Al-Kashaf: Research Journal for Social Sciences (Miscellaneous)
Volume:05, No:04. October–December 2025
ISSN:2790 –8798; E-ISSN: 2790–8801

The Role of Bilateral Cooperation in Regulating Ship-Recycling Industry in the Region South Asia

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KEYWORDS
Maritime Regulations, Shipbreaking South Asia,

ABSTRACT
The global ship-recycling industry is highly concentrated in South Asia, where India, Bangladesh, and Pakistan collectively account for more than 80% of dismantled vessels worldwide. Despite its economic importance in providing employment and supplying recycled steel and other materials, the industry is widely criticized for hazardous "beaching" practices that expose workers to severe health risks and generate significant environmental pollution. This paper examines the regulatory challenges associated with ship recycling in South Asia and explores the potential role of bilateral cooperation in improving environmental governance and labor protection in the region. Using a doctrinal and comparative legal methodology, the study analyses key international and regional regulatory frameworks, including the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, the EU Ship Recycling Regulation, and relevant national legislation in India, Bangladesh, and Pakistan. The findings reveal substantial gaps between international standards and on-ground practices due to weak enforcement mechanisms, infrastructural limitations, and fragmented regulatory approaches. It argues that strengthened bilateral and regional cooperation can play a crucial role in harmonising regulatory standards, improving compliance with international environmental norms, and promoting sustainable ship-recycling practices. By proposing a cooperative governance framework, the study contributes to ongoing debates on maritime environmental regulation and highlights pathways toward a more sustainable and responsible ship-recycling industry in South Asia.

Introduction

Literature The global ship recycling business forms a crucial part of the maritime economy mainly located in South Asia, where all three countries of India, Bangladesh and Pakistan rely on it as an inseparable part of their economic structures. Together, these countries produce over 80% of global shipbreaking (especially in the shipyards of Alang (India), Chattogram (Bangladesh), and Gadani (Pakistan). Even though ship recycling provides raw material that is very much needed such as steel, aluminium, and copper, it also creates significant environmental and health issues. The most common South Asian method of shipbreaking, which is called beaching, is to aground a ship and dismantle it on shore with no sufficient safety or environmental measures. The practice has gained a lot of criticism due to its risky working environments, environmental pollution and the exploitation of workers, most of whom are migrant workers (International Labour Organization, 2020).

Shipbreaking in South Asia is a highly profitable business that creates millions of employment opportunities and brings millions of dollars to the governments. However, its ecological and human implication is still intense. According to the International Labour Organization, the industry has considered the most dangerous worldwide and every year, many deaths and

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injuries have been recorded. This year alone, nine workers died and fifty were injured in ship recycling yards in India, Bangladesh and Pakistan. The toxic chemicals like asbestos, heavy metals and persistent organic pollutant (POPS) are some of the worker risks that cause long-term health complications. Besides, the release of harmful chemicals into the coastal waters has a severe negative effect on marine ecosystems and local communities who depend on these ecosystems as a source of their income (Zhao, 2021).

Regulations and conventions that are geared towards improving ship recycling process have been promulgated by international bodies like the European Union (EU) and the International Maritime Organization (IMO). The adoption of the Hong Kong Convention (HKC) to the Recycling of Ships in a safe and environmentally friendly manner in 2009 aims at reducing the environmental and health impact of shipbreaking by setting international standards of the ship recycling facilities (International Maritime Organization, 2009). Similarly, the EU Ship Recycling Regulation (EU SRR) came into operation in 2013 and it has a framework of how end-of-life ships are handled and also the recycling facility has to meet high environmental and safety standards (European Commission, 2013).

Regardless of such international initiatives, the South Asian shipyards often do not comply with the standard requirements, which can be attributed to poor infrastructure, low enforcement, and lack of regulatory systems. In most cases, the local governments of India, Bangladesh and Pakistan have failed to institute an elaborate environmental policy that can adequately control the toxic waste that ship recycling produces. Moreover, tension between states and little cooperation on the region has affected the efforts aimed at mitigating the environmental and labor issues that are involved in the industry (Zhao, 2021).

