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SHIP RECYCLING IN PAKISTAN: PROSPECTS, CHALLENGES AND WAY FORWARD

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FOREWORD

Globally, the shipbreaking industry along-with its value chain is considered as a vital part of maritime sector and the country's economy at large. Shipbreaking operations encompass the conversion of the end-of-life ships into recyclables and various articles for further use. Although the idea of recovering maximum materials from decommissioned vessels to be incorporated in other industries and operations to promote circular economy and industrial symbiosis seems to be ideal on paper, the ground realities are far from ideal. Shipbreaking operations are considered hazardous for workers and the environment alike. The materials and processes employed to recycle ships result in the emission of dangerous chemicals and fumes, which are continual threat to the workers, along with the nature of operations, which usually is an occupational risk and causes serious harm to employees. Similarly, ineffective handling, storage, and disposal of ship wastes such as residual oil, along with their haphazard dumping in the surrounding environment where the ship is being broken causes serious damage to the delicate coastal and marine ecosystems, while simultaneously polluting the workplace for workers. The very nature of shipbreaking operations and the lack of effective operational framework call for the need to employ suitable regulations and technologies to ensure the sustainable functioning of the industry worldwide.

To put things in perspective, there are five countries formally involved in major shipbreaking operations including India, Pakistan, Bangladesh, China and Turkiye, with some percentage of the activities happening in the European Union (EU). Statistics show that 68 percent of global ship breaking activates happened in the aforementioned south Asian countries, making this region the global centre of shipbreaking operations. Pakistan, hosting major shipbreaking operations since the pre-independence colonial period, ranks third in terms of shipbreaking operations involving number of ships and tons of scrapped material. Shipbreaking operations at Gadani have proven to be the most lucrative industry in Balochistan. Apart from being a source of employment to thousands of Pakistanis, the operations contribute majorly to the national steel demand. Despite of these contributions, among many others, the industry does not get its due attention from the government and civil society alike as it is still an informal sector. This negligence supports the claim that the reason South Asia, precisely Pakistan, is a hub for shipbreaking operations is the low wages, disregard of labour laws, and obliviousness to the environmental, health and safety practices. The disregard to ecosystem destruction and health and safety risks of employees by not incorporating relevant regulations in these countries make it easier for the global ship owners to earn maximum benefit from their end-of-life vessel as they don't have to pay up the ecosystem destruction and health costs. One of the challenges faced by the shipbreaking industry in Pakistan is the disinterest in sanctioning global conventions and regulations concerning the shipbreaking operations, such as the EU regulations and the Hong Kong Convention. While this has resulted in an immense ecological and socio-economic loss already, the global ship owners now have reservations sending their vessels for recycling to Pakistan due to this. Additionally, the industry has seen decline in ship recycling activity at Gadani Yard, which is due to the fiscal / taxation policies of current governance regime at federal level in Pakistan. Earlier resistance towards the idea of Public-Private Partnership is also a reason the industry is in shambles.

The industry is running on ad-hoc mechanism due to absence of specific policy, legal, institutional framework and / or procedures in place. As far as the constitutional guarantees are concerned, general legal provisions in Pakistan cover the shipbreaking activity in a number of ways but in scattered form and no single comprehensive legal

arrangement exists. The national and international stakeholder groups have concerns regarding availability and the implementation of rules and regulations to deal with the hazardous waste, environmental protection and the aspects of occupational health & safety (OHS) associated with the end of life ships. For instance, Pakistan is not signatory of Hong Kong Convention, and its ratification is still awaited at the government level.

This report highlights and evaluates the aforementioned issues in detail, along-with providing suitable recommendations for each of them based on observations and interviews during site visit, including the recognition of operations at Gadani as a proper industry with an incentive based national ship recycling policy, a regulation and a "green ship recycling strategy", to allow for the needed transition towards clean and safe ship recycling; resource allocation; and yard relocation. The crux of consultative sessions is presented vis-à-vis the need of domestic/international regulations and policy gaps i.e. the need of sector-specific regulations, revised taxation policy, and infrastructural development are discussed by reviewing the global scenarios regarding shipbreaking operations and the future of the industry in Pakistan. We hope that the essence of this report i.e. the recommendations, reach far and wide to policymakers and other stakeholders to result in compliance and developments in the Ship Recycling industry of Pakistan.

VICE ADMIRAL ABDUL ALEEM (R) HI(M)
Director General, NIMA

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This report is an original research work carried out by NIMA's research team. I appreciate the efforts of the research team members (Mr. Fida Hussain, Mr. Imtiaz Hussain and Ms. Sadia Abdullah) for successfully completing this comprehensive research study with deep insight, and the remarkable research outcome became possible only due to the energetic and enthusiastic participation of all the team members.

I admire the leadership and catalytic role of DG NIMA Vice Admiral (R) Abdul Aleem HI(M) that enabled the team to carry out an authentic work on a theme significant for the development and prosperity of the maritime sector and also for the economic stability and sustainability of the overall value chain associated with Ship Recycling industry. I also acknowledge his intellectual contribution in framing the questions, developing the study proposal and devising a timeline.

I express my gratitude to NIMA officials at Islamabad and Karachi including Commodore (R) Ali Abbas SI(M), Commodore (R) Baber Bilal Haider SI(M), Commander (R) Muhammad Akhtar TI(M) PN, Lt. Commander Mukhtar Ahmed PN, Commander Sajjad Ahmed Khrbey PN and Commander Muhammad Akhtar PN, who extended all possible support for this research study. I wish to express my appreciation for the dedication of Mr. Muhammad Asif, UDC NIMA who assisted in desk related work.

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I also express my gratitude to the officials of Federal Ministry of Climate Change (MoCC) including Dr. Zaigham Abbas for sharing relevant information related to Multilateral Environmental Agreements, which was especially helpful for converting the findings into a useful and relevant report.

I hope that the findings of the report will be helpful for the stakeholders to adopt the desired strategy, policies and actions in shaping the future of the Green Ship Recycling in Pakistan.

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ACRONYMS

BDA	Balochistan Development Authority
BEPA	Balochistan Environmental Protection Agency
BOO	Build – Own – Operate
BOOT	Build – Own – Operate – Transfer
BOT	Build – Operate – Transfer (BOT)
CA	Competent Authority
CIP	Compliance Implementation Plan
CPEC	China-Pakistan Economic Corridor
DBF	Design – Build, Design – Build – Finance
DBFM	Design – Build – Finance – Maintain
DBFO	Design – Build – Finance – Operate
DBMFO	Design – Build – Finance – Maintain – Operate
DCMF	Design – Construct – Maintain – Finance
EIA	Environmental Impact Assessment
EMS	Environmental Management System
ESM	Environmentally Sound Management
ESM	Environmentally Sound Method
EU	European Union
EURR	European Union Ship Recycling Regulation
FBR	Federal Bureau of Revenue
FOC	Flag of Convenience
HKC	Hong Kong International Convention
HSE	Health, Safety, and Environment
IEE	Initial Environmental Examination
ILO	International Labour Organization
IMO	International Maritime Organization
ISO	International Organization for Standardization
JVs	Joint Ventures
KICT	Karachi International Container Terminals
KPT	Karachi Port Trust
LPG	Liquefied Petroleum Gas
MEA	Multilateral Environmental Agreement
NEQS	National Environmental Quality Standards
NIMA	National Institute of Maritime Affairs
O&M	Operation & Maintenance
OECD	Organization for Economic Cooperation and Development
PBS	Pakistan Bureau of Statistics
PFI	Private Finance Initiative
PICT	Pakistan International Container Terminals
POP	Persistent Organic Pollutant
PPE	Personal Protective Equipment
PPP	Public Private Partnership
PPPA	Public Private Partnership Authority

PPPAA	Public Private Partnership Authority Act 2017
PRM	Pakistan Re-rolling Mills
PSBA	Pakistan Shipbreaking Association
PSMA	Pakistan Steel Melting Associations
QMS	Quality Management System
SAPT	South Asia Pakistan Terminals
SBP	State Bank of Pakistan
SRFP	Ship Recycling Facility Plan
SRP	Ship Recycling Plan
TSDF	Treatment, Storage and Disposal Facility
UNCLOS	United Nations Convention on Law of the Sea
UNEP	United Nations Environment Program

IMPORTANT TERMINOLOGIES FOR SHIP RECYCLING SECTOR

(i) **Air bag Method**

In Ship Recycling, this method requires the ship to be winched onto dry land through a slipway of inflatable rubber bags. When the ship is settled on dry land over a queue of keel-blocks then air bags are detached. Usual cutting practices then take place. The principle of this method is altering the sliding friction into rolling friction. Winches, marine airbags and rigging are the basic instruments required for carrying out air bag method.

(ii) **Along-side Parking**

The ship is halted in a sheltered harbor on a quay or wharf and dismantled in a vertical or top down manner piece by piece. Pieces are removed through cranes starting with the upper pieces till the lowest part of the hull. The remnant is then taken to the dry dock for final cutting.

(iii) **Beaching Method**

In this method, the ships are beached during spring tides in the inter-tidal zone by their own power or by tow. The size of the ship to be recycled is restricted by the beach slope, tidal range and material of the beach (a beach consisting of rocks or coarse causes hurdles and not suitable for beaching of the ship).

(iv) **Berthing Method**

Berthing is a method of parking which involves breaking of ships berthed along quays. The ships are tied alongside a quay and cut into pieces while floating. Detachable materials/ items are removed and cutting process takes place using oxygen-acetylene or oxygen-LPG torches.

(v) **Cold Work**

Cold work refers to a working situation in which there are no sources of ignition present.

(vi) **Dry-Docking Method**

In this method, ships are broken up within docks, which can be either graving or floating docks. The ship is properly positioned after moving into a graving or a submerged floating dock. If ship is moved inside a graving dock then the dock gates are shut and the water is driven out. In case of a floating dock, the dock is elevated and bringing the ship out of the water. Afterwards the ship is cut as per tradition.

(vii) **Hot work**

"Hot work" means riveting, welding, flame cutting or other fire or spark-producing operation.

(viii) **Hot work permit**

A hot work permit is a permit that is needed in some countries and on some jobsites, in order to perform work that involves hot work.

(ix) **Hot work in confined spaces**

Hot work shall not be performed in a confined space until a designated person has tested the atmosphere and determined that it is not hazardous.

(x) **Initial Environmental Examination (IEE)**

Initial environmental examination (IEE) means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect.

(xi) **Light Displacement Tonnage (LDT)**

Light Displacement Tonnage (LDT) is the mass of the ship excluding cargo, fuel, ballast water, stores, passengers and crew.

(xii) **Melter**

Melter is an installation or factory for melting a metal or wax etc. OR a person a worker who melts substances.

(xiii) **Re-rolling Mills**

Steel Re-Rolling Mill is one of the types of steel rolling mills used in rolling mill industry. In rolling mills, different kinds of metal objects are rolled to give them desired shape, thickness, density and curves. These are mainly used to roll or process products made from Steel, Copper, Iron, Aluminium etc.

(xiv) **Slip-way Method**

In slipway method, the ship or the vessel is driven on to the concrete/masonry slipway which connects shore and the sea. Typically, this method is adopted in areas with easily predictable low tidal flow. Normally, sections from the ship are removed using remote cranes and the ship is progressively dragged on the dry land as it is lightened. Since the tide is constant, predictable and steady, water front is present where the access and lifting activities take place

(xv) **Smelter**

Smelter is an installation or factory for smelting a metal from its ore OR a person engaged in the business of smelting.

(xvi) **Spring Tide**

A tide just after a new or full moon, when there is the greatest difference between high and low water.

EXECUTIVE SUMMARY

THE CONTEXT OF THE REPORT

1. The ship breaking and recycling industry (SBRI) utilizes the end-of-life ships for converting them recyclable and other useable items. On one hand, ship recycling offers the most environmentally sustainable way of disposing of old vessels, with virtually every part of the hull and the machine complex being reused or recycled as scrap metal. While the flip side has concerns on clean and safe operations at most of the facilities located worldwide. Although the industry is beneficial from a life-cycle assessment point of view, over the years it has gravitated toward countries with low labor costs, weak regulations on occupational safety, and limited environmental enforcement.

2. This 'global trend' has rendered serious concerns of the stakeholders regarding a number of hazards associated with the end-of-life ships, which need to be dealt by putting in place proper social and environmental safeguards. Currently, the global center of the ship breaking and recycling industry is located in South Asia, specifically Bangladesh, India, and Pakistan. These three countries account for 70–80 percent of the international market for ship breaking of ocean-going vessels, with China and Turkiye accounting for most of the rest. Only about 5 percent of the global volume of such vessels is scrapped outside these five countries.

3. Gadani ship recycling industry is considered as a vital industry in the maritime economy. Facts reveal that the ship recycling industry of Pakistan had significant contribution both in terms of steel tonnage and catering dependent population size of 3.5 million household persons through its direct and indirect value chain involved. In recent years, it touched its peak during FY 2014-15.

