July 27, 2014, the Concordia has been moored at the "Seawall" pier in the Port of PràVoltri, Genoa, where initial ship dismantling is in progress with stripping of the interior furnishings and fittings. The Concordia is afloat by means of a system consisting of 30 sponsons fitted to the sides of the wreck to provide buoyancy needed for refloating. There are 15 of these large metal boxes on each side of the ship. The 15 on the starboard side are fastened by means of chains and strand-jacks, namely hydraulic grips used to tighten the chains and hold the sponsons in position. The various systems are monitored from the Remote Operations Center (ROC), a control room actually located right on the Concordia and fitted with all the control and monitoring systems

for handling the ballast in the sponsons and guaranteeing vessel stability, trim and the even distribution of the forces acting on the hull. A team of engineers and technicians continuously checks these parameters thanks to sensors installed in the sponsons and to the use of video cameras. The ship is manned and supervised 24/7 by an 11-strong team working in shifts. About 200 technicians are working on the wreck and cutting decks – from 3 to 1 – while strip out operations continue on decks 1 and 0 to remove internal fitting.

As the weight of the wreck becomes lighter, it has been possible to remove 8 sponsons so far (S1, S2, S3, P1, P2, P3, P4 and P8). Simultaneously operations are in progress to restore autonomous buoyancy to the hull so to allow to remove all the sponsons and then to transfer the wreck to dry dock where the final demolition will take place.



Fig.2 *Concordia Ship Recycling*

Source: <http://shiprecycling.it/la-concordia>

IV. IMO GUIDELINES ON SHIP RECYCLING (A.962(23))

A. *Guidelines*

Francesca Bondini et al (2010) from RINA Marine Division stated in his paper that The "IMO Guidelines on Ship Recycling" are addressed to all stakeholders in the recycling process, including administrations of ship building and maritime equipment supplying countries, flag, port and recycling States, as well as intergovernmental organizations and commercial bodies such as ship-owners, ship builders, repairers and recycling yards. The guidelines note that, in the process of recycling ships, virtually nothing goes to waste. The materials and equipment are almost entirely reused:

1. Steel is reprocessed to become, for instance, reinforcing rods for use in the construction industry or corner castings and hinges for containers;
2. Ships' generators are reused ashore;

3. Batteries find their way into the local economy;
4. Hydrocarbons on board become reclaimed oil products to be used as fuel in rolling mills or brick kilns;
5. Light fittings find further use on land.

Furthermore, new steel production from recycled steel requires only one third of the energy used for steel production from raw materials. Recycling thus makes a positive contribution to the global conservation of energy and resources.

However, the guidelines recognize that, although the principle of ship recycling may be sound, great attention must be paid to the working practices and environmental standards in the yards. While ultimate responsibility for conditions in the yards has to lie with the countries in which they are situated, other stakeholders must be encouraged to contribute towards minimizing potential problems in the yards. In short, these Guidelines seek to:

1. Encourage recycling as the best means to dispose of ships at the end of their operating lives;
2. Provide guidance in respect of the preparation of ships for recycling and minimizing the use of potentially hazardous materials and waste generation during a ship's operating life;
3. Foster inter-agency co-operation; and
4. Encourage all stakeholders to address the issue of ship recycling.

The guidelines are recommendatory.

B. Green Passport

The basic concept of these guidelines is to prepare the ship, so that the dismantling process can be carried out safely and the dangerous materials on board can be handled properly. For this purpose a document, the so-called "Green Passport", should accompany the ship through its operating life. This document should contain:

1. Ship's identification data;
2. List of potentially hazardous materials used for the construction (reporting location and approximate quantity/volume);
3. List of operationally generated wastes and stores, to be prepared prior to the final voyage to the recycling facility.

The Green Passport should be prepared by the shipyard for new ships and by the ship-owner for existing ships, while the ship-owner is responsible for the updating during the ship's life.

For the inventory of potentially hazardous materials and wastes, 3 appendixes are attached to the guidelines containing:

1. A list of hazardous wastes and substances;

2. A list of potentially hazardous materials which may be on board ship;
3. A model form of the inventory to be kept on board.

C. Other requirements of the Guidelines on Ship Recycling

Shipbuilders are invited to limit hazardous materials in the construction of ships. Substances prohibited by international conventions such as:

1. The Stockholm Convention on Persistent Organic pollutants (POPs);
2. The Montreal Protocol on Substances that Deplete the Ozone Layer;
3. The International Convention on the Control of harmful Anti-fouling Systems; should not be used in the construction, refitting and repair of ships.