The countries of South Asia need to collaborate bilaterally in solving such problems. The introduction of the regional ship recycling scheme might introduce uniformity in safety measures, enforce the environmental law, and ensure the enhancement of the working conditions. Best practices, sustainable practices and mutual trust can be encouraged between such nations by means of bilateral and multilateral agreements (including the South Asian Association of Regional Cooperation (SAARC)). As an example, Article1(3) of the Ship Recycling Convention promotes collaboration between nations to facilitate the provision of appropriate recycling policies (International Maritime Organization, 2009). Furthermore, South Asian nations need to work together to seal the loopholes in the legislation, achieve sustainable recycling, and protect the health and safety of the workers.

In this paper, the authors explore the prevailing situation as well as issues related to ship recycling in South Asia, with a particular focus on the environmental and human implication of the industry. It also shows the possibility to have bilateral

cooperation between India, Bangladesh, and Pakistan in order to overcome such challenges and meet international standards. By critically examining the current regulatory frameworks, the paper will focus on identifying a roadmap on sustainable ship recycling in South Asia, and will also highlight the relevance of regional collaboration in improving the practices in the industry.

Significance of the Paper

The international shipbreaking and recycling business forms an important part of the world economy with a stronghold in South Asia. It is estimated that in the year 2025 the ship recycling market will reach a value of US13 billion and the compound annual growth rate (CAGR) will be 7.4 percent between 2025 and 2033. The major motivators that support this growth are the rising level of demand of recovered metals such as steel, aluminum, and copper and the ageing of world fleet which have led to the need to have more intensive dismantling processes (Hossain and Islam, 2006). Countries south of the Asian continent especially India, Bangladesh and Pakistan have become the center of interest of the sector due to their established infrastructure and comparatively low labor prices. Despite its economic importance, the industry is facing a significant environmental problem, the major part of which can be explained by the dangerous shipbreaking activities like beaching that result in toxic pollution and cause serious health risks to employees. In this regard, this paper will attempt to critically examine the regulatory frameworks and bilateral cooperation mechanism necessary to curb such problems and ensure the sustainable future of the industry.

In the recent years, international efforts have been heightened to ensure that ship recycling is regulated in a better manner and its negative effects minimized. The Hong Kong Convention (HKC) and the European Union Ship Recycling Regulation (EU SRR) are aimed at making sure that shipping vessels are dismantled in such a way that would cause minimum environmental harm and that the health of the workers is not jeopardized. Still, even after such regulations, South Asian shipyards often do not achieve the necessary standards as they have outdated infrastructure, lack of enforcement and proper legal provisions. As the European Commission (2019) notes, despite some of the shipyards making some advancement in terms of adopting cleaner technologies, the industry overall is still far away in terms of meeting international norms. The paper identifies the gap between the established regulatory frameworks and the current practices in South Asian shipyards and provides a critical evaluation of the challenges that are associated with it and the possibility to improve it.

The multilateral and bilateral collaboration between South Asian countries is essential to resolve environmental and labor issues that are involved in the shipbreaking business. The regional cooperation may support the harmonization of rules, share best practices, and raise the safety level in shipyards. According to Zhao (2021), the creation of the framework of

collaboration between India, Bangladesh, and Pakistan is likely to help these countries jointly address the problem of hazardous waste disposal, labor safety, and the implementation of the environmental regulations. Besides, this type of cooperation may trigger the creation of green shipyards, when recycling technologies which are environmentally friendly are implemented and the workers are provided with greater protection and fair remuneration. This paper therefore highlights the significance of bilateral agreements and regional schemes in bridging the regulatory lapse and enhancing a more sustainable and responsible ship recycling business in South Asia.