4. The industry has a long history and witnessed its golden days in 1980's. The geographical location of Pakistan's recycling Yard and the nature of beach have given it a competitive advantage over other ship recycling industries in the region. However, the industry lost its standing to other regional yards due to various factors. Currently, it is ranked 3rd after India and Bangladesh and is struggling to survive. The factors that led to this decline include negligence by the regulator, lack of ownership by the Federal and Provincial Governments, absence of well-defined governing policy and regulations, no parent ministry, not declared as an industry, currency depreciation, unfair advantage in taxation to imported re-rollable scrap compared to ships brought for scrap, obsolete ship breaking techniques and poor working conditions, stakeholders' capacity gap, non-adherence to international obligations and inadequate infrastructure etc.

5. It is feared that if the remedial measures are not taken timely and comprehensively, the survival of the industry will remain uncertain. On the other hand, if the factors responsible for the decline are timely addressed, the industry has full potential to revive its glorious past and play an active and significant role in national economy.

6. The key problem identified at the time of commissioning this study was that Pakistan's shipbreaking industry was facing a continuous downward trend

since the beginning of FY 2018-19. Along with the jump in dollar exchange rate, fiscal policies of the federal government and additional taxation by Balochistan government were considered the key drivers for downward trends.

7. To rationalize the problem, the primary research question was 'how to promote green ship recycling in Pakistan', with breakdown in specific queries in order to study and understand the overall processes and dynamics of the industry at Gadani Yard and the value chain involved. Therefore, the overarching objective of the study was to carry out an in-depth appraisal of ship recycling in Pakistan to make it most competitive, profitable and efficient industry. Following was the scope of the study:

    - Role of Ship Recycling towards Socio-economic and Industrial Development in Pakistan
    - Ship Recycling Site Analysis
    - Ship Recycling process analysis at Gadani Yard
    - Value chain analysis by taking stock of activities at Rerolling Mills
    - Analysis of tax revenue generation
    - Drivers of Declining Trends for Ship Recycling at Gadani
    - Analysis of International Obligations for Green Practices
    - Governance of Ship Recycling in Pakistan (Analysis of Regulatory and Institutional Framework)
    - Stakeholders' consultation – for Identification of long-term and workable solutions for institutional framework and requirements of Green Ship-Recycling
    - Govt's support towards promotion of Ship Recycling in Pakistan
    - Workable solutions with analysis of alternatives for infrastructure development at Gadani Yard

8. Based on basic research queries and overall scope, this study was divided into different sections and subsections for in-depth analysis. Each sub section's methodology employed various suitable research tools, which are mostly mentioned in respective sections of the report. Overall, the research work of each section was carried out firstly by taking into account a range of relevant research techniques and tools such as content analysis, collection of primary data through expert / key informant interviews by using qualitative questionnaires, in-person discussion meetings with relevant stakeholders by visiting office bearers and members of Pakistan Ship Breakers Association (PSBA) at Gadani Yard, members of the trade unions and workers at Gadani Yard, and officials of Re-rolling Mills at S.I.T.E. Karachi.

ROLE OF SHIP RECYCLING TOWARDS SOCIO-ECONOMIC AND INDUSTRIAL DEVELOPMENT IN PAKISTAN

Economic Contribution

9. It is pertinent that this industry contributes equally to all the three dimensions i.e. steel demand, tax revenues and employment generation. The overall country's steel demand is approximately 5 to 5.50 million tons in which on average 1.5 million tons is contributed by the ship recycling (excluding the abnormal period). The ship recycling industry has also paid a huge amount of 16.3 Billion rupees to Government of Pakistan in account of taxes for FY 2017-18. The industry has imported high amounts of 1.7 million metric tons of ship steel in FY 2014-15, whereas the industry has imported a lowest tonnage in FY 2019-20 i.e. an amount of 0.1 million metric tons.

Employment Opportunities

10. Gadani ship recycling industry is playing an important role in the provision of employment opportunities and livelihood to multiple segments of the society. It is providing employment opportunities at Gadani yard and in the industries directly related to the yard. It also provides indirect employment opportunities at Pakistan re-rolling mills and ancillary industries. In the peak year, the ship recycling industry has provided highest employment opportunities in form of direct and indirect employment to approximately 490,951 personnel. The employment mix of the industries has multiple ethnicities and diversities across the country as the workers belong to Khyber Pukhtunkhwa, Punjab, Sindh, Balochistan and Gilgit Baltistan.

11. In the peak year, the industry provided direct employment opportunities to approximately 24,000 personnel as under:

    a. About 22,500 persons who worked directly in the Gadani yard.
    b. About 862 employment opportunities to the trucking sector.
    c. About 100 employees working in the hoteling operating at Gadani yard.

12. The Gadani yard has also provided indirect employment opportunities to approximately 467,488 personnel through various sectors as under:

    a. Re-rolling mills employed the highest number of 30,160 employees.
    b. Transportation industry, which supplies the ship steel from Karachi to countrywide provided the highest number of approximate 430 employment opportunities.
    c. The average miscellaneous steel store which utilizes the re-rolling mills steel provided the highest number of 25,000 employment opportunities.
    d. The main user of the re-rolling mills steel is the construction industry which has provided a highest number of 156,642 employment opportunities to the workers engaged in construction activities.
    e. The construction industries, which require steel are supplied through trucks which further provided employment opportunities to 208,856 persons.
    f. The ship steel is also used by the smelting and melting industries and provided 22,900 employment opportunities.
    g. Ship steel further provides raw materials and machinery parts and other industrial units and provided employment opportunities of 22,500.

h. Lastly, the wood and agree items recovered from the ships have also provided a number of 1000 employment opportunities.

Sectors Associated in Value / Supply Chain

13. Steel collected from the ship recycling industry at Gadani is almost used in all industries across the country ranging from construction to end users' products. The value and supply chain of Ship Recycling Industry involves Re-rolling mills, Smelters & Steel Melting units, wood & agree items, transportation and other ancillary industries including machinery parts & industrial units.

14. Primarily, the re-rolling mills are the main beneficiary of ship steel in the country. The re-rolling mills convert the ship steels into beneficial forms like bars which are used in the construction industry. The main supply of ship steel goes to the re-rolling mills in Hub located in district of Balochistan and Karachi. The Gadani steel also goes to Lahore, Wazirabad, Sialkot, and Gujranwala in Punjab. The ship steel also goes to Gujjar Gari, Chakdara, Peshawar in Khyber Pakhtunkhwa, and Quetta in Balochistan.

15. The ship steel is ultimately used by the end consumers in form of steel cutlery, fan industry, medical instruments, machinery (agricultural and others), garters for the construction of houses, concrete slabs etc.

SHIP RECYCLING SITE ANALYSIS

16. The geographical location of Ship Recycling industry at Gadani has given a competitive advantage over others in the region and it has the potential to lead in South Asia. In recycling process, the first step is to park / or place the ship at a ship dismantling facility area by employing at suitable method. However, this procedure varies from region to region depending upon beach aesthetics and available resources. There is a variety of methods used to park / or place a ship prior to ship breaking process, which includes berthing, dry-docking, alongside, beaching and lifting towards dry land over a slip-way or through marine air bags. Beaching method is practiced not only on the shoreline of Gadani Ship Recycling Yard but also in Bangladesh and India as well.

17. Beaching Method for the end-of-life ships followed at different ship recycling sites in South Asia is dependent upon the suitability of geographical characteristics (beach slope, nature of soil, climate, tidal range, sea currents etc.), along with infrastructure, environment, legislation, capabilities of workforce and costs of the operation.

18. Gadani is particularly a low tide beaching yard with a tide level of 3.2m. High tide at Gadani beach comes at least once in a day while it takes many days for high tides to come in India. Hence, there is lesser waiting time for high tide in Pakistan which is beneficial as compared to India.

19. Sandy soil and high tidal ranges make Gadani a 'hotspot' for ship recycling. The slope of this low tide beach has two major impacts; reduction of the cost of transportation and time to break a ship. Deep sea and sandy beaches elevate the importance of Gadani yard for ship recycling process as ships are not required to wait due to the deep-sea beach. Silky sandy beach facilitates in

beaching process as the sand slips from under the ship, which aids in bringing it forward.

20. Economic operators want to stay at Gadani Yard considering it is the most suitable location for ship recycling and has vast space so the land is not a constraint for the size of ship to be broken. However, issue of land ownership and rights is present. During a focus talk with PSBA members, it was also revealed that stakeholders are not in favour of establishing shipbreaking yard at Gwadar under the China-Pakistan Economic Corridor (CPEC) as the cost of transportation would be very high as compared to Gadani. Moreover, the “ideal” characteristics of beach at Gadani cannot be matched with the nature of beach in Gwadar. An export-oriented facility may be developed at Gadani in order to take advantage of the Tax-Free Zone.

SHIP RECYCLING PROCESS AT GADANI YARD

21. Shipbreaking operations pose serious threats to the environment, health and safety of the workers as they have to bear miserable working and living conditions, if not properly managed. Clean and safe operations always remained a question mark for Ship Recycling activity on South Asian beaches, due to a number of reasons including improper compliance with environmental, safety and health measures at the workplace.

22. The shipbreaking procedure starts after a lengthy way for reaching the final destination at Gadani coast. Usually, end of life ships are bought through an intermediary who facilitates dealing between local yard and the international owner. These brokers are typically residing in Dubai, Hamburg or Singapore, having expertise in purchasing scrap ships from shipping companies with an aim to resell them. Change of flag into a convenient one is also a common practice. Loan is then received by the yard from local bank which is to be paid back in six months- approximate time needed for ship to be broken.

23. Primary way to break a ship is to cut it apart into numerous different parts prior to further breaking. During interviews at Gadani shipbreaking yard, it was revealed by the field supervisors that Ship Recycling Plan is not usually developed formally and it is in the minds of workers. However, after surveying various different shipbreaking plots at Gadani yard, a process flow diagram was attained from one plot owner (See figure 4.1, Section 4) and there are emerging trends seen towards getting facility areas certified through ISO standards. Table 4.1 shows environmental, health and safety management and monitoring plan of M/S Salam International Company operating at Gadani shipbreaking yard. This plan is technically sound good and needs to be adopted at all recycling facilities at Gadani Yard. However, such a plan is being followed for all ships for breaking purpose at Gadani, but in an informal way. Generally, different methods are used to determine the air quality, drinking water, noise level, soil quality, hazardous environmental, health & safety management and monitoring plan of non-hazardous solid waste.

24. Parking/ placement of ship at facility area is the prerequisite step for ship recycling for which **‘beaching’** is the method used at Gadani Yard. The ship is set offshore by the captain, waiting for perfect time for beaching by its own power at maximum speed during high tide. The engine is shut down and the

ship is made steady by dropping the anchor. Once the ship is brought to its exact position within cutting zone, its inspection is done and oils are removed by experts to clear the tanks. To prevent explosions in the yard, the fuel tanks are completely drained by removing all the flammable materials. Primary cutting of ships into parts according to its structural design then begins by the workforce. The big parts are pulled onshore using motorized winches for secondary and tertiary cutting. As per requirement of Balochistan Environmental Protection Agency (EPA), a procedure of cold work permit followed by hot work permit is practiced for all cases of end-of-life Tankers arriving at Gadani Yard.

25. Storage areas, tanks and compartments of a ship may possess hazardous substances like oils, fuels, Asbestos, Lead, PCBs and other harmful wastes. In various cases, a facility will dispose of certain items due to the presumption that those items contain hazardous materials. Generally, waste materials are dumped in the nearby areas of the yard. In such circumstances, the employer is supposed to use suitable engineering controls to confirm the proper protection of workers from exposure involved in removal.

26. From past years, due to continuous criticism about poor working conditions and environmental damage resulted from shipbreaking; some of the Economic Operators are working to upgrade their facilities at Gadani Yard.

DRIVERS OF DECLINING TRENDS FOR SHIP RECYCLING AT GADANI

27. The Ship Recycling at Gadani is still an informal and neglected segment of maritime economy in Pakistan despite its significant contribution through value chain. The industry is running through ad-hoc mechanism due to absence of specific policy, legal, institutional framework and green practices in place. Due to negligence by the governments, the industry has not only experienced adverse situations but also a huge reduction in the tonnage imported per year. Earlier, the industry had been shut down up to 2008 due to the government's decision.

28. The Gadani ship recycling industry has been found to lack basic necessities for the workers and people living in Gadani. There is no provision of hospital, utilities and other basic facilities at Gadani Yard area. The industry is deprived of clean drinking water as well other primary facilities. Similarly, there is no provision of electricity, gas, cellular networks and hygienic living facilities at the yard.

29. Apart from the basic facilities, the industry has also been neglected by the federal as well as provincial governments. The ownership of the plots and working facility at the yards are uncertain due to the ownership by the landlords. There are 132 plots at Gadani out of which, 100 are owned by the landlords while remaining 32 are owned by the government. The absence of proper implementation of the rules and regulations of the federal and provincial governments has resulted in the discouragement of investments for ensuring best practices with clean and safe operations.

30. Additionally, the tax structure of the federal and provincial governments has also negatively affected the investment in the ship recycling industry at Gadani.

