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paper titled

REVIEW ON SHIP RECYCLING INDUSTRY



INTRODUCTION

- Ship breaking, dismantling, scraping, demolition and ship disposal are expressions with a same meaning which ends at ship recycling yards.
- The ship recycling industry is a vigorous market which offers a huge profit to the ship owner, ship brokers and the cash buyers from selling ships as scrap.

- The ship recycling industry starts after the second world war and it is situated in the industrial countries like Germany, Italy, United Kingdom, United States and Scandinavian countries till 1980.
- Recently, the ship recycling industry is transferred to another five countries which are India, Bangladesh, China, Pakistan, and Turkey.
- “The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal” was adopted in 1989, which entered in force in 1992, and which currently has 175 Parties.

- The Basel Convention protects the human health and the environment against adverse effects that result from the generation and management of hazardous and other wastes.
- In May 2009 the IMO diplomatic conference held in Hong Kong and attended by representatives of 63 States, the Secretariats of the Basel Convention and of ILO, and other stakeholders, adopted the “Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009”, which is also known as the Hong Kong Convention (HKC).

- **IMO is looking forward to the early entry into force of the HKC which will:**

1. help ship recycling States to regulate the safety and environmental standards of their recycling industries.
2. improve the health and safety of ship's crews: (a) by controlling the installation of hazardous materials to ships; and (b) by making crews aware of risks onboard through the availability of the Inventory of Hazardous Materials;
3. make it possible for the shipping industry to help solve the problem of substandard ship recycling, by requiring that ships are recycled in compliant yards and in this way by making shipowners contribute to the cost of compliance to the standards of the Convention.

Statement of the problem

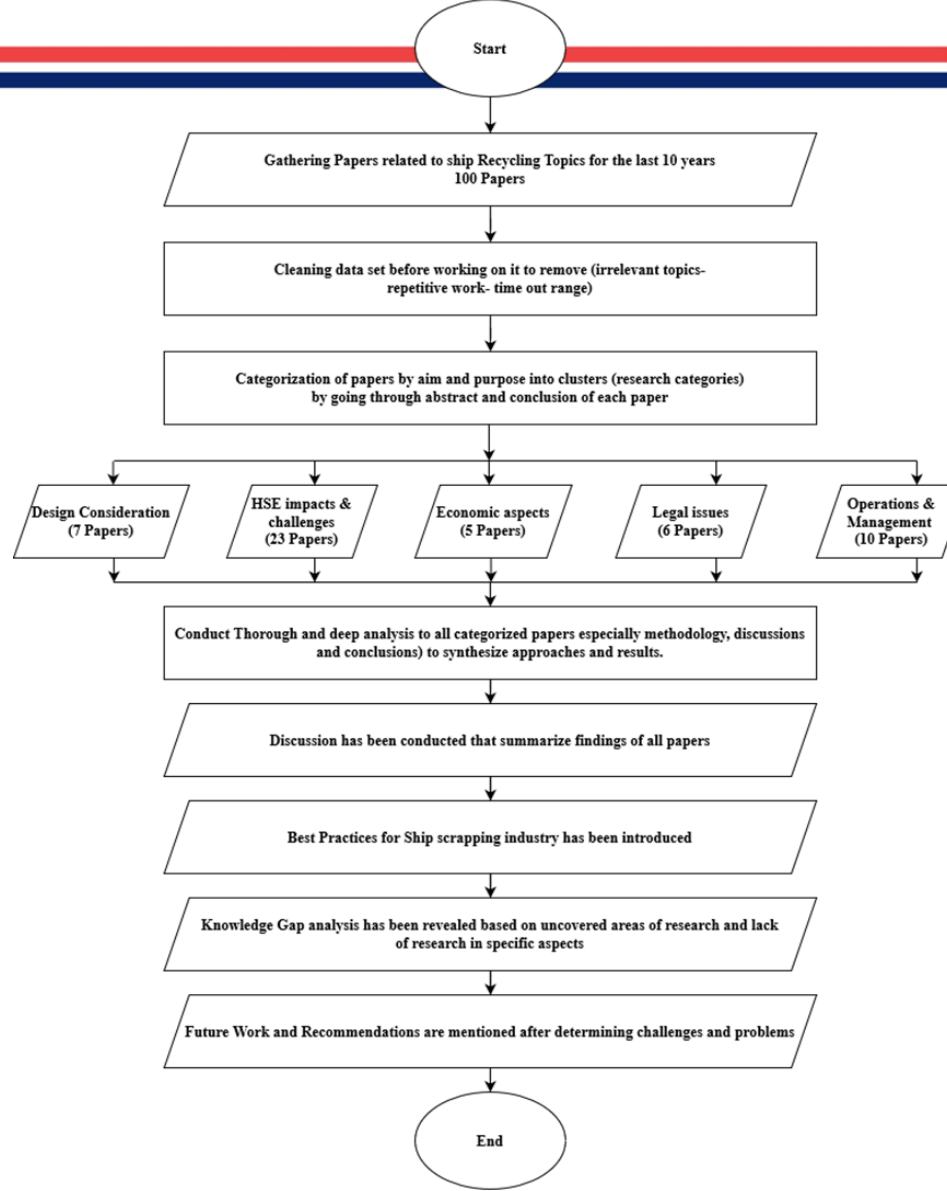
- In the ship recycling sector, there is a difference between yards that adhere to international regulations and safety standards, such as the Hong Kong Convention and the European Union Recycling Regulation, and non-compliant or sub-standard yards that charge more than the standard ship recycling yards.