Role of Bilateral Cooperation to Regulate Ship-Breaking or Recycling in South Asia

Ship recycling forms an important segment of South Asian economy as it adds a substantial amount to foreign exchange reserves and creates important source of revenue to the national governments. The industry provides key raw materials such as steel, aluminum and copper that are later reused by the emerging economies and rolling mills, hence creating a vital chain of supply in the various production industries. Moreover, the shipbreaking business is a prime source of employment in the area, where hundreds of thousands of workers are employed, many of which are migrants to rural areas in the search of a source of livelihood. The ship recycling business in Alang (India) was seen as a major economic resource since its initiation in 1983. According to Gupta (2007), the Gujarat Maritime Board was making a profit of about USD 1.01billion in the lease of land to ship scrapping between 1994 and 2004, the best years in the history of the sector. At the same time, the Indian state government was gathering over USD 220 million sales taxes, and the federal government was getting about USD 11.7 billion customs duties. This strong revenue generation is evidence of the economic importance of ship recycling in South Asia but it also points to the other issues associated with the safety and environmental sustainability.

Shipbreaking in South Asia is known to be very dangerous to the environment and the low working standards of their employees in spite of the benefits to the economy. The traditional beaching system used in India, Bangladesh, and Pakistan introduces dangerous compounds in the environment including asbestos, heavy metals, and other harmful substance. This activity is very dangerous to the workers, as well as, the local people, leading to the pollution of the coastal waters, soil degradation and air pollution. In addition, employees often work in unhealthy environments without proper safety gears, which result in high levels of deaths and injuries (Rahman, 2013). The pollution of the environment due to shipbreaking also negatively affects the marine biodiversity, since the runoff of the toxic wastes into the ocean affects the fish stocks, as well as damages the coastal ecosystem. The external and human environmental and human costs of such practices are substantial and require to be addressed by stricter regulatory mechanisms and mutual collaboration.

As a way of looking into these fears, the states in South Asia need to encourage bilateral and multilateral cooperation as one should see the collective responsibility in dealing with transboundary environmental challenges. India, Bangladesh and Pakistan should enter into bilateral environmental accords to counter the intricate issues that arise out of shipbreaking. These agreements are known to ease the harmonization of regulations, and sharing of best practices, as well as the implementation of internationally agreed safety and environmental standards. The Ship Recycling Convention, or the Hong Kong Convention, promotes collaboration among the parties in the quest to achieve the effective implementation and enforcement of its provisions. The regional cooperation systems, including the ones promoted by the South Asian Association of Regional Cooperation (SAARC), also encourage the sharing of the expertise and resources by means of seminars, conferences, and joint environmental projects. The Declaration of Delhi which was adopted as part of the SAARC framework highlights the significance of coordination in dealing with environmental problems especially those relating to ship recycling. Through local cooperation, the South Asian states will be able to develop a common vision of sustainable ship recycling that can support the domestic and global environmental goals (SAARC, 2015).

India-Bangladesh-Pakistan bilateral cooperation is not only one of the issues of environmental protection but also a road towards mutual economic benefit. These nations should work together to ensure that the harm caused by shipbreaking is alleviated, and this can only be achieved through recognizing that these nations have a common interest (Rahman, 2013). The creation of innovative cooperative framework can result in more efficient and safer ship recycling plants, which would have extensive positive effects on the health of the population, labor environment, and the environment in the region. Another important move to make the ship recycling industry in the region sustainable in the long term will be to strengthen the legal frameworks to close the loopholes that exist in the national legislation, as well as the implementation of the international environmental and labor regulations. What is more, the local collaboration in this regard can promote the adherence to such international conventions as the Basel Convention and the EU Ship Recycling Regulation that introduce international standards of the hazardous waste management and its environmentally friendly reuse (European Commission, 2013).