The recycling facility should be selected according to its capability to recycle the ship in compliance with national legislation and with international Conventions. In particular the "Guidelines on Safety and Health in Ship-breaking" developed by ILO and the Basel Convention's "Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships" should be used as reference. The dismantling of the ship should be carried out according to a Recycling Plan defined by the ship-owner and by the recycling shipyard. The contract for dismantling should request the ship to be recycled according to the defined plan.

Finally, before the ship is delivered for dismantling, it should be made safe by ensuring that:

1. Spaces are certified gas free as applicable;
2. Oxygen deficient spaces are clearly marked;
3. Areas with structural integrity problems are clearly identified;
4. Wastes on board are minimized or eliminated, depending on the capacity of the recycling shipyard to handle properly such wastes.

"Guidelines for the development of the ship recycling plan" were issued by Circular MEPC/Circ.419 dated 12 November 2004. The guidelines give general advice on the methods and procedures that should be included in the plan and on the responsibilities for the development of such a plan. Moreover, they specify that the plan should comprise three main parts:

1. A worker safety and health plan (SRP);
2. An environmental compliance plan (ECP);
3. An operational plan (OP); Listing for each part the relevant aspects that should be included.

V. ENVIRONMENT PROTECTION OF SHIP RECYCLING ACTIVITIES

Farshchi (2015) from Department of Environment (DOE) in Iran said that “We are against ship recycling and don’t intend to become a ship-breaking yard for the neighboring Arab countries,” There are currently 170 sunken ships in Arvand River and hundreds more in the Persian Gulf. “The case was first taken up in 1987 when the DOE opposed the idea,” said Shahram Fadakar, director of Beaches and Coastal Wetlands Office at the DOE. Taking stock of the pressing need for scrap and high demand for steel and dilapidation of the marine fleet, Fadakar said a workgroup has been formed to study the feasibility of breaking ships in the far reaches of the Oman Sea, in the southern parts of Sistan Baluchestan Province. “Ship-breaking will only be done at the far ends of Oman Sea for Iranian ships under special conditions,” he said without elaboration. While 70 to 80% of all global ship breaking activities occurs in Asia, Fadakar said instances of demolition, if any, in the country had taken place illegally.

The “Bangladesh Ship Recycling Bill, 2015” also proposes formation of a regulatory body, “Bangladesh Ship Recycling Board”, to enhance monitoring and minimizing environmental hazards in the industry. The cabinet, at a meeting at Bangladesh Secretariat with Prime Minister Sheikh Hasina in the chair, yesterday approved the bill in principle, meaning it would undergo an examination by the law ministry before being finally endorsed by the cabinet and then placed in parliament for passage.

Briefing journalists at the Secretariat, Cabinet Secretary Musharraf Hossain Bhuiyan said the law’s aim was to address occupational health hazards of the industry’s huge workforce, ensure safe working conditions, better waste management, and protect the coastal environment. Businesses would need to take permission of the “Ship Recycling Board”. The cabinet also approved in principle the draft “Petroleum Law, 2015” for more efficiently regulating import, storage, and transportation of petroleum. The draft law is an updated version of the existing petroleum ordinance and doubles the extent of the punishment for violations in petroleum production, refining, mixing, recycling or reusing.

VI. The Kolmogorov – Smirnov test

The Kolmogorov–Smirnov test can be modified to serve as a goodness of fit test. In the special case of testing for normality of the distribution, samples are standardized and compared with a standard normal distribution. This is equivalent to setting the mean and variance of the reference distribution equal to the sample estimates, and it is known that using these to define the specific reference distribution changes the null distribution of the test statistic. A statistical

hypothesis test is a method of statistical inference. Commonly, two statistical data sets are compared, or a data set obtained by sampling is compared against a synthetic data set from an idealized model. A hypothesis is proposed for the statistical relationship between the two data sets, and this is compared as an alternative to an idealized null hypothesis that proposes no relationship between two data sets. The comparison is deemed statistically significant if the relationship between the data sets would be an unlikely realization of the null hypothesis according to a threshold probability—the significance level. In this research normality of the variables are as follows:

TABLE.1 KOLMOGOROV–SMINNOV TEST

<i>Variables</i>	<i>Statistic</i>	<i>Sig</i>	<i>Error</i>	<i>Result of test</i>
Environmental Pollution	1.483	0.25	0.05	Reject
Health and hygiene of the labors	1.789	0.03	0.05	Reject
Accidents during working times	1.500	0.18	0.05	Reject
Employment and Economic growth	1.531	0.22	0.05	Reject

VII. REVIEW THE HYPOTHESES TEST OF THIS RESEARCH

A. First Hypothesis

The null hypothesis (H_0): The factors related to the pollution of marine environment have no significant effect on implementation of ship recycling industry at the Southern ports of Iran. The alternative hypothesis (H_1): The factors related to the pollution of marine environment have significant effect on implementation of ship recycling industry at the Southern ports of Iran.