The federal and provincial governments have changed the tax regime on time-to-time basis, which has caused a reduction in the investments as quite visible with low tonnage import during the recent years particularly from FY 2018-19 onward. The increase in the value of dollar also decreased the Pakistani rupees value, which led to decrease in the tonnage imported per year. The main concerns of the PSBA members were the change in the policy of tax structures, increase in dollar exchange, the lack of infrastructural and basic facilities at the yard. The yard lacks basic facilities like clean drinking water, sanitation and proper residence etc. It is also found that the re-rollable scrap poses negative impact on the ship recycling industry.

31. The international obligations also have been noticed to have adverse implications for the import of ships for recycling at Gadani yard. The European Union (EU) regulations, Hong Kong Conventions (HKC), and Basel regulations unfavorably affect the import of ship for recycling purposes at the Gadani yard as these regulations encompass numerous requirements to be fulfilled for the import of EU flag carrier to the Gadani Yard. Whereas there is confusion about the applicability of various international conventions to Ship Recycling. Stakeholders demand for the ratification of HKC and compliance with national legal instruments.

GOVERNANCE OF SHIP RECYCLING IN PAKISTAN

32. The presence of more than hundred ship-breaking plots / facilities at Gadani Yard is an informal and neglected segment contributing significantly through its value chain to industrial economy of Pakistan for the last fifty years. The business-as-usual scenario depicts that this industry is running through ad-hoc mechanism due to lack of specific policy, legal, institutional frameworks and/or regulatory procedures in place. Historically, the important checks were limited to custom clearance, while environmental clearance added recently as legal instrument, which has outstanding issues due to cumbersome procedure and bureaucratic hurdles, as reported by the PSBA members.

The Baluchistan Ship Breaking Industry Rules, 1979

33. Considering location of Gadani Yard within the provincial jurisdiction of Balochistan province, an early attempt was made to formalize this industrial segment through "*the Baluchistan Ship Breaking Industry Rules, 1979*" made under section 30 of the "*Balochistan Development Authority Act, 1974*" of the Government of Balochistan. However, these rules were meant to empower the BDA and are very much limited to handle the leasing of government owned plots for ship breaking purpose at Gadani coast. There is a need to completely revise these rules by incorporating all aspects related to green ship recycling industry, and to bring these in line with international conventions and best practices.

Occupational Safety and Health in Ship Recycling

34. The fundamental rights provided by the *Constitution of Pakistan, 1973* to its citizens cover the workers in ship breaking sector activity in a number of ways. First and the foremost important element is the constitutional guarantee for

fundamental rights, which are applicable to the shipbreaking sector, but needs to be made more specific. While several laws dealing with occupational safety and health of labour exist in Pakistan, their applicability in ship recycling industry is wanting. There are several legal provisions related to the issues of 'occupational health and safety' (OHS), but there is a lack of single legal arrangement so as to deal the matter in a comprehensive manner.

35. It is quite interesting that the OHS related legislation in Pakistan has its roots to the colonial times, for example the 'Factories Act of 1934', the 'Labourers Act of 1934' and the 'Workmen Compensation Act of 1923'. After independence of Pakistan, legal provisions to operationalize the 'Workmen Compensation Act' were promulgated in 1961, the 'West Pakistan Hazardous Occupations Rules' in 1963, the 'Provincial Employees Social Security (Occupational Diseases) Regulations' in 1967, and the 'Labour Laws (Amendment) Ordinance' in 1972. In order to deal the issue through a single and comprehensive law, the Ministry of Labour and Manpower prepared a draft Act i.e. 'Pakistan Occupational Health and Safety Act' in 2018, but the draft has not yet been debated to have consensus at the level of relevant stakeholders.

Hazardous Waste and Environmental Protection

36. There are concerns regarding availability and the implementation of rules and regulations to deal with the hazardous waste, environmental protection and the aspects of occupational health & safety (OHS) associated with the end-of-life ships. Government of Pakistan promulgated the 'Hazardous Substances Rules 2003' under the umbrella of 'Pakistan Environmental Protection Act (PEPA) 1997'. Later, the Government of Balochistan Province promulgated 'Balochistan Environmental Protection Act (BEPA) 2012'. These federal and provincial legislations are applicable to the ship-breaking sector.

37. Ministry of Climate Change (MoCC) is the national focal point for the Basel Convention. The Ministry had conducted a detailed study on the generation of hazardous waste by the shipbreaking industry in 2016. During the study, it was estimated that the inventory of toxic landfill waste from shipbreaking yard and industrial area were 4320 and 500 metric tons per year and 5813 thousand metric tons per year respectively. The adoption of National Hazardous Waste Management Policy was approved by the federal government on 28th June 2022 to address the issues of hazardous waste management in Pakistan.

38. During the course of this study, it was assessed that the environment and occupational health and safety related legislation has weak enforcement and its compliance monitoring system is also not adequate. The temporary and contractual job arrangement in prevailing system of recruitment by the 'contractors' particularly at Gadani Shipbreaking Yard also undermines the fundamental rights of the labour. Most of the responsibilities related to environmental and labour issues were devolved to the provincial governments, while some important responsibilities are still under the federal government, following the decentralization process in Pakistan, which began in the year 2011 and being practiced as an outcome of the 18th Amendment in the national Constitution of Pakistan.

Institutional Procedures and SOPs in Vogue

39. Following important steps are observed for end-of-life ships coming to Gadani Yard:

a. Purchase and import of end-of-life ship.
b. Entry in Pakistani waters by furnishing information to JMICC.
c. Temporary Stay at Gadani Anchorage.
d. Beaching at Gadani Yard facility area.
e. Custom clearance.
f. Bow (Nall/Nose) cutting upon permission from Balochistan Environment Protection Agency (BEPA) – for ship stability.
g. Submission of Initial Environmental Examination (IEE) report to BEPA, under Balochistan Environmental Protection Act 2012 and its subsequent approval.
h. Removal of hazardous material, wood and agree items – after cold work permission from BEPA.
i. **Inspection of Tankers by Explosive Department:** Degasification, proper ventilation and clearing of tanks are pre-requisite prior to get hot work approval from BEPA against submitted IEE report. Department of Explosives, Circle Office Karachi, Ministry of Industries inspects the ship and issue an NOC which is subsequently submitted to BEPA for issuance of hot work approval.
j. Cutting operations after observing necessary approval from BEPA including hot work permission after clearance from Department of Explosives, Circle Office Karachi, Ministry of Industries in case of a Tanker.
k. **Waste Management:** There is no proper waste management practice in most of the ship recycling facilities at Gadani Yard.

Responsible Institutions

40. Balochistan Environmental Protection Agency (BEPA) and Balochistan Development Authority (BDA) have shared responsibilities regarding shipbreaking, in addition to various ministries on Federal level including the Ministry of Labour and Manpower, the Ministry of Maritime Affairs (MoMA), Ministry of Climate Change (MoCC) and the Social Welfare Department.

41. Based on the standard procedure in vogue, it is found that various legal provisions are fulfilled for environmental and safety related aspects pertaining to arrival, beaching and cutting of ships on the shores of Gadani. However, a lot more is needed to bring it at par with international obligations particularly HKC and EU Regulations for Ship Recycling.

INTERNATIONAL OBLIGATIONS FOR GREEN PRACTICES

42. Compliance of international obligations is critically important for the maritime sectoral economies. Conventions of United Nations including International Maritime Organization (IMO) are quite significant particularly for the Ship Recycling. Over the time, concerns have been expressed by the stakeholders at the national and international level over the environmental, health and safety standards in ship recycling industry, particularly in countries employing the beaching method of ship recycling, including Pakistan. Poor enforcement of regulations relating to this activity means that problems with local environmental pollution are common and incidents of workers' injury and fatality are high. It is

observed that there is a lack of clarity about the scope and application of different MEAs particularly the Prior Informed Consent (PIC) instrument under Basel Convention and the provisions of HKC.

Basel convention

43. The Basel Convention, adopted on 22 March 1989, deals with movement and disposal of hazardous waste. This is of particular concern to Ship Recycling as end-of-life ships comprise of an array of hazardous materials – such as asbestos, PCB and waste oils – which can have serious implications for the environment and human health if not managed properly. The Convention provides recommendations on procedures, processes and practices that must be implemented to ensure safe and environmentally sound practices. The Guidelines also advise on monitoring and verification of environmental performance.

44. Recognising that Basel controls may often be circumvented for ships going for recycling, IMO developed Hong Kong Convention (HKC) for exclusive guidance regarding green ship recycling. HKC's guidelines are comprehensive and supersedes the Basel Convention.

Hong Kong Convention (HKC)

45. HKC was adopted in Hong Kong, China, on 15 May 2009. The Convention elaborates in its articles and regulations a control system for ship recycling, which includes obligations for flag States, ship owners, recycling States and recycling facilities. Under the Convention, Parties are required to take effective measures to ensure that ship recycling facilities under their jurisdiction comply with the HKC. Ship recycling yards are required to provide a Ship Recycling Plan, to specify the manner in which each individual ship will be recycled, depending on its particulars and its inventory. Ships will be required to have an initial survey to verify the inventory of hazardous materials, renewal surveys during the life of the ship, and a final survey prior to recycling.

46. The Convention will only enter into force 24 months after the ratification by 15 States, representing 40 per cent of world merchant shipping by gross tonnage, with a combined maximum annual ship recycling volume not less than 3 per cent of their combined tonnage. HKC is not expected to enter into force before many years due to its strict criteria. So far, seventeen countries (i.e. Belgium, Denmark, Croatia, Spain, Estonia, France, Germany, India, Japan, Malta, Netherlands, Norway, Panama, Republic of the Congo, Republic of Serbia, Turkiye, Ghana) have ratified HKC, - the combined merchant fleets of which constitute approximately 29.77% of the gross tonnage of world's merchant fleet, and combined recycling volume of the Contracting States during the preceding 10 years is approx. 13.9 million tons i.e. 0.56%.

ILO Guidelines

47. Earlier to HKC requirements, the International Labour Organisation (ILO), a UN agency, had called shipbreaking one of "the most dangerous occupations" in the world. In March 2004, the ILO unanimously endorsed at its 289th session a set of criteria to govern the disposal of ships, for occupational safety and health in shipbreaking operations. Besides, on 31 May 2006, ILO adopted a

Convention on Promotional Framework for Occupational Safety and Health Convention (No. C187) which is also relevant. India, Pakistan and Bangladesh have not ratified ILO's C187 yet. GoP should implement clauses of ILO's C187 (2006) and ratify it.

EU Waste Shipment Regulation

48. Came in 2006. It bans all exports of hazardous waste to non-OECD (Organisation for Economic Co-operation and Development) countries and all exports of waste for disposal outside the EU/EFTA (The European Free Trade Association).

EU Ship Recycling Regulation (EU SRR)

49. European ship owners own 35% of the world fleet. Given the reason that a large percentage of these is being dismantled under conditions which are often harmful to workers' health and the environment, European Union promulgated EU Ship Recycling Regulation which was entered into force on 30 December 2013. All new and existing ships of 500 Gross Tonnage and above, either flying an EU Member State flag, or calling at an EU port, must comply with EU SRR. It closely follows HKC text and is designed to facilitate early adoption of HKC. It sets requirements for ship recycling activities, and includes environmental protection and occupational health and safety standards that go beyond the Hong Kong Convention.

50. From December 2018, large vessels flying the flag of an EU Member State may be recycled only in safe and sound ship recycling facilities included in the European List of ship recycling facilities ('the European List').

51. The European List was first established on 19 December 2016, and last updated on 11 November 2020 under Commission's decision EU 2016/2323. The European Commission has added several new yards to the List. With the new update, the European List of ship recycling facilities currently contains 46 yards, including 37 facilities in EU Member States, 8 facilities in Turkiye and 1 facility in the USA. It also contains 36 more applications under certification process; 19 Indian companies, 4 from China, 2 from USA and 11 from Turkiye. None of Pakistani or Bangladeshi company has applied so far.

52. The EU Regulation would likely influence operations at Gadani Yard to a considerable degree, considering the past trends of EU ships' arrival at Gadani. Generally, flags are changed for end-of-life-ships through flag of convenience such as Panama, Palau, Samoa, Marshal Island etc. However, with growing pressure from EU states against such practices of flag change, the impact would likely be more at Gadani Yard considering the global share of EU state's fleet i.e. 35%.

Inclusion in EU List

53. EU SRR Article 15(4) introduces a two-step inspection and verification regime. There is a requirement of compliance by ship recycling facilities as set out in Article 13 and certification through *a s*ite inspection by an **independent verifier** with appropriate qualifications. Companies owning or operating a ship recycling facility need to ensure that it is independent and has the necessary

qualifications. Following is the list of classification societies which are recognized / accredited by the European Union:

a. American Bureau of Shipping (ABS)
b. Bureau Veritas SA
c. China Classification Society (CCS)
d. Croatian Register of Shipping (CRS)
e. DNV GL AS
f. KR (Korean Register)
g. Indian Register of Shipping (IRCLASS)
h. Lloyd's Register Group LTD (LR)
i. Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK)
j. Polish Register of Shipping (PRS)
k. RINA Services S.p.A.
l. Russian Maritime Register of Shipping (RS)

54. While individual Gadani Ship-Recycling Facilities should bear the expenses, Government should facilitate their inclusion in European List by patronizing the process through engagement of an approved classification society. Bahria Classification Society may strive for its inclusion in European List of classification societies.