Towards a Sustainable Ship Recycling Industry

Ships, like other channels of transportation, are bound to end their useful working life and thus must be dismantled. Such vessels can be recycled in the most environmentally beneficial manner of disposal but also do not fail to have an economic advantage. Ships hold precious materials such as steel, aluminum, copper and plastics which can be reused and recycled by including them in the preparation of other new products. As a result, the reuse of these important

commodities through shipbreaking will be possible instead of destroying the vessels by sinking or discarding, which may lead to the creation of environmental catastrophes (Zhao, 2021).

The shipbreaking business is also highly hazardous, not only to the workforce, but also to the ecological environment. The industry is a serious pollutant of the environment globally with the majority of the ships being dismantled in such a way that the dismantled materials (asbestos, heavy metals, cadmium, oil, etc.) are often released to the surrounding environment (Rahman, 2013). The end of the commercial life of ocean-going commercial vessels takes thousands of such vessels a year, which need to be disposed of. In the past, the dismantlement was carried out in Europe and the United States, but a new wave of strict environmental and labor protection laws began in the 1970s, which led to the shift of the industry to countries with less strict regulatory frameworks, most of which are found in South Asia (Zhao, 2021). The migration has led to the growth of shipbreaking yards in India, Bangladesh, and Pakistan where over 70 percent of all shipbreaking is carried out nowadays. Especially the Alang-Sosiya (India), Chittagong (Bangladesh) and Gadani (Pakistan) beaches have become the hub of ship recycling in the world with the three locations handling the overwhelming majority of end-of-vessels (Gupta, 2007).

This technique that is used in these yards, also known as beaching is costly to the environment and the human being. The beaching is achieved by ramming the ships on tidal beaches with workers taking the vessels to pieces manually. This is an extremely unsafe method that involves heavy human work in dangerous environments and exposes employees to toxic substances and materials including asbestos, heavy metals and oil. Most of these workers are migrants who have very fewer legal rights, which makes them very vulnerable to fatality injuries, diseases, and work-related illnesses as a result of exposing themselves to these harmful substances. The International Labor Organization (ILO, 2020) states that shipbreaking is one of the worst-paid industries in the world, as every year, many deaths are associated with it. In 2024, alone, nine workers were killed and more than 45 employees were injured in the shipbreaking yards in South Asia. Quite a significant number of these employees end up acquiring long-term conditions, such as cancers and breathing problems, due to working with toxic substances without proper protective equipment (ILO, 2020).

In addition to the immediate environmental harm to human health, beaching causes the extreme degradation of the environment. Ships are wrecked upon the beaches, which leads to the release of toxic substances which include oil plus dangerous chemicals into the surrounding environment which pollute both the land and water. Such pollution has negative effects on the marine organisms and the local fishing community that relies on clean water in their day-to-day operations. It has been determined that the negative impact of beaching activities is not localized to the immediate environment, but

the whole coast ecosystem. The toxic spills and dumping of heavy metals in the ocean are also very harmful to marine biodiversity, which may cause disruption in whole ecosystem, destruction of coral reefs, fish populations and coastal plants (Hossain and Islam, 2006). In addition, the emission of persistent organic pollutants (POPs) by outdated vessels is an additional cause of long-term environmental pollution that could last decades.

Although, South Asia remains the main location of shipbreaking, other locations like China and Turkey are becoming secondary locations where ships are being decommissioned. Although these countries have made relatively more progressive recycling practices than the South Asian ones, they still face serious difficulties in the way hazardous materials are disposed of and with the way the workers are provided with protection. International maritime organization (IMO, 2009) has reported that despite the improvements in the recycling facilities in China and Turkey, the countries continue to face poor waste management activities and the issue of labor rights being violated (IMO, 2009). Recycling of only 3 percent of the world ships occurs in other facilities other than South Asian, and even in such instances, issues of poor enforcement of policies and inability to adopt sustainable ways still exist.