- The high expense of enforcing health, safety, and environmental regulations, as well as worker exploitation in recycling yards and the requirements for worker welfare in conventional ship recycling yards, all contribute to this condition.
- As a result, the owner of the ship will not consider selling it to the typical ship recycling yards because of the price difference. In a nutshell, to fill this gap, the total cost of ship recycling process must be less than the revenue for the ship recycling yard.

Literature survey structure

- The literature review of ship recycling topic was carried out on a sample of 100 papers related to that field, 51 papers are refined and classified into 5 parts; Design considerations in ship recycling industry, Health safety and environment challenges, Economic aspects related to ship scrapping, Legal issues for ship breaking and Operations and asset management in ship demolition. An open literature was carried out through the last 12 years with time range from 2010 to 2022

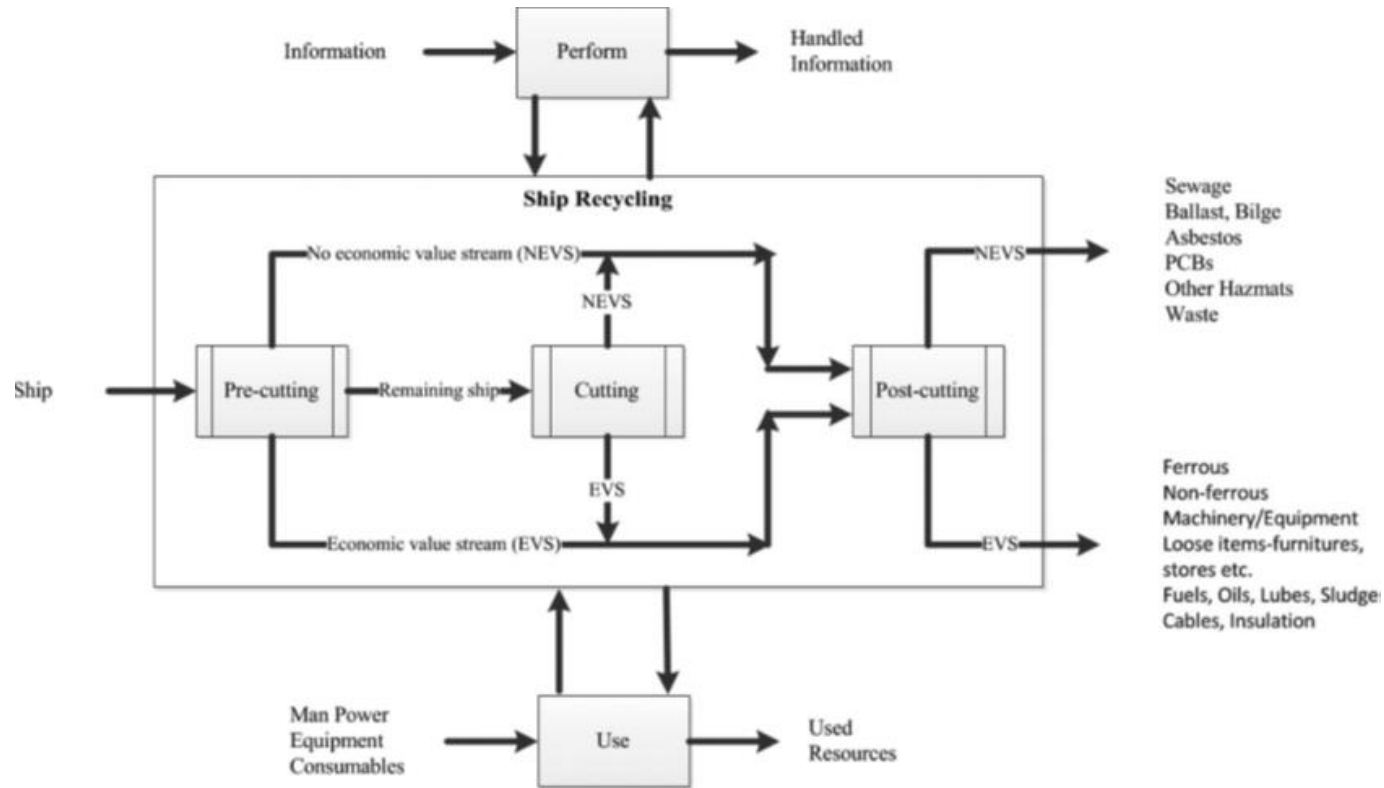
Methodology



Data analysis

Design consideration