Preparedness for International Obligations and Green Ship Recycling Operations at Gadani Yard

55. Economic Operators are trying to comply with national legislation and international obligations including the provisions of the Hong Kong Convention (HKC), EU Regulations and other multilateral environmental agreements by achieving certifications of ISO-14001, ISO 9001, ISO 18001 and ISO 30000.

56. During consultative sessions of NIMA Officials with relevant stakeholders held in January 2021 at Karachi and a subsequent session at Gadani Yard during July 2021, PSBA members showed their resolve towards ratification of Hong Kong Convention and supported the efforts by Government of Pakistan to ensure early compliance strategy for green ship recycling. This is a welcome development for ship recycling sector of Pakistan.

57. The PSBA members reiterated their stance in the recently held seminar / webinar by NIMA on 27 October 2022. During the webinar, Mr. Asif Ali Khan, Vice Chairman Pakistan Ship Breaking Association (PBSA) told that most of the requirements as per the HKC are already being complied at Gadani. The number of casualties at Gadani are almost negligible. He appreciated the efforts made by the Ministry of Climate Change (MoCC) with regards to Treatment Storage and Disposal Facilities (TSDF). He said that Pakistan is going on the right path for the early implementation of ratification of Hong Kong convention.

Ratification by Pakistan

58. While Pakistan has signed and ratified Basel Convention, it is neither signatory nor has ratified the HKC. Prime reasons for non-ratification of HKC attributes to absence of any road map by the concerned government quarters and businesses authority in this regard. The lack of interest to invest by the

economic operators, inadequate capacity of the actors and issues pertaining to land rights for the public as well as privately owned plots at Gadani Yard; have further slowed the process. In a recently held seminar / webinar by NIMA on 27 October 2022, Secretary Ministry of Maritime Affairs (MoMA) assured the participants that the MoMA has been successful in creating more clarity on the subject matter particularly in the context of Hong Kong convention for safe and environmentally sound recycling of ships.

THE WAY FORWARD TO GREEN SHIP RECYCLING – RECOMMENDATIONS

59. Following are recommendations pertaining to compliance with International Obligations:

a. Pakistan needs to ratify Hong Kong Convention, which sets the global standards for safe and environmentally sound ship recycling. In this regard, Government of Pakistan (Ministry of Maritime Affairs) is to make a comprehensive action plan to ensure that all legal frameworks, environmental and occupational safety requirements and best industrial practices required under the ambit of HKC are timely and properly implemented before the Convention is enforced.

b. GoP needs to implement clauses of ILO's C187 (2006) and ratify it. There is no harm to ratify it along-with HKC as both will be complementing each-other.

c. There is also a need to get certified ship recycling facilities under EU Regulation.

d. Bahria Classification Society may strive for its inclusion in EU accredited classification societies.

60. Following are recommendations pertaining to Policy, Legal and Strategic Measures:

a. The Federal Government needs to declare this informal sector as an "Industry" with an incentive based National Ship Recycling Policy including required Regulations and a "Green Ship Recycling Strategy", to allow for the needed transition towards clean and safe ship recycling.

b. It may be placed under the Ministry of Industries with a strong connectivity with Ministry of Maritime Affairs.

c. There is a dire need for sector-specific regulations that deal with decent work practices and conditions, along-with clean, green and safer ship recycling activities, which should be in accordance with the national legislation as well as international obligations. These new instruments must take into consideration the occupational safety and health of workers, labour inspections and job security to the yard workers to ensure the overall safety and progress of the industry.

d. Balochistan Environmental Protection Agency (BEPA) needs to ensure environmental compliance against the mandatory requirements as part of approval for Initial Environmental Examination (IEE).

e. As part of Balochistan Environmental Protection Act, there is a need to develop and implement a sector specific regulation and detailed guidance, alike IEE/EIA Regulation 2000 and its guidelines, for the operational aspects of ship-recycling process at a facility area.

f. The federal government needs to decrease the taxation and apply fixed tax method on the ship recycling industry in Pakistan, by simplifying the tax structure and providing ease of doing business.

g. Pakistani beaches and conditions, especially at Gadani, are suitable for recycling the ships through beaching method. However, there is a need to adopt the modern techniques and well defined SOPs and trained manpower to bring it at par with global standards. This would not only improve the work efficiency but will also preclude the dangers to environment and occupational safety. Therefore, the Federal Government is to set the policy guidelines for ship recycling through beaching method at Gadani by incorporating the aforementioned measures.

h. So far, the industry is running through ad-hoc mechanism due to absence of specific policy, legal, institutional framework and / or procedures in vogue. Therefore, there is a need to have comprehensive instructions to deal with all aspects of Ship Recycling. This may include federal and provincial rules as well as international obligations, and requirements of various national institutions.

i. Pre-determined SOPs for monitoring and responding to various contingencies need to be put in place. This should cover all scenarios from entering of a ship into Pakistani waters to beaching at Gadani Yard etc. Continuous monitoring should be adopted by all relevant institutions in order to avoid any other similar issue in future.

j. Since JMICC related SOP for the entry of ship into Pakistani waters is not documented, a procedure for the functional aspect of JMICC should be laid down properly.

k. In the context of CPEC, an export-oriented ship recycling facility may be developed at Gwadar which would be having more prospects considering the Free-Zone status of the Gwadar.

61. Following are recommendations pertaining to provision of Infrastructure and other Allied Facilities:

a. Provision of required infrastructure and basic amenities at Gadani Ship Recycling Yard by the federal and provincial governments.

b. Provision of adequate healthcare facilities to the workers and an ambulance service by the federal and provincial governments.

c. Government needs to conduct a meaningful consultation with relevant stakeholders for viable solution of necessary infrastructure related to Ship Recycling process-based operations.

d. The PSBA members are very much willing to enter into public-private partnership. For the purpose, government needs to provide green incentive scheme, which may be materialized through tax waiver by adopting a green ship recycling policy and maintaining the competitive edge of ship steel over the import of re-rollable steel.

e. The federal government needs to settle the land-rights for Gadani Ship Recycling Yard with provincial government as well as private plot owners.

62. Following are recommendations pertaining to clean and safe operations at Gadani:

a. Establishment of enhanced coordination mechanism between the federal and provincial government of Balochistan in order to ensure clean and safe operations at Gadani Ship Recycling Yard.

b. Technical training, capacity building and creating awareness amongst the workforce to ensure safe and clean operations.

c. Shipbreaking yard owners should be educated regarding the requirement of HKC to ensure their smooth compliance prior ratification of HKC for meeting international standards of ship recycling processes.

d. PSBA members are required to prepare their facility areas on HKC requirements.

Section 1
The Context of the Report

SECTION 1: THE CONTEXT OF THE REPORT

1 INTRODUCTION

1.1 Background / Rationale

The ship breaking and recycling industry (SBRI) utilizes the end-of-life ships for converting them recyclable and other useable items. On one hand, ship recycling offers the most environmentally sustainable way of disposing of old vessels, with virtually every part of the hull and the machine complex being reused or recycled as scrap metal. While, the flip side has concerns on clean and safe operations at the most of the facilities located worldwide. Although the industry is beneficial from a life-cycle assessment point of view, over the years it has gravitated toward countries with low labor costs, weak regulations on occupational safety, and limited environmental enforcement. This 'global trend' has rendered serious concerns of the stakeholders regarding a number of hazards associated with the end-of-life ships, which need to be dealt by putting in place proper social and environmental safeguards. Currently, the global center of the ship breaking and recycling industry is located in South Asia, specifically Bangladesh, India, and Pakistan. These three countries account for 70–80 percent of the international market for ship breaking of ocean-going vessels, with China and Turkiye accounting for most of the rest. Only about 5 percent of the global volume of such vessels is scrapped outside these five countries [1]. Figure 1.1 provides detail on number of ships dismantled in South Asian countries since year 2009. Trends in figure 1.1 are not encouraging for these countries, which are due to a number of challenges for ship dismantling activity on South Asian beaches.

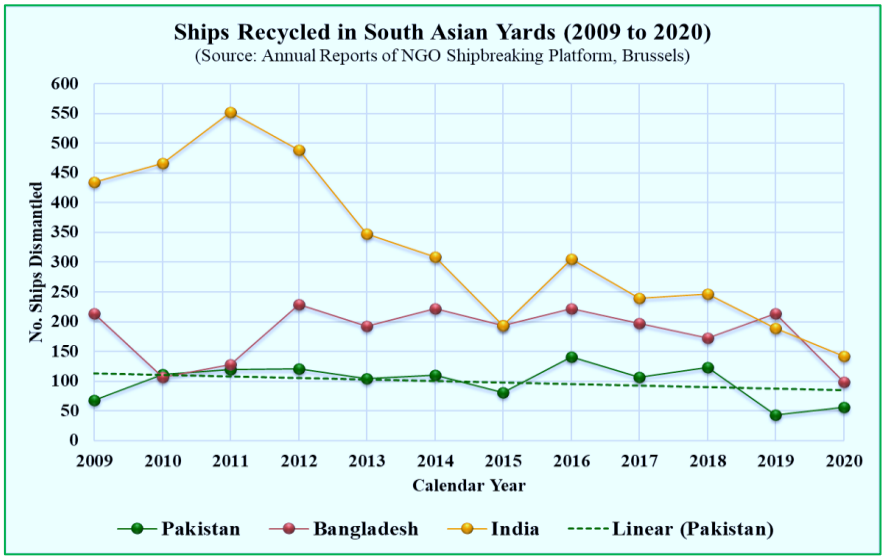

Figure 1.1: Ships recycled in South Asian Yards from 2009 to 2020
(Source: NGO Shipbreaking Platform)

[1] Stuer-lauridsen, Bloch, and Watkinson, "The Ship Breaking and Recycling Industry in Bangladesh and Pakistan."

Ship Recycling is an important and labour intensive but quite challenging and informal segment of Pakistan's maritime economy, which has many governance issues in federal and provincial context. Status of this economic activity is not clear, and it has faced many ups and downs during different governance regimes in the past. Steel from ships acts as market price stabilizer with a reasonable share in local steel requirements. It also helps in poverty alleviation by providing direct and indirect employment through its value chain. Additionally, it also contributes substantial tax payments to Federal and Provincial Governments.

Pakistan's shipbreaking industry has a long history. Initially, the local tradesmen practised shipbreaking operations in Karachi on a small level, limited to small vessels such as barges, tugs, and fishing boats. Later, in the 70s, a number of small companies strived to establish a formal shipbreaking industry in Pakistan. This led to the formation of a bigger industry than before on the beach of Gadani in the province of Balochistan. Due to the civil unrest in the country and the ultimate formation of Bangladesh, the provision of steel and iron goods was halted. In addition to that, the depreciation of Pakistani currency around that time made the import of these materials expensive. This increasing demand of steel and iron materials in a developing Pakistan provided an opportunity for the budding shipbreaking industry to flourish as the recycled steel and iron from decommissioned ships was cheaper than the imported and domestically produced materials. The industry at Gadani became a popular shipbreaking yard in the greater south Asian region due to its geographical and topographical characteristics as it is a sandy beach, having deep water levels which allowed ease of beaching of ships[2].

In the late 70s and early 80s, the shipbreaking industry of Pakistan was thriving as around 35,000 labourers directly involved in the shipbreaking activities, along with half a million people indirectly making a living of off the sector. Subsequently, in the early 90s, due to the regional competition with Bangladesh and India, along with high market prices and variations in tax regime, the shipbreaking activities dropped to one-fifth. This depression caused a tumble in the extraordinary number of 150-175 ships coming to be scrapped per year to a mere 30-40 ship, with 2001 receiving only 11 ships. More recently, the relevant authorities and the industry have been able to make the government reduce the taxes and duties from fifteen to ten percent. Along with that, the decrease in the prices of end-of-life vessels and rising national demand of steel and iron to satisfy the construction sector has resulted in a revival of the shipbreaking industry, which is also evident through the recent surge in the employments in the sector. Approximately 100 ships are being scrapped

[2] Iqbal and Heidegger, "Pakistan Shipbreaking Outlook: The Way Forward for a Green Ship Recycling Industry-Environmental, Health and Safety Conditions."

annually at Gadani, with around 500,000 people directly or indirectly involved in the shipbreaking activities and its related operations.

Shipbreaking operations at Gadani have proven to be the most lucrative industry in Balochistan, a province with a high rate of illiteracy and unemployment. Apart from being a source of employment to thousands of Pakistanis, the industry contributes majorly to the steel demand of the country with approximate one third of the total steel production. In a global perspective, Gadani shipbreaking yard is ranked fourth considering the volume of ships being scrapped annually around the world. To put it in perspective, there are five countries formally indulging in shipbreaking operations including India, Pakistan, Bangladesh, China and Turkiye, with some percentage of the activities happening in the European Union (EU). Statistics show that 68 percent of global ship breaking activities happened in the aforementioned South Asian countries, making this region the global centre of shipbreaking operations[3].