In order to move towards more sustainable ship-recycling procedures, a number of changes should be made both on technological and regulatory levels. A possible future remedy is the invention and implementation of the sophisticated recycling systems that are environmentally friendly. Some shipbreaking facilities in South Asia have already started using mechanized cutting systems that lessen reliance on manual labor, which make them more efficient. Moreover, the release of poisonous elements into the environment can be reduced by the creation of the system of containment and the effective disposal of garbage. The Hong Kong Convention which came into being in 2009 gives guidelines to take the standards of safety and environmental standards to a higher level in terms of ship recycling. The Convention stipulates that the ships are to be recycles in recycling plants that meet international standards, and attention should be given to safety of workers and pollution. However, it has been slow in its implementation with most South-Asian shipbreaking yards not being able to meet the required standards because of financial and infrastructural limitations.

Can South Asian Ship Recycling Yards Make It to the European List?

The South Asian ship recycling has received a lot of criticism by international and local non-governmental organizations (NGOs) due to the hazardous ecologically unsafe activities, the risky nature of work, and the sheer use of child labor that is widespread. The main method used in shipbreaking in the area, also known as beaching, has received criticisms due to the high level of marine pollution, inadequate disposal of hazardous wastes and unsafe working conditions. Beaching involves grounding ships on the

beach, where workers then dismantle the ships by hand, often without any sufficient safety equipment, and thus exposing themselves to the harmful chemicals, which often include asbestos, heavy metals, and petroleum remains. Such actions are a violation of several global environmental and labor regulations, which makes the South Asian ship recycling yards incompliant with the ship recycling policies of the European Union (EU) (Zhao, 2021).

The EU has responded to these fears by seeking to formulate more rigorous requirements on ship recycling plant, hence ensuring that ships are recycled safely and in an environmentally friendly manner. The EU Ship Recycling Regulation (EU SRR), which became effective in 2013, provides the standards of ship recycling in EU and it establishes a list of ship recycling facilities approved by the standards that the facility must meet. The rule forbids recycling of ships to be recycled in yards that fail to meet such standards and only the plants included in the EU list are allowed to receive ships with an EU flag (European Commission, 2013).

In 2016, the delegation including the representatives of the European Community Shipowners Association (ECSA), EU member states government, the European Commission, and the International Chamber of Shipping (ICS) visited some shipyards in Alang, India. The aim of this visit was to consider whether the processes of ship separation in the tidal areas could be considered sustainable enough to comply with the EU regulations. Although the ECSA noted that some improvement was achieved, it highlighted that application of these standards on shipyards was still inconsistent, with only a small number of shipyards taking major steps towards adherence to the Hong Kong Convention (ECSA, 2021).

Despite the sluggish development in South Asian yards, the Hong Kong Convention which was adopted in 2009, provides a guideline on how the ships should be recycles in a way that does not have severe effects on the human life and environment. The convention is however yet to come in force and its implementation is being undermined by poor infrastructure and financial limitation of most South Asian shipyards. The ECSA has pushed to incorporate some of these yards in the list of approved facilities in the EU, as long as they meet the environmental and labor standards set in the EU SRR (ECSA, 2021). However, even with the goodwill of the rhetoric by the stakeholders in the industry, local NGOs and environmental organizations in India have expressed worries over the fact that the local people are still practicing old and hazardous methods. Such groups have pointed to the inadequacy of environmental impact assessments (EIA) of new shipbreaking yards, and the inability to develop a transparent process of public involvement. Since environmental lawyers observe that under the Alang shipbreaking yards, many of them have not undertaken the necessary EIAs, which are necessary to ensure that the environmental impact of any of the facilities is adequately assessed (Rahman, 2013).