The results of first hypothesis for the pollution of marine environment variable have been obtained as follows:

Variable	Group	Limit	Number	Percentage of vision	Percentage of the test	Sig
The Iran Environmental Organization forbids the implement of ship recycling at the Iranian south ports.	1	≤ 3	107	68%	0.05	0.001
	2	>3	50	32%		
	Total		157	100%		
There is delay as a result of lack of information about the advantages of ship recycling at the Iran southern ports.	1	≤ 3	27	14%	0.05	0.000
	2	>3	130	86%		
	Total		157	100%		
The desirable and correct implementation of laws related to ship recycling could prevent the pollution of the Iranian south coasts.	1	≤ 3	0	0%	0.05	0.000
	2	>3	157	100%		
	Total		157	100%		
By creating the Ship Recycling Industry at the ports of Khuzestan province may provide the possibility of floating wrecks and dredging of the Arvand River.	1	≤ 3	0	0%	0.05	0.000
	2	>3	157	100%		
	Total		157	100%		
Lack of integration and coordination among implementing agencies and the securities industry laws related to ship recycling in Iran.	1	≤ 3	32	20%	0.05	0.006
	2	>3	125	80%		
	Total		157	100%		
Lack of specific rules and formulated guidelines by the Iran's environment organization is a major barrier to create the ship recycling industry.	1	≤ 3	8	10%	0.05	0.000
	2	>3	141	90%		
	Total		157	100%		

Test Result and its Interpretation

As seen in the table above, the significant level of error for the index is smaller than .05 (Sig<.05), this means that it can be stated with 95% confidence that the hypothesis based on the environmental factor has a significant effect to the implementation of ship recycling at the Iran Southern ports are confirmed.

B. Second Hypothesis

The null hypothesis (H₀): The factors related to the health and Hygiene of industrial workers have no significant effect on ship recycling activity at the Southern ports of Iran. The alternative hypothesis (H₁): The factors related to the health and Hygiene of industrial workers have significant effect on ship recycling activity at the Southern ports of Iran.

The results of second hypothesis for the health and Hygiene of industrial workers variable have been obtained as follows:

Variable	Group	Limit	Number	Percentage of vision	Percentage of the test	Sig
Because of the abundance of labors in the south of Iran, the supply of labor as wage and without health insurance in the industry is easily possible.	1	≤ 3	22	14%	.05	.000
	2	>3	135	86%		
	Total		157	100%		
Release of toxic gases in the environment of Ship Recycling may not show its effects immediately, but in the long run serious diseases like lung cancer provide to the workers.	1	≤ 3	0	0%	.05	.000
	2	>3	157	100%		
	Total		157	100%		
Halogen gas emissions and harmful substances during the process of ship recycling at the Iran southern ports may cause problems for the health of workers.	1	≤ 3	30	19%	.05	.000
	2	>3	127	81%		
	Total		157	100%		
The process of textile workers causes informally activity and the lack of permanent life insurance and social security conditions.	1	≤ 3	25	16%	.05	.000
	2	>3	132	84%		
	Total		157	100%		

Test Result and its Interpretation

As seen in the table above, the significant level of error for the index is smaller than .05 (Sig<.05), this means that it can be stated with 95% confidence that the hypothesis based on the health and Hygiene of industrial workers has a significant effect to the implementation of ship recycling at the Iran Southern ports are confirmed.

The null hypothesis (H₀): The factors related to the accidents and injuries of workers have no significant effect on ship recycling activity at the Southern ports of Iran. The alternative hypothesis (H₁): The factors related to the accidents and injuries of industrial workers have significant effect on ship recycling activity at the Southern ports of Iran.

The results of third hypothesis for the accidents and injuries of industrial workers variable have been obtained as follows:

C. Third Hypothesis

Variable	Group	Limit	Number	Percentage of vision	Percentage of the test	Sig
Due to the destruction of the Securities and workers operating environment and to avoid the possibility of equipping the workforce with full safety equipment for workers falling from height is very high	1	≤ 3	10	6%	.05	.000
	2	>3	147	94%		
	Total		157	100%		
Due to the lack of modern technology for recycling ships in the southern ports of Iran, accidents while floating bonds is high for workers.	1	≤ 3	0	0%	.05	.000
	2	>3	157	100%		
	Total		157	100%		
As a result of the accumulation of combustible gases in indoor spaces fully cause an explosion for workers who are welding and cutting.	1	≤ 3	11	11%	.05	.000
	2	>3	146	93%		
	Total		157	100%		

Test Result and its Interpretation

As seen in the table above, the significant level of error for the index is smaller than .05 (Sig<.05), this means that it can be stated with 95% confidence that the hypothesis based on the accidents and injuries of industrial workers has a significant effect to the implementation of ship recycling at the Iran Southern ports are confirmed.

significant on the implementation of ship recycling industry at the Southern ports of Iran.