Few of the reasons South Asia is a hub for the shipbreaking operations are the low wages, disregard of labor laws, and obliviousness to the environmental, health and safety practices [4]. The disregard to the ecosystem destruction and the health and safety risks to the employees by not incorporating relevant regulations make it easier for the industries to employ and operate by not paying up the ecosystem destruction and health costs [5]. Inherently, shipbreaking industry is known to be 'hazardous' as the operations expose the workers and the environment to toxic chemicals, whereas the labour intensive and mechanical operations pose severe occupational hazards to the workers [6]. Oils, fuels, asbestos, heavy metals, PCBs and numerous other toxic materials originate from shipbreaking operations, which are usually disposed of haphazardly in the immediate environment [7]. Along with that, it is considered one of the most hazardous of occupations, with excessively high levels of mortalities, injuries and work-related ailments. Shipbreaking is a cumbersome process because of the structural complexity of the ships. Workers are generally deprived of personal protective equipment during work and have less training for occupational safety. Poorly supervised work operations, inadequate safety checks, and chances of explosions make work situations dangerous [8].

[3] Karim, *Shipbreaking Dev. Ctries.*

[4] Galley, *Shipbreaking: Hazards and Liabilities*.

[5] Hossain et al., "Impact of Ship-Breaking Activities on the Coastal Environment of Bangladesh and a Management System for Its Sustainability."

[6] Hossain et al., "Vertical Distribution and Contamination Assessment of Heavy Metals in Sediment Cores of Ship Breaking Area of Bangladesh"; Bomhauer-Beins and Strüver, "Mobilities of Waste, Value and Materials in the Shadow of the Maritime Transport System."

[7] Yan, Wu, and Yu, "The Environmental Impact Analysis of Hazardous Materials and the Development of Green Technology in the Shipbreaking Process."

[8] Hiremath, Pandey, and Asolekar, "Development of Ship-Specific Recycling Plan to Improve Health Safety and Environment in Ship Recycling Yards."

Pakistan and other south Asian shipbreaking yards have been reported lacking the provision of PPEs, along with proper healthcare facilities in case of emergencies, which puts the lives of workers at risk [9]. The application of respective local and national environmental laws is also an issue at the shipbreaking yards as the system lacks an effective monitoring system to ensure compliance, an issue which calls for the development and implementation of efficient coastal management and environmental monitoring systems, HSE trainings and compliance [10].

One of the challenges faced by the shipbreaking industry in Pakistan is the disinterest in adoption of global conventions and regulations concerning the shipbreaking operations, such as the Hong Kong Convention and EU regulations. While this has resulted in an immense ecological and socioeconomic loss, the global ship owners have reservations sending their vessels for recycling to Pakistan due to this. Additionally, due to the lack of interest of past governments in the shipbreaking industry and the hesitation in recognizing it as an industry, the infrastructure and operations have not been able to evolve with time and latest technology. This is one of the reasons that the Gadani shipbreaking yard does not have the capacity to incorporate global regulations and ensure green and sustainable shipbreaking operations. Domestic politics, lobby and power dynamics play a major role in hindering a move towards green ship recycling in south Asian countries. The issue of ownership of land and plot reserved for shipbreaking operations continues to be a nuisance for the industry.

Moreover, the provision of primary facilities such as access to medical services, sewage system, electricity, clean drinking water and public infrastructure is also a major issue which concerns the well-being of employees and ultimately hampers the growth of the industry in question. The inadequacy of labor laws and the unjust wage patterns are the ongoing issues at the Gadani shipbreaking yard which contribute towards the socioeconomic imbalance in the workers' community.

1.2 Problem Statement

Based on a preliminary screening process at the time of commissioning this study, the key issue identified was that Pakistan's shipbreaking industry was facing a continuous downward trend since the beginning of FY 2018-19. Along with the jump in dollar exchange rate, fiscal policies of the federal government and additional taxation by Balochistan government has impacted the ship

[9] Singh et al., "Assessment of the Future Mesothelioma Disease Burden from Past Exposure to Asbestos in Ship Recycling Yards in India"; Yan, Wu, and Yu, "The Environmental Impact Analysis of Hazardous Materials and the Development of Green Technology in the Shipbreaking Process."

[10] Ali and Pearce, "Effectiveness of the Hong Kong Convention on Ship Recycling In"; Mishra, "Non-Entry into Force of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009: An Analysis from the Perspective of India, Pakistan and Bangladesh."

purchase power of Pakistani Economic Operators in the international brokerage. Additionally, dominance of re-rollable imported steel in re-rolling mills and less taxation on imported re-rollable steel has also put a dent in the economy of the industry. The increasingly competitive international market due to the integration of international obligations such as Basel Convention, ILO Guidelines, Hong Kong Convention, EU Waste Shipment Regulation, and EU Ship Recycling Regulation which require assurance of green practices, along with the development of infrastructure and other allied facilities at Gadani yard has put the future of Pakistan's shipbreaking industry in jeopardy.

1.3 Research Questions

To rationalize the problem statement, the primary research question was 'how to promote green ship recycling in Pakistan', with breakdown in following specific queries in order to study and understand the overall processes and dynamics of the industry at Gadani Yard and the value chain involved.

a. What is socio-economic contribution of Ship Recycling in Pakistan?

b. Why Gadani Yard beach is important for Ship Recycling in Pakistan?

c. What are concerns of stakeholders regarding clean and safe operations at Gadani Yard?

d. Are the existing practices at Gadani Ship Recycling Yard not clean and safe?

e. What are concerns of Pakistan Shipbreakers Association (PSBA) and other stakeholders regarding declining activity trends at Gadani Yard?

f. PSBA has complaint regarding applicable taxation and changes in it by federal and provincial governments, in comparison with other sectors. So, why can't the previously exercised flat rate taxation be restored?

g. Is there a level playing field exist regarding taxation for the Ship Recycling and imported rerollable scrap coming from neighbouring countries?

h. How the import of re-rollable scrap is impacting this sector? What is the point of view of importers of re-rollable scrap and other forms of iron import?

i. How the impact of dollar exchange rate can be managed to provide more buying edge to our economic operators over the Indian and Bangladeshi operators?

j. There are international obligations without which this sector can't survive. What are issues towards ratification of Hong Kong Convention (HKC)? Is there no serious intention of PSBA members or the GoP to fulfill requirements of HKC?

k. How can certification to EU listing or HKC be achieved?

l. Why this activity is neglected and can't be regulated by declaring as an industry?

m. Why can't a proper incentive based policy be formulated by linking with on-site clean and green practices management?

n. What are plans of GoP to provide proper infrastructure facilities for clean and safe operations at Gadani while having a regular tax benefit from this very important but neglected sector of Maritime economy?

o. What is likelihood for the success of PPP- BoT regarding development of infrastructure facilities at Gadani Yard or any other place?

1.4 Aim and Objectives

The overarching objective of the study was to carry out an in-depth appraisal of ship recycling in Pakistan to make it most competitive, profitable and efficient industry.

1.5 Scope of the Study

Following was the scope of the study:

- Role of Ship Recycling towards Socio-economic and Industrial Development in Pakistan
- Ship Recycling Site Analysis
- Ship Recycling process analysis at Gadani Yard
- Value chain analysis by taking stock of activities at Rerolling Mills
- Analysis of tax revenue generation
- Drivers of Declining Trends for Ship Recycling at Gadani
- Analysis of International Obligations for Green Practices
- Governance of Ship Recycling in Pakistan (Analysis of Regulatory and Institutional Framework)
- Stakeholders' consultation – for Identification of long-term and workable solutions for institutional framework and requirements of Green Ship-Recycling
- Govt's support towards promotion of Ship Recycling in Pakistan
- Workable solutions with analysis of alternatives for infrastructure development at Gadani Yard

1.6 Methodological Context

This research study was aimed to examine in depth the topic of priority interest i.e. “Ship Recycling in Pakistan”. Based on basic research queries, this study was divided into different sections and subsections for in-depth analysis. Each sub section’s methodology employed various suitable research tools, which are mostly mentioned in respective sections of the report. Overall, the research work of each section was carried out firstly by taking into account a range of relevant research techniques and tools such as content analysis, collection of primary data through expert / key informant interviews by using qualitative questionnaires (See Annex A & B), in-person discussion meetings with relevant stakeholders by visiting office bearers and members of Pakistan ShipBreakers Association (PSBA) at Gadani Yard, members of the trade unions and workers at Gadani Yard, and officials of Re-rolling Mills at S.I.T.E. Karachi. The primary source of information was then scrutinized. Secondly, the study identifies and lists section wise key issues and relevant national legislation as well as international obligations by way of thematic and content analysis. Thirdly, the report deduces section wise inferences and generates key strategy points and concrete recommendations for practical actions including policy measures proposed for consideration by higher echelons. Important auxiliary material is included in Annexures of this report.

1.7 Classification of Key Contents for the Report

Based upon scope of the study, the key contents of the report are classified as under:

Section 1: Introduction

Section 2: Role of Ship Recycling in Pakistan

Section 3: Drivers of Declining Trends for Ship Recycling at Gadani

Section 4: Ship Recycling Site Analysis

Section 5: Ship Recycling Process at Gadani Yard

Section 6: International Obligations

Section 7: Governance of Ship Recycling in Pakistan

Section 8: Conclusions and The Way Forward

Section 2
Role of Ship Recycling in Pakistan

SECTION 2: ROLE OF SHIP RECYCLING IN PAKISTAN

2 ROLE OF SHIP RECYCLING TOWARDS SOCIO-ECONOMIC AND INDUSTRIAL DEVELOPMENT IN PAKISTAN

2.1 General Overview

The coastal area Gadani is considered as an ideal yard for shipbreaking activities in Pakistan compared to the other regional countries due to the competitive advantage with good characteristics of the soil and location for favorable tidal movement. The history of shipbreaking industry at Gadani is traced back to the pre partition colonial period of the subcontinent, with traditional approaches and methods. The industry was facing multiple issues at the time when Pakistan came into being, but gradually, the industry worked on the issues and initiated different measures to compete globally. In 1970s, shipbreaking at Gadani was the leading industry all over the world. But due to the negligence by the government and lack of support, the industry did not flourish and could not maintain to harness its optimum potential. The industry has contributed immense support over the time in the form of employment generation and economic activities of the country, which are considered as an important contributor in socio-economic development of the country. The current study has highlighted the role of ship recycling in the socio-economic and industrial development.

Addressing to the research question of the significance of shipbreaking industry of Pakistan, the research team physically visited the Gadani Yard and its value particularly at Karachi and Hub in Pakistan. Visits to the re-rolling and other melting mills were made in order to explore the beneficial impact of the ship steel. The re-rolling mills are the main beneficiary of the Gadani ship recycling industry as the re-rolling mills across the country used approximately 70-75% of the ship steel for making the steel bars. The ship steel is considered as B class steel which can be used for the construction of buildings up 10 stairs. Additionally, ship steel is also used by smelters mills for the production of different steel products. The smelters and melters use 20% of the recovered ship steel. The ship steel is also used by other industries for utilization in machinery parts and industrial units for the production of different industrial products, which account for 4% of the ship steel. Additionally, the ships also provide wood and miscellaneous items which are approximately 1 % of the total tonnage. Based on the available records, the industry has imported a maximum tonnage of 1,670,851 and a lowest tonnage of 100,827 metric tons in 2014-15 and 2019-20 respectively.

The industry provides direct employment opportunities to a number of employees working at Gadani yard as well as in the hoteling industry operating at Gadani yard along-with employments to the trucking sector, which supplies the ship materials from Gadani to Karachi. Its indirect socio-economic contribution is not only available to the population and value chain involved at Karachi and Hub but also to whole of Pakistan. The indirect employment are linked with re-rolling mills, transportation sector, steel stores, construction sector, smelting and melting mills, machinery parts & industrial units, and wood & agrees items.

The main consumer of the re-rolling mills steel is the construction industry. The construction industries, which need steel, are supplied through trucks. Although the ship recycling industry contributes in terms of employment, it equally plays a part in fulfilling the ship steel demand and tax revenues. The country's overall steel demand is approximately 5 to 5.50 million tons, in which approximately 1.5 million tons is contributed by the ship steel. Additionally, the industry has also paid a decent amount of 16.3 billion rupees to the Pakistani governments in account of taxes in 2017-18.

The current section 2 of the research report tried to respond the research question, 'what is significant contribution of Ship Recycling in Pakistan?' It is structured into four parts. The first part discusses about the methodology employed for this section and for the data involved for quantification of direct and indirect employment generation in the overall value chain involved. In second part, the historical trends of ship recycling at Gadani are studied. Whereas; in the third section, the value chain analysis has been done. In the final part, conclusions are drawn and recommendations are made.