Besides environmental concerns, there is also the case of labor rights violation. Shipbreaking yards usually have employees who do not wear proper protective equipment and are therefore prone to unhealthy exposure. Although there are certain recent efforts to change the situation in the chosen yards, a large number of them do not meet even the most basic requirements of the labor rights, such as the right to safe working conditions, fair wages, and the lack of hazardous exposure. The local NGOs have petitioned the European Commission to revisit including South Asian yards in the EU list because of the continued breach of labor rules and environmental politics (Hodgson Russ LLP, 2021). The lack of strong regulatory management in these yards remains a significant impediment to the attainment of a fully sustainable ship recycling business in the region.

According to the Technical Guidance Note, issued by the EU in 2016, to be included in the EU list, the shipyards have to prove that they meet the criteria of environmental and labor standards, along with effective waste management work. However, there are numerous South Asian yards, despite the recent changes that do not meet such requirements. Indicatively, though China and Turkey have gone a step further in their quest to embrace cleaner recycling technology, issues concerning hazardous waste disposal and breach of labor rights continue to exist in the two countries. The global ratio of ships being recycled in plants other than South Asia is only 3 percent and the remaining 97 percent of the plants have difficulties complying with the complete list of environmental and safety standards required by the EU (Hossain and Islam, 2006).

The Potential for Regional Collaboration to Improve Ship Recycling Practices

South Asia has developed as the best location in the world to recycle the ship, and the majority of the decommissioned vessels globally are in South Asia. Although this innovation has brought substantial social-economic benefits, it increases traditional fears about environmental destruction, workplace safety, and regulatory compliance. Empirical evidence has also shown in recent years that by organizing activities of ship recycling operations regionally, the industry can turn into a significant contributor to a circular economy and the United Nations Sustainable Development Goals (SDGs), instead of remaining a source of environmental and labor injustices (Mannan et al., 2024). In fact, researchers argue that presently, South Asian ship recycling that has largely been viewed as dangerous has unexploited potentials that can be achieved through the exploitation of strengths and opportunities through coordinated sustainability efforts.

The regional cooperation might start with the development of common policies and standards making the national legislation correspond to the international conventions like the Hong Kong Convention on ship recycling aimed at providing the safe and eco-friendly procedures. It has been shown that harmonizing of legal and operational framework in the South-Asian countries

where ship recycling is practiced might help to address regulatory loopholes that currently allow unsafe and polluting practices to continue, especially at the intertidal beaching yards (Razali et al., 2025). This harmonization would attract transparency and accountability and create trust between stakeholders in the country and foreign partners. Through a common way, these nations can develop identical standards of environmental risk management, employee health and safety, management of hazardous wastes, and implementation frameworks. Another way of preventing a race to the bottom where individual shipyards seek to undermine environmental standards in order to secure business would be regulatory design cooperation, which encourages compliance instead of evasion.

Along with aligning the policies, it is necessary to jointly invest in infrastructure and technical capacity to modernize ship recycling facilities. The experts posit that the basis of a sustainable and green ship recycling is the upgrade of physical infrastructure, including effluent treatment facilities, dust and emissions control facilities and codified material segregation facilities. Not only do these upgrades minimize pollution to the environment, but they also make recycling yards more competitive on the international markets where greater focus on environmental standards is set to dictate the business opportunity. Government-to-government, technical university to vocational training institution partnerships and industry-to-industry can create human capital in terms of certified training courses on safe dismantling methods, environmental risk analysis and sophisticated technologies in recycling. In Pakistan, policymakers have been recommended to set up specific funds on modernization and climate finance to cater to such transitions, and it has been highlighted that investment in technological and human capital is also required to support sustainable practices (SDPI, 2025).

Having a regional certification system might also enhance the consistency of regulation and increase the environmental and labor standards. With a unified set of criteria of compliance by the region, imposed by common audits and regular evaluations, the ship recycling facilities can show objective changes in the sustainability performance. Such a model, where the compliance is checked against the accepted standards would not only inspire the South Asian shipyards to improve, but also bring them nearer to global standards using the tools like the EU Ship Recycling Regulation. Sustainable production and recycling research proves that tough certification programs augment stakeholder confidence, diminish negative effects, and provide global back up to local producers in search of credibility (ElMenshawy, 2024). Additionally, the application of the principles of the circular economy maximization of material recovery, remanufacturing of components, and minimization of waste of resources have been suggested as a way to convert the ship recycling industry into a cleaner and more resource-efficient industry.