- Design is one the most important factor among other factors affecting the ship breaking industry success, the following paragraphs discusses the research effort from 2013 to 2020 including seven research papers. The design stated below includes ship design for future recycling, green ship recycling yard layout design and the design of ship recycling plan.
- K.P. Jain et al. (2015) [2] developed a methodology to build a scientific model for optimizing ship recycling yards for cost-effective green ship recycling.



ship recycling process K.P. Jain et al. (2015)

HSE Impacts & Challenges

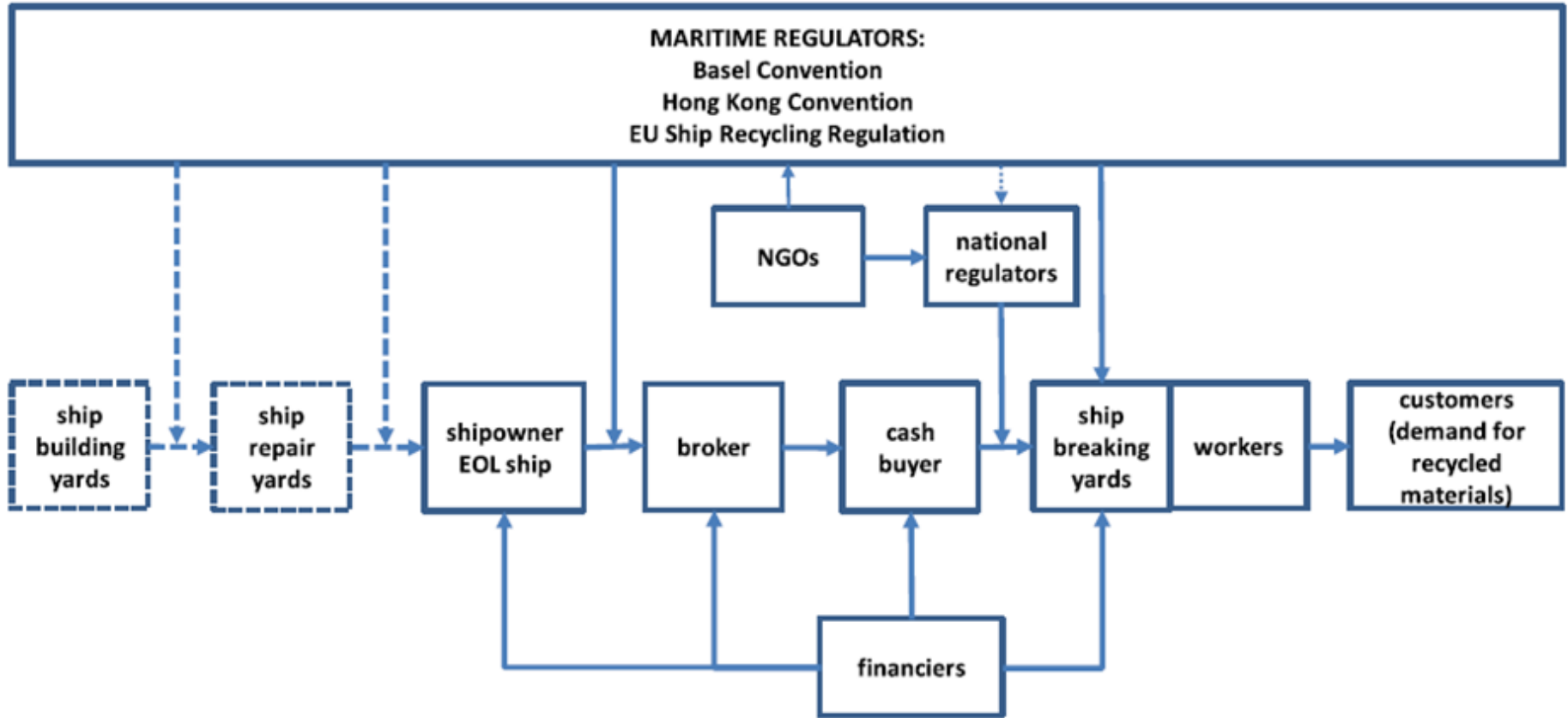
- The pollution which occurs due to substandard ship recycling process leads to harmful environmental impacts. The following research papers ranging from 2012 to 2021 includes 13 papers discussing different issues related to environmental impact problems.
- The non-green ship breaking process exposes the ship breaking workers to a serious risk on health and safety. Throughout the next paragraph, 10 research papers covering years from 2012 to 2021 discusses problems in health safety and environment.