2.2 Historical Trends of Ship Recycling at Gadani

Gadani Ship Recycling Yard is operational for more than 70 years. The industry has played a leading role during mid 1970s and 80s. Currently, the industry is on third number in the world after India and Bangladesh respectively as it has experienced many ups and downs over the period.

Based on primary data from PSBA sources, Table 2.1 summarizes the number of ships and tonnage imported per year at Gadani Yard since the year 2014 onward. While, Figure 2.1 shows tonnage trends while Figure 2.2 gives picture about number of end-of-life ships imported per year from FY 2014-15 to FY 2019-20. Primary data shows that 137 ships with 1,670,851 tonnage were imported during FY 2014-15. Unfortunately, these figures could not be attained / or maintained in any subsequent year. The industry has experienced a huge decline in terms of number of ships imported to 29 and also 100,827 metric tons during FY 2019-20, with substantial improvement in FY 2020-21.

Table 2.1: Ships and Tonnage Imported FY 2014-15 to 2021-22

S. No.	Year	No. of Ships Imported Per Year	Tonnage Imported (Metric Tons)
1.	2014-15	137	1,670,851
2.	2015-16	117	1,412,864
3.	2016-17	118	1,380,947
4.	2017-18	123	1,670,516
5.	2018-19	43	335,241
6.	2019-20	29	100,827
7.	2020-21	134	1,146,555
8.	2021-22	142	1,183,610

Data Source: PSBA

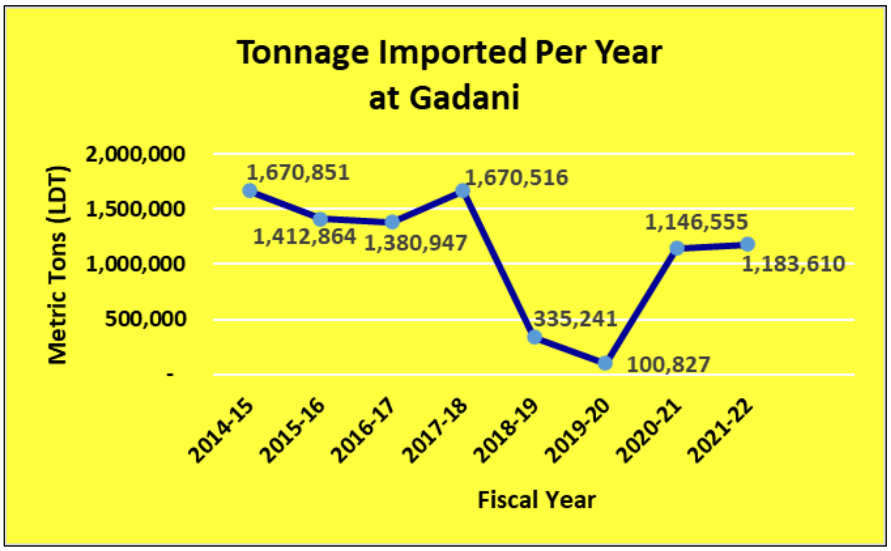

Figure 2.1: Tonnage Trends for Imported end-of-life Ships

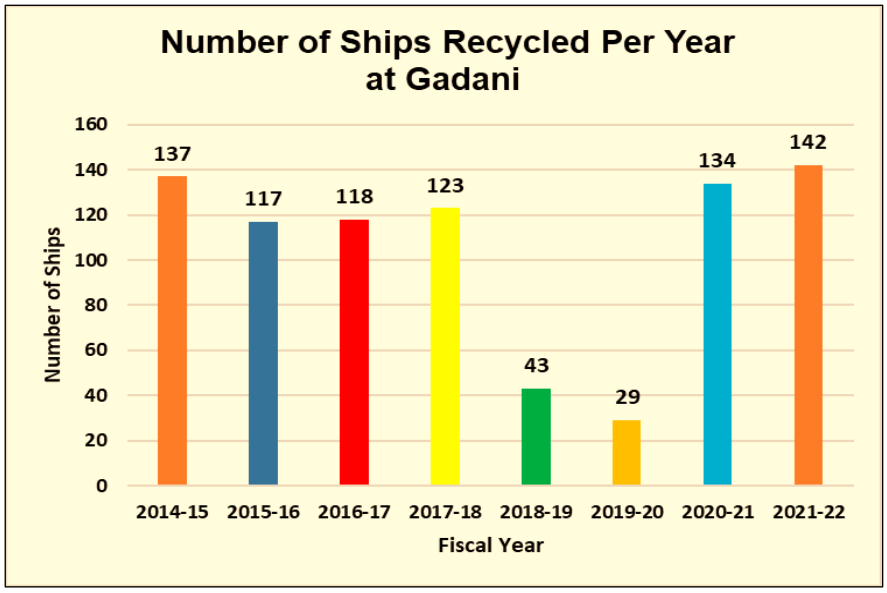

Figure 2.2: Ships Recycled at Gadani from FY 2014-15 to 2021-22

The industry experienced a lowest quantity of tonnage imported in 2019-20. The reductions in the import of tonnage were due to changing in the taxation policies, exchange rate fluctuations and the import of scrap iron from international market. The figure shows an encouraging trend in 2020-21 and industry has imported a higher quantity as compared to the previous two years. The industry is reviving due to favorable business environment and government concentration on the blue economy as the Prime Minister of Pakistan had declared the year 2020 as the year of blue economy.

2.3 Employment Generation by Gadani Ship Recycling Activity

In addition to low cost steel solution for a variety of products in the overall value chain, the Gadani Ship Recycling activity generates direct and indirect employments, which contribute significantly towards socio-economic uplift and poverty alleviation. Various sources, type and duration of the primary data were taken into account for the calculation of direct and indirect employments.

2.3.1 Data sources and types

The data for the study comprised of both primary as well as secondary sources. In order to gather data and relevant documents, interviews of PSBA members and other relevant persons (including the economic operators, workers, managerial staff and transporters) were conducted in the value chain involved at Gadani and Karachi. In addition, physical verification was also done through site visits at Gadani and SITE Karachi.

The secondary data was collected from multiple official sources including the State Bank of Pakistan (SBP), Federal Bureau of Revenue (FBR), Pakistan Bureau of Statistics (PBS), Ministry of Manufacturing, Ministry of Commerce, Ministry of Finance, World Steel Associations and NGO shipbreaking Platform. Estimation of missing variables is based on other influencing and complementing variables.

2.3.2 Datasets for the study

The cradle to grave life-cycle approach was employed with an effort to calculate the direct and indirect employment in the overall value chain reliant on Ship Steel. The purposive method of was applied for the selection of data, based on the availability of maximum data of past years. Mostly, the data was made available from 2014-15 to 2020-21 with the help of PSBA Office.

2.3.3 Calculation of Direct Employment in Gadani Ship Recycling Industry

The researcher calculated the total direct employment by summing the total employees directly working on the yard, total employees working in the hotels, and total employees working on trucking sector who supply ship materials from Gwadar to Karachi. The following table 2.1 shows the mathematical calculation

of total direct employment on ship recycling in Pakistan. The table shows the total direct employment, which has been calculated by adding the total employees at serial 01, 02 and 03.

Table 2.2: Calculation of Overall Direct Employment in Gadani Ship Recycling Industry

S. No.	Name of Sector/Industry Employees
01	Total Number of Employees directly working at Gadani Yard = A
02	Total Number of Employees on Transportation- Gadani to Karachi = B
03	Total Number of Employees in Hotels at Gadani Yard = C
04	**Overall Total Direct Employment =** 01 (A) + 02 (B) + 03(C)

2.3.3.1 Breakdown of direct employment at Gadani Yard

The current subsection explains the estimation of the total direct employees working at Gadani yard i.e. category A of direct employment, for the year 2014-15 to 2020-21. The data from PSBA helped in the calculation of approximate values of the total direct employees working on the yard based on the PSBA defined intervals for different activity progress periods including the peak and minimum operations at the Yard. Table 2.3 shows the methodology for the calculation of the total direct employees working on the yard (i.e. category A). Mathematically, the total number of direct employees is calculated as follows:

Direct Employees at Gadani yard = (Lowest Value + Highest Value)/2

For the year 2014-15:

Total Employees (on Average basis) = (20000+25000)/2

Total average Employees = 22500

Table 2.3: Calculation of Direct Employment Working at Gadani Ship Recycling Yard Site

S.No.	Fiscal Year	Average Range of Total Employees at Gadani Yard	Total Average Direct Employees at Gadani Yard
1	2014-15	20000-25000	(20000+25000)/2= 22,500
2	2015-16	15000-20000	(15000+20000)/2= 17,500
3	2016-17	15000-20000	(15000+20000)/2= 17,500
4	2017-18	20000-25000	(20000+25000)/2= 22,500
5	2018-19	12000-15000	(12000+15000)/2= 13,500
6	2019-20	10000-12000	(10000+12000)/2= 11,000
7	2020-21	15000-20000	(15000+20000)/2= 17,500

2.3.3.2 Breakdown of total employees in the hotels at Gadani Yard

This sub-section has calculated of the total employees working in the hoteling industry at Gadani i.e. category B for direct employment, for the year 2014-15 to 2020-21. The researchers collected the information about the number of hotels and workers working with them, through on-site visit to the Gadani yard.

Key informant interviews (KIIs) of the workers as well as the owners and workers in the hoteling industry were conducted. It was revealed that the employment is directly linked with the economic activity in the yard, meaning that if the economic activity is higher, the demand for the hoteling industry will be higher and vice versa. Consequently, the number of employees will be higher in the years where tonnage imported is higher and the number will be lower when the tonnage imported is lower. It shows a very strong correlation.

Further, the workers on the yard and owners of hotel revealed that there are approximately 15-20 hotels in the yard having an average of 3-5 workers per hotel. So, the value of the total number of employees in the hoteling industry was calculated based on the tonnage imported and information provided by the workers working in the yard and the hotels.

The table 2.4 summarizes information about the calculation of the total employment in the hoteling industry in Gadani yard for the year 2014-15 to 2020-21. The first, second and third column respectively shows the serial number, years and tonnage imported per year; where the fourth column **(A)** shows the total number of hotels in the Gadani yard. The fifth column shows **(B)** the total number of workers per hotel for the respective years. The fourth and fifth column of the table show that the number of hotels and workers both are high in the years in which the tonnage imported is higher. Whereas, the last column **(C)** of the table shows the total number of employees in hoteling industry at Gadani for the respective years and is calculated by multiplying the total hotels and total number of workers in the respective years. Mathematically, it can be calculated as follows:

Total Employment on Hoteling industry= Total Hotels * Total Number of workers

For the Year 2014-15:

Total Number of Employees in Hoteling = 20 * 5

Total Number of Employees in Hoteling = 100

Table 2.4: Calculation of Total Direct Employment Working in Hoteling Industry at Gadani Yard

S.No.	Year	Tonnage Imported	Total Hotels (A)	Total workers (B)	Total Hotels Employment at Gadani Yard (C)= A* B
1	2014-15	1,670,851	20	5	100
2	2015-16	1,412,864	20	4	80
3	2016-17	1,380,947	20	4	80
4	2017-18	1,670,516	20	5	100
5	2018-19	335,241	15	3	45
6	2019-20	100,827	15	3	45

Table 2.4: Calculation of Total Direct Employment Working in Hoteling Industry at Gadani Yard

S.No.	Year	Tonnage Imported	Total Hotels (A)	Total workers (B)	Total Hotels Employment at Gadani Yard (C)= A* B
7	2020-21	1,146,555	16	5	80

2.3.3.3 Breakdown of total employees in trucking industry supplying ships steel from Gadani Yard to Karachi

In this section, the researchers have focused on the methodology of the total number of employees in the trucking industry who supply ship materials from Gadani yard to Karachi i.e. category C for direct employment. The calculation of total number of employees in the transportation industry for the period 2014-15 to 2020-21 is done.

The researchers have estimated the employment in the transportation industry by considering the axle loads of the World Bank as well the Pakistan axle load. The World Bank provides 10 tons axle load rule for the supply of material on the truck of 12 wheel trucks. While the Pakistan National High Ways and Motor Way police provides a permissible an axle load of 17.5 tons for Single Bedford Truck to the supply of materials through highways. Based on the aforementioned requirements, the researchers took an average axle load of 12.5 tons for the trucks in order to calculate the employment in the trucking sector.