Notably, the social aspects of sustainability should also be involved in regional cooperation. By adopting the

conceptualization of environmental justice in policy formulations, communities facing the impacts of ship recycling contamination, as well as those workers who are faced with dangerous workplaces, will be incorporated in the decision-making. The ship recycling sector in South Asia already creates the impact on the economies and livelihoods of nations; in Bangladesh, Chittagong shipyard has up to half of the annual steel demand in the country, where hundreds of thousands of people work (Wikipedia contributors, 2024). Regional solidarity would improve social cushions as they would create common norms on worker rights, health insurance, and career growth and development and surpass minimal compliance to really sustainable worker outcomes. This strategy is also reminiscent of the recommendations of a just transition in global industries where the socioeconomic and environmental goals are co-produced (Circular Economy Initiative, 2025).

Conclusion

This study finds that due to the ship-breaking and recycling industry, large amounts of hazardous waste are disposed-off into South Asia (India, Bangladesh and Pakistan) coastal water damages the marine environment, and causes of pollution. The level of harm is not addressed in this study so as to avoid diverting the legal framework of this paper to more of a biological one. The disposal of wastes, the pollution from land-based sources, and oil pollution from vessels are the main threats to sustaining a healthy environment around the world. The recent developments in the industrialization field the commencement of ship-breaking and recycling industries is also one of the major causes of marine pollution because the huge amount of hazardous waste is being disposed-off into the oceanic water which may adversely affect the ecosystem of marine. The disposal of hazardous and toxic wastes from the ship-breaking and recycling industries into the marine water can be controlled and regulated only by imposing **strict** laws. The Pakistani ship breaking industry is covered by waste trade law and international environmental laws, most importantly the Basel Convention. Pakistan has to implement the Environmentally Sound Management (ESM) standard practices of controlling hazardous wastes as laid down in the Basel Convention and the Technical Guidelines as a state party to the Convention. Additionally, according to the Hong Kong Convention, the endorsement of facilities, supplies for their operations as well as a ship recycling plans for every ship also becomes obligatory for Pakistani ship workers. In order to fully maintain its competitiveness, seek early compliance, and comply with the obligations placed on Pakistan by the international legal framework, and given the many negative impacts of the ship-breaking industry on the environment, existing laws related to this industry and environmental laws should be amended accordingly or separate legislation should be adopted to address the labor, environmental and all other aspects of the ship-breaking industry. Along with the provisions mentioned above, such a proposed legal framework should be clearly defined the roles and responsibilities of the related stakeholders as it would be difficult to

operate the ship-breaking and recycling industry without a clear legislative framework.

Recommendations

The suggested measures that can be offered to improve the implementation and the long-term sustainability of the regulatory and legislative frames that the establishment of Green Yards in South-Asian countries is the following:

- The process of decarbonization can also be expedited by specifying that each metric ton of recycled ferrous scrap should reduce the resulting carbon dioxide emissions of about 1.6 tons of CO_2 in the production of carbon steel, and about 5 tons of CO_2 in the production of stainless steel, compared to the production of primary material.
- Material disposal strategic independence should be strengthened, which will reduce reliance on the imports of iron ore and coal and, therefore, reduce the supply chains.
- There is a particular need to develop green-skilled and non-specific workforce capacities of modern ship recycling plants and the green steel industry, and, thus, create jobs in engineering and environmental management, as well as in highly professional manufacturing fields.
- The European leadership should be reinforced and maintained by strengthening the European Union position as a leading power in the environmental protection, health and safety in workplaces, and circular economies governance.

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