Economic aspects

The economic gains resulting from the scrapping of ships randomly, most of ship owners who want to scrape end of life ships scape from the green ship recycling yards towards the non-green ones. The following research papers published from 2016 to 2020 includes 5 papers that introduce different drawbacks from an economic point of view.

Legal issues

- The Hong Kong convention were not entered into force yet. Because of a number of legal constraints facing the implementation of these regulations. The following parts includes 6 research activities from 2010 to 2020 focusing on the legal aspects of the ship breaking industry poor implementation.



The supply chain of ship recycling (J Hsuan et al. (2020))

Operations & Management

The absence of specific guidelines for ship breaking and relevant information, results in decreasing the scrapping performance to the lowest level. The next paragraphs ranging from 2012 to 2020 includes 10 research papers which shows the defects facing the ship recycling industry due to bad management and operation.



Projection of potential ship recycling market for the next 20 years in Brazil (Reference year: 2017).
 C. Benjamin et al (2020)

Best Practices for Ship Scrapping

- There are four methods for ship recycling “Beaching”, “landing”, “alongside” and “docking”, the first one is refused from the HKC convention due to the large amount of hazardous materials which are landed on the mud. The next two methods also causing marine pollution but less than beaching method. While, the fourth method is the best practice for ship recycling which is applied inside the dock land but it needs large area with high cost.

conclusion

An analysis of the reviewed articles also identifies research challenges and directions for future research. In this way, this article provides a brief summary of the advances in ship recycling through scholarly publications. The main conclusions of this study are as follows:

- Top leading countries in ship recycling industry are Pakistan, India, Bangladesh, China and Turkey.

- 5 research categories have been defined:
 1. Design consideration
 2. HSE impacts & challenges
 3. Economic Aspects
 4. Legal issues
 5. Operations & management

There is a lack of research activities related to a number of topics.

- There are only 7 published papers for the Design considerations in ship recycling industry topic.
- There are only 5 published papers for the economic research activities.
- Egypt is one of the rich coastal countries, but there is an almost no research activities published in regarding with this industry implementation in Egypt.
- There is a gap in research activities regarding to the merging among traditional ship recycling methods, operation and management studies, environmental impacts and economic feasibility studies.

QUESTIONS

Thank You