The table 2.5 summarizes the methodological calculation of the employment on trucks from Gadani to Karachi for the respective years from 2014-15 to 2020-21. The first two columns represent the serial number and years respectively. The second column A represents the tonnage imported for the respective years. While, the third column B represents the total number of per year trips by trucks from Gadani to Karachi. The column B has been calculated as the total tonnage imported per year divided by the axle load of 12.5 tons. The fourth column C represents the total number of daily trips by trucks from Gadani to Karachi. The column C has been calculated by dividing column B on 365. Whereas, the fifth column D is represents the total number of trips from Gadani to Karachi, which is similar to the column C. On average the trucks only do one trip from Gadani to Karachi due to time and distance involved in the transportation. Further, one truck provides employment to two persons, one driver and one conductor. At last, the sixth column E represents the total number of employees in trucking industry. The column E has been calculated by multiplying the column D with 02. Mathematically it can be calculated as follows:

Total Trips per Year= Total Tonnage Imported per Year/ 12.5

Total Daily Trips= Total Trips per Year/ 365

Total Trucks= Total Daily Trips

Total Employment on Trucks= Total Tucks* 02

For The Year 2014-15:

Total Trips per Year= 1670851/ 12.5= 157256.6

Total Daily Trips= 157256.6/ 365= 430.8399

Total Trucks= 430.8399

Total Employment on Trucks= 430.8399* 02= 861.6798

Table 2.5: Calculation of Total Employment on Trucks from Gadani to Karachi

S.No.	Year	Total Tonnage Imported per Year	Total Trips Per Year @ per Truck Axle load of 12.5 tons	Total Trips Per Day	Total Trucks (Gadani to Karachi)	Total Employment on Trucks @2 Persons per Truck
		(A)	(B)=A/12.5	(C)	(D)=C	(E)=D*2
1	2014-15	1670851	157256.6	430.8399	430.8399	861.6798
2	2015-16	1412864	132975.4	364.3163	364.3163	728.6325
3	2016-17	1380947	129971.5	356.0863	356.0863	712.1725
4	2017-18	1670516	157225	430.7535	430.7535	861.507
5	2018-19	335241	31552.09	86.44409	86.44409	172.8882
6	2019-20	100,827	9,489.6	26	26	52.0
7	2020-21	1,146,555	107,911.1	295.6	295.6	591.3

2.3.4 Calculation of Indirect Employment associated with Gadani Ship Recycling Industry in Pakistan

The calculation of indirect employment dependent on the value chain of Gadani ship recycling industry in Pakistan for the year 2014-15 to 2020-21 is provided in this sub-section. The indirect employment was calculated for employees in Pakistan re-rolling mills, construction and transportation industry, smelters and melting industries, machinery parts and industrial units, and wood and agree items, which has been done by adding all employees in mentioned industries. This section further concentrates on the industry wise calculation of the indirect employment generated from the ship materials, especially ship steel.

2.3.4.1 Breakdown of indirect employment in Re-rolling Mills, Transportation and Miscellaneous Steel Stores

In this sub section, the indirect employment was calculated in Pakistan re-rolling mills, transportation and miscellaneous steel stores in the country. For this purpose, the researchers have physically visited ship recycling industry at

Gadani district Lasbella and re-rolling mills at Karachi. Key Informant Interviews of the PSBA and re-rolling mills officials were conducted for the collection of relevant data. The officials of the PSBA and re-rolling mills provided information about the total number of re-rolling mills in the country (list is attached as Annex-F), the number of re-rolling mills based on their size, and number of workers in each mill in Pakistan. The list of re-rolling mills was also downloaded from the official website of Pakistan Re-rolling Mills Association about the total number of the re-rolling mills in the country, and was subsequently refined. There are a total number 208 active re-rolling mills operating across the country i.e. Karachi, Lahore, Faisalabad, Gujranwala, Sialkot Peshawar, Hub and Quetta, which use the ship steel as an input for the creation of steel bars.

Table 2.6 summarizes the total number of re-rolling mills in the country. It shows that there are 208 total re-rolling mills in the country. The re-rolling mills consist of 40% small sized, 30% medium sized and 30% large sized mills in the country. While in terms of numbers, there are 83.2 small sized mills, 62.4 are medium sized, and 62.4 are large sized re-rolling mills in the country. Mathematically it can be calculated as follows:

Total Number of Small Sized Re-rolling Mills= 208* 40%= 83.2

Total Number of Medium Sized Re-rolling Mills= 208* 30%= 62.4

Total Number of Large Sized Re-rolling Mills= 208* 30%= 62.4

Table 2.6: Summary of Re-rolling Mills in Pakistan

S. No.	Size of Re-rolling Mills	Number of Mills
1	Small (40%)	84
2	Medium (30%)	62
3	Large (30%)	62
	Total in Pakistan	**208**

Table 2.7 provides information about the calculation of total employment in small, medium, and large sized re-rolling mills in Pakistan for the years 2014-15 to 2020-21. The first and second column of table provides information about the serial number and year of the calculation. While the third column A provides the data about the total number of employees in the small sized re-rolling mills. The column A has been calculated by multiplying the total number of small sized re-rolling mills (83.2) with the number of workers (100) in the re-rolling mills in the country. Whereas the third column B represents the calculation of total number of employees in the medium sized re-rolling mills in the country. The column B has been calculated by multiplying the total number of medium mills (62.4) with the total number of workers (150) in the mills. Additionally, the fourth column C shows information about the total employees in large sized re-rolling mills. The column C has been calculated by multiplying the total number

of large sized mills (62.4) with the total number of workers (200) in the mills. Consequently, the last column D communicates information about the total number of employees in small, medium and large sized re-rolling mills. The column D has been calculated as the summation of Column A, B and C, which can be mathematically written as:

Total Employees in Small Sized Re-rolling Mills= Total Small Sized re-rolling mills in the country * Total Number of workers in each mill

- **For the Year 2014-15:**

Total Employees in Small Sized Re-rolling Mills= 83.2 * 100= 8320

Total Employees in Medium Sized Re-rolling Mills= Total Medium Sized re-rolling mills in the country * Total Number of workers in each mill

- **For the Year 2014-15:**

Total Employees in Medium Sized Re-rolling Mills= 62.4 * 150= 9360

Total Employees in Large Sized Re-rolling Mills= Total Large Sized Re-rolling mills in the country * Total Number of workers in each mill

- **For the Year 2014-15:**
- **Total Employees in Large Sized Re-rolling Mills =** 62.4 * 200= 12480

Total Employees in all Sized Re-rolling Mills= Total Employees in Small Sized Re-rolling Mills + Total Employees in Medium Sized Re-rolling Mills + Total Employees in Large Sized Re-rolling Mills

- **For the Year 2014-15:**
- **Total Employees in all Sized Re-rolling Mills=** 8320+ 9360+12480= 30160

Table 2.7: Calculation of Total Employees based on Sizes of Re-rolling Mills in Pakistan

S. No.	Year	Small Sized Re-rolling Mills@ 100 Employees Per Mills (A)= 83.2* 100	Medium Sized Re-rolling Mills@ 150Employees Per Mills (B)= 62.4* 150	Large Sized Re-rolling Mills@ 200 Employees Per Mills (C)= 62.4*200	Total Number of Employment in Re-rolling Mills of All Sized (D)= A+B+C
1	2014-15	8320	9360	12480	30160
2	2015-16	8320	9360	12480	30160
3	2016-17	8320	9360	12480	30160
4	2017-18	8320	9360	12480	30160
5	2018- 19	8320	9360	12480	30160
6	2019-20	8320	9360	12480	30160
7	2020-21	8320	9360	12480	30160

The table 2.8 provides information about the calculation of total indirect employment in Pakistan's Re-rolling mills for the period 2014-15 to 2020-21. The first two columns provide the serial number and year's respectively. The third column A represents the quantity of tonnage imported for the respective years. The fourth column represents the data about percent consumption of ship steels by the re-rolling mills in Pakistan. The column B shows that 75% ship steel is used by the re-rolling mills and calculated by multiplying total tonnage imported in column A with 75% or 0.75. The fourth column C provides information about the total number of employees in all sized re-rolling mills. The fifth column D represents the percentage change in the re-rolling mills utilization of ship steel by taking the year 2014-15 as a base year for all the successive years of the study. The column D has been calculated by calculating relative change in the value of the tonnage utilized by the re-rolling mills. The percent change of column D has been calculated by subtracting Column B 2014 value form column B 2015 value and whole dividing on column B 2014 value. Then seventh column E has been calculated for the calculation of change in the amount of employment for the respective years. The column E has been calculated by multiplying the column C & D. While the last column F calculates the total number of employees in the re-rolling mills in Pakistan. The column F can be calculated by subtracting the change in employment/or column E from the total number of employment in Re-rolling Mills of all Sized/or Column C. Mathematically, it can be calculated as follows:

Ship Steel Utilization in Re-rolling Mills = Total tonnage imported * 75% or 0.75

- **For the Year 2014-15:**

Re-rolling Mills Utilization of Ship Steel= 1,670,851 * 0.75= 1,253,138.25

Percent Change in Re-rolling Mills Utilization of Ship Steel= Re-rolling Mills Ship Steel Utilization in 2015- Re-rolling mills Ship Steel Utilization in 2014)/ Re-rolling Mills Ship Steel Utilization in 2014

- **For the Year 2015-16:**

Percent Change in Re-rolling Mills Utilization of Ship Steel= (1,059,648.00-1,253,138.25)/ 1,253,138.25= -0.1544

Change in Employment= Total Number of Employment in Re-rolling Mills of all Sized * Percentage change in Re-rolling mills Utilization of Ship Steel

- **For the Year 2015-16:**

Change in Employment= 30160*-0.1544 =-4,656.84

Total Employees in Re-rolling Mills= Total Number of Employment in Re-rolling Mills of all Sized- Change in Employment

- **For the Year 2015-16:**

Total Employees in Re-rolling Mills= 30160- 4,656.84= 25,503

Table 2.8: Calculation of the Total Employment in Pakistan Re-rolling Mills

S. No.	Year	Total Tonnage Imported per Year	Re-rolling Mills Utilization @ 75% of the total quantity	Total Number of Employment in Re-rolling Mills of All Sized	Percentage Change (Base Year=2014-15)	Change in Employment	Total Employees in Re-rolling Mills
		(A)	(B) = A*.0.75	(C)	(D) = (B2015-B2014)/B2014	(E) = C * D	(F) = C-E
1	2014-15	1,670,851	1,253,138.25	30160	-	-	30160
2	2015-16	1,412,864	1,059,648.00	30160	-0.1544	-4,656.84	25,503
3	2016-17	1,380,947	1,035,710.25	30160	-0.1735	-5,232.96	24,927
4	2017-18	1,670,516	1,252,887.00	30160	-0.0002	-6.05	30,154
5	2018- 19	335,241	251,430.75	30160	-0.7994	-24,108.67	6,051
6	2019-20	100,827	75,620.54	30160	-0.6992	-28,341.35	1,820.00
7	2020-21	1,146,555	859,916.25	30160	-10.3715	-9,464.2	20,696.10

Table 2.9 summarizes the overall calculation for the indirect employment generation in re-rolling mills, transportation industry, and average miscellaneous steel stores for the year 2014-15 to 2020-21. The first two columns provide information about the serial number and number of years respectively. The third column A represented the total employees in re-rolling mills calculated in the table 2.9. The fourth column B provides information about the calculation of number of trucks from Gadani to Karachi calculated in first table for the number of daily trips from Gadani to Karachi. The fifth column C focuses on the calculation of number of trucks from Karachi to the whole country.

According to the officials of Pakistan re-rolling mills, approximate 50% of ship steel is consumed in Karachi and adjoining areas at Hub, while the rest 50% is supplied to the whole of the country. First, the ship steel goes to Karachi from where it is supplied to the rest of Pakistan. Hence, column C has been calculated by dividing the number of trucks from Gadani to Karachi /or column B by 02. The sixth column D calculated the total number of employees on trucks supplying ship steel from Karachi to the whole country. The column D has been calculated by multiplying Total trucks/or column C with 02. The seventh column E has been calculated as a lump sum employees working in the steel stores. It consists of two workers, one supervisor, one steel fixer and the owner. The number has taken as fixed for all years by keeping in view the information available on the tonnage of ship steel used by the re-rolling mills and handling

of other steel from steel mills etc. The eight column has focused on the estimation of total indirect employment in re-rolling mills, trucking and miscellaneous steel stores. The column F has been calculated by summing the number of employees in re-rolling mills/or column A, the total number of employees in trucking industry/or column D and the average number of employees in miscellaneous steel stores /or column E, which can be mathematically written as follows:

Number of Trucks from Karachi to Whole Country = Total Trucks from Gadani to Karachi/ 2

For the Year 2014-15:

Number of Trucks from Karachi to Whole Country= 430.84 * 2= 215.42

Number of Employees on Trucks = Number of trucks from Karachi to Whole country* 2

For the Year 2014-15:

Number of Employees on Trucks= 215.42*2= 430.84

Total Indirect Employment of Re-rolling Mills, Trucking and Miscellaneous Steel Stores Employees = Total Employee in Re-rolling Mills+ Total Employees on Trucks+ Miscellaneous steel store Employees

For the Year 2014-15:

Total Indirect Employment of Re-rolling Mills, Trucking and Miscellaneous Steel Stores Employees = 30160+430.84+25000=55590.84

Table 2.9: Calculation of the Total Employment in Re-rolling Mills, Transportation and Miscellaneous Steel Stores

S. No.	Year	Total Employees in Re-rolling Mills (A)	Total Trucks from Gadani to Karachi (B)	Number of Trucks from Karachi to Whole Country (C)= B/2	Number of Employees on Trucks (D)= C*2	Average Miscellaneous Steel Stores Employees (E)	Total Indirect Employment of Re-rolling Mills, Trucking and Miscellaneous Steel Stores (F)= A+D+E
1	2014-15	30160.00	430.84	215.42	430.84	25000	55590.84
2	2015-16	25503.16	364.32	182.16	364.32	25000	50867.48
3	2016-17	24927.04	356.09	178.04	356.09	25000	50283.13
4	2017-18	30153.95	430.75	215.38	430.75	25000	55584.71
5	2018- 19	6051.33	86.44	43.22	86.44	25000	31137.78
6	2019-20	1,820	26	13	26	25000	26846
7	2020-21	20,696	295.6	148	295.6	25000	45992

2.3.4.2 Breakdown of indirect employment in construction and transportation industry

In this section, indirect employment was calculated in construction and transportation industry for the period 2014-15 to 2020-21. The construction industry is the main beneficiary of the steel produced from the ship steel plates by re-rolling mills in the country. The construction is generating a large number of employment opportunities and also provides prospects to the transportation industry for the supply of steel to the end users.