The alternative hypothesis (H₁): The factors related to the Job creation and economic prosperity have significant effect on the implementation of ship recycling industry at the Southern ports of Iran.

The results of fourth hypothesis for the Job creation and economic prosperity variable have been obtained as follows:

D. Fourth Hypothesis

The null hypothesis (H₀): The factors related to the Job creation and economic prosperity have no

Variable	Group	Limit	Number	Percentage of vision	Percentage of the test	Sig
Because of the high average age of the Iran merchant navy, so ship recycling market has great potential for economic growth.	1	≤ 3	8	5%	.05	.006
	2	>3	149	95%		
	Total		157	100%		
Twenty-first position of Iran in the world and first place in the Persian Gulf in terms of tonnage ships will determine the brilliant future for ship recycling market.	1	≤ 3	125	80%	.05	.002
	2	>3	32	20%		
	Total		157	100%		
Adverse market conditions may cause ship owners to remove their high age ships from transportation in order to recycling which has direct	1	≤ 3	111	71%	.05	.041
	2	>3	46	29%		
	Total		157	100%		

impacts on employment of human resources.						
There are submerged ships in the Arvand River which need to be floated in the near future, it causes to improve ship recycling industry and also job creation.	1	≤ 3	22	14%	.05	.006
	2	>3	135	86%		
	Total		157	100%		
With the establishment of ship recycling industry in the Persian Gulf, the scrap irons can be used in other industries or even export them to other countries will promote job creation too.	1	≤ 3	16	6%	.05	.006
	2	>3	141	94%		
	Total		157	100%		
The import of old ships with age of more than 20 years to Iran may cause to improve demand for ship recycling in future and economic prosperity and job creation in the southern ports.	1	≤ 3	2	1%	.05	.001
	2	>3	155	99%		
	Total		157	100%		

Test Result and its Interpretation

As seen in the table above, the significant level of error for the index is smaller than .05 (Sig<.05), this means that it can be stated with 95% confidence that

VIII. Conclusion

To prevent environmental pollution, as previously mentioned fuel on the ship should be minimized before delivering it to the ship-recycling industry; it should be mentioned that If there is no possibility to take up harmful substances such as Polychlorinated biphenyls fluids, materials containing fiberglass and halogen gases, etc. then they should be separated in the right place by the ship owner's order before delivery of the ship.

It is recommended to use portable fire extinguishers Instead of the fixed fire fighting system of halogen gases for Last Voyage of the ship. If necessary, waste oil and water ballast tanks must be delivered to the last port. In the end, all the remained harmful materials on the ship and its dangerous spaces must be distinguished and marked. On the other hand for the health and safety issues of workers, the ship owner must perform certification for degassing and ventilation of enclosed spaces and, if necessary, to take a work certificate for the duration of cutting activity there.

It does not mean that the ship-recycling industry has no responsibility for the require safety on board the ship. All spaces where there is a risk of flammable gases and toxic and dangerous lack of oxygen should be identified and marked. All parts of the ship which are damaged by accident need be identified and marked in order to be considered during the ship scraping arrangements. Creating the industry needs an appropriate

the hypothesis based on the Job creation and economic prosperity has a significant effect to the implementation of ship recycling at the Iran Southern ports are confirmed.

infrastructure that requires an initial investment which is relatively high. However, the level of talent available in the Khuzestan province in the context of a significant number of submerged vessels in order to recycle at the provincial level and the neighboring areas, convenient and favorable geographical position of the labor force in the region are the main factors in the context of the creation of this industry.

Taking into consideration the limitations and talents, so the following two plans for creating ship dismantling industry which presently being performed in China and Turkey can be suggested to be carried out at Khuzestan Province too. The firs plan is landing method – as mentioned above this method is currently being conducted in Turkey, which is due to the existence of the shipbuilding and ship repair dock at Khoramshahr, Abadan and the pattern of this method can be evaluated and pursued in order to create this industry at Khuzestan province. The second plan is afloat method – this method is currently being conducted in China, which can be implemented in Khuzestan Province with a focus on the existence places such as Khorramshahr, Abadan and Imam Khomeini port in order to consider the creation of this industry and the country's economic growth. "We would like to thank Khorramshahr University of Marine Science and Technology for supporting this work under research grant contract No. 127 ".

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