Table 2.10 summarizes the basic information about the construction of houses for the respective years from 2014-15 to 2020-21. The second and third column provides information about the description of houses, size, quantity and time required to complete a house construction. On average, 05 Marla double story house is constructed by using 02 tons of steel in 04-08 months. The table further provides that on average, a team of 06 persons required for the handling of steel related work in construction of a house. A single team on average spends 15 days in a single house steel related work activities. So, they provide their steel related services to two houses per month. While on average, one team can complete the steel related work of 24 houses in a year (i.e. 12*2).

Table 2.10: The Table of Basic Information about the Construction of Houses

S.No.	Description	Size/Quantity/ Time
1	House Size	05 Marla
	Story	02
2	Steel Demand @ per House	02 Tons
3	Average Completion Period @ per House	04-08 Months
4	Team Composition	06 Persons
5	Average Main Steel Related Work time by a team	15 Days
6	Per Month Steel Related Work by a team	02 Houses
7	Average Number of Houses Completed in a Year by a team (12*2)	24 Houses

Table 2.11 calculated the average number of trips by a truck/tractor trolley/dumper to supply the steel to the end users. The table shows that on average one vehicle can do 06 trips per day to supply the materials to the consumers. On average one vehicle can do maximum 06 trips due to the time constraint and the vehicle and labor efficiency. The table provides that one vehicle hires 02 persons on trucks/tractor trolley/ dumper to supply the materials to end users.

Table 2.11: The Table of Information about the Daily Trips by a Truck

S.No.	Description	Trips/Quantity
1	Average Daily Trips per truck / tractor trolley/ dumper	06
2	Employees on Trucks / Tractor Trolley / Dumper	02

Table 2.12 provides the calculation of the total employment in construction industry and transportation sector for the year 2014-15 to 2020-21. The first two columns represent the serial number and years respectively. The third column A presented the data of tonnage imported for the respective years used for the calculation of employment in construction and transportation industry. The fourth column B represents the quantity of re-rolling mills steel used by the construction industry. The column B has been calculated by multiplying the tonnage imported/or column A with 75% or 0.75. The fifth column conveys the information about the total number of houses steel supplied at the rate of per year. The column C has been calculated by dividing the quantity of re-rolling mills steel used by the construction industry/or column B on 02 tons. The sixth column D reveals information about the total teams required for construction industry per year. The column D has been calculated by dividing the total number of houses steel supplied per year/or column C on 24. The seventh column E provides information about the calculation of total construction employees per year. The column E has been calculated by multiplying the total teams required for construction per year/or column D with 06.

While, the eighth column F has focused on the calculation of total number of houses steel supplied per day. The column F has been calculated by dividing the total construction employees per year/or column C by 365 days. The ninth column G provides information about the calculation of average number of trips by trucks per day. The column G has been calculated by dividing the total number of Houses steel supplied per day/or column F by 06 trips daily. The tenth column H reveals information about the total trucks per year. The column H has been calculated by multiplying average number of trips by trucks per day/or column G with 365 days. The eleventh column I communicated information about the calculation of total trucks employment per year. The column I has been calculated by multiplying total trucks per year/or column H with 02 persons. The last column J conveys information about the calculation of total employment in construction industry and transportation sector. The column J has been calculated by summing the total construction employees per year/or column E and total trucks employment per year/or column I. Mathematically, it can be written as follows:

Quantity of Re-rolling Mills Steel Used by Construction Industry= Total Tonnage Imported per year * 75% or 0.75

- **For the Year 2014-15:**
- Quantity of Re-rolling Mills Steel Used by Construction Industry= 1670851* 75% or 0.75= 1253138 tons

Total Number of Houses steel Supplied per year= Quantity of Re-rolling Mills Steel Used by Construction Industry/ 2tons

- **For the Year 2014-15:**
- Total Number of Houses steel Supplied per year= 1253138/2= 626569

Total Teams Required for Construction per Year= Total Number of Houses steel Supplied per year/ 24 houses

- **For the Year 2014-15:**
- Total Teams Required for Construction per Year=626569/24= 26107.05

Total Construction Employees per Year= Total Teams Required for Construction per Year * 06 persons

- **For the Year 2014-15:**
- Total Construction Employees per Year= 26107.05*6= 156642.3

Total Number of Houses Steel Supplied per Day=

Total Number of Houses steel Supplied per year/ 365

- **For the Year 2014-15:**
- Total Number of Houses Steel Supplied per Day= 626569.1/365= 1716.628

Average Number of Trips by Trucks per Day= Total Number of Houses Steel Supplied per Day / 06 trips

- **For the Year 2014-15:**
- Average Number of Trips by Trucks per Day= 1716.628/6 trips= 286.1046

Total Trucks per Year= Average Number of Trips by Trucks per Day *365

- **For the Year 2014-15:**
- Total Trucks per Year= 286.1046 * 365= 104428.2

Total Trucks Employment per Year= Total Trucks per Year * 2

- **For the Year 2014-15:**
- Total Trucks Employment per Year=104428.2*2= 208856.4

Total Employment in Construction Industry and Transportation Sector= Total Construction Employees per Year + Total Trucks Employment per Year

- **For the Year 2014-15:**
- Total Employment in Construction Industry and Transportation Sector= 156642.3+ 208856.4= 365498.7

Table 2.12: Calculation of Total Employment in Construction Industry and Related Transportation Sector

S.No.	Year	Tonnage Imported Per Year (A)	Quantity of Re-rolling Mills Steel Used by Construction Industry @ 75% of tonnage imported (B)	Total amount of Houses Steel Supplied@ per Year (C)= B/2tons	Total Teams Required for Construction @ per Year (D)= C/24	Total Construction Employees @ per Year (E)= D * 6	Total Number of Houses Steel Supplied @ per Day (F)= C/365	Average Number of Trips by Trucks@ per Day (G)= F/6	Total Trucks @ per Year (H)= G * 365	Total Trucks Employment per Year (I)= H * 02	Total Employment in Construction Industry and Transportation Sector (J)= E + I
1	2014-15	1670851	1253138	626569	26107.05	156642.3	1716.628	286.1046	104428.2	208856.4	365498.7
2	2015-16	1412864	1059648	529824	22076	132456	1451.573	241.9288	88304	176608	309064
3	2016-17	1380947	1035710	517855	21577.3	129463.8	1418.781	236.4635	86309.19	172618.4	302082.2
4	2017-18	1670516	1252887	626443.5	26101.81	156610.9	1716.284	286.0473	104407.3	208814.5	365425.4
5	2018-19	335241	251430.8	125715.4	5238.141	31428.84	344.4257	57.40428	20952.56	41905.13	73333.97
6	2019-20	100,827	75,621	37810	1575	9453	104	17.6	6302	12603	22056
7	2020-21	1,146,555	859,916	429958	17915	107490	1178	196.3	71660	143319	250809

2.3.4.3 Breakdown of indirect employment in smelting and melting mills

In this section, calculations were made based on number and sizes of smelting and melting mills. Table 2.13 enlists summary of the smelting and melting mills in Pakistan. There are 204 total numbers of the smelting and melting mills in Pakistan. There are 20-25 large sized melting mills in Pakistan. Whereas, the number of small and medium sized melting mills are approximately 170-179. The table further provides information about the total number of employees in smelting and melting mills of large, medium and small sized mills in the country. It was found that there are about 150-250 average employees associated with large sized mills. While, there are 50-150 number of employees in small and medium sized mills. All these mills utilized the steel supplied from the ships for their production of different tools and equipment.

Table 2.13: List of the Smelting and Melting mills in Pakistan

S. No.	Name	Number
1	Total Smelting and Melting Mills	203
2	Total Number of Large Size Melting Mills	20-25
3	Total Number of small and Medium Size Melting Mills	170-179
4	Average number of Employees in Large Size Melting and Smelting Mills in Pakistan	50-150
5	Average Number of Employees in small and Medium Size Melting and Smelting Mills in Pakistan	150-250

Table 2.14 provides information about the total employment calculated in smelting and melting mills of Pakistan on the basis of their sizes for the year 2014-15 to 2020-21. The first two columns of the table provide information about serial number and years respectively. The third column A of the table reveals information about the calculation of total employment in small and medium sized smelting and melting mills in Pakistan. Column A has been calculated by multiplying the number of total small and medium sized smelting and melting mills with the total number of employees in the mills. The fourth column B indicates information about the total employment in large sized smelting and melting mills in Pakistan. The column B has been calculated by multiplying the number of large sized melting and smelting mills with the total number of employees in the large sized mills. The last column C gives information about the total number of employees in small, medium, and large sized mills in Pakistan. The column C has been calculated by adding the column A and column B. Mathematically; it can be written as follows:

Total number of Employees in Small and Medium Sized Smelting and Melting Mills= Average Numbers of Employees in Small and Medium Sized Smelting and Melting Mills * Total Number of Small and Medium Sized Mills in the country

- **For the Year 2014-15**
- **Total number of Employees in Small and Medium Sized Smelting and Melting Mills =** 100*179 = 17900

Total number of employees in Large Sized Smelting and Melting Mills = Average Number of employees in Large Sized smelting and melting mills * Total number of large size smelting and melting mills in the country

- **For the Year 2014-15**
- Total number of employees in Large Sized Smelting and Melting Mills = 200* 25 = 5000

Total number of employees in all sized smelting and melting mills = Total number of Employees in Small and Medium Sized Smelting and Melting Mills + Total number of employees in Large Sized Smelting and Melting Mills

- **For the Year 2014-15**
- **Total number of employees in all sized smelting and melting mills = 17900+ 5000 =** 22900

Table 2.14: Calculation of Total Employment Based on Sizes of Smelting/Melting Mills

S. No.	Year	Total Small and Medium Sized Smelting and Melting Mills (A)= 179*100	Total Large Sized Smelting and Melting Mills (B)=200*25	Total Smelting and Melting Mills Employees of all Sized (C)= A+ B
1	2014-15	17900	5000	22900
2	2015-16	17900	5000	22900
3	2016-17	17900	5000	22900
4	2017-18	17900	5000	22900
5	2018-19	17900	5000	22900
6	2019-20	17900	5000	22900
7	2020-21	17900	5000	22900

The table 2.15 shows the calculation of total employment in smelting and melting mills in Pakistan for the period 2014-15 to 2020-21. The first two columns conveyed information about the number and years respectively. The third column represents information about the total tonnage imported by the ship recycling industry for the respective years. The fourth column B indicates information about the quantity of ship steel used by the smelting and melting mills in Pakistan. The column B has been calculated by multiplying the total tonnage imported for the respective years with 20% or 0.20. The fifth column C reveals information about total employment based on all sized of smelting and melting mills in Pakistan. The column C has been calculated in table 2.13. The sixth column D manifest the calculations of the percentage change for the respective years by considering the year 2014-15 as a Base year for all years. The column D has been calculated by subtracting the value at column B 2014-

15 from value at column B 2015-16 and divided by the value at column B 2014-15. The seventh column E shows the information about amount of percentage change in total smelting and melting mills employments for the respective years. The column E has been calculated by the value at column C and column D for the respective years of calculations. The last eighth column F reveals information about the calculations of total employment in smelting and melting mills in Pakistan. The column F has been calculated by subtracting the values in column E from the column C for the respective years in order to calculate the total employment in smelting and melting mills in Pakistan. Mathematically; it can be calculated as follows:

Total Ship steel used by Smelting and Melting Mills in Pakistan= Total Tonnage Imported by the Ship breakers * 20% or 0.20

- **For the Year 2014-15:**
- **Total Ship steel used by Smelting and Melting Mills in Pakistan=** 1670851 * 0.20= 334170.2 Metric Tons

Percentage Change over the Years= {(Smelting and Melting value at 2015-16) – (Smelting and Melting Value at 2014-15)}/ Smelting and Melting Value at 2014-15

- **For the Year 2015-16:**
- **Percentage Change over the years**= {(282572.8)-(334170.2)}/334170.2= -0.1544 or -15.44%

Total Quantity **of percentage change in total smelting and melting mills employments=** Total Employment in all sized mills * Percentage Change over the years.

- **For the Year 2015-16:**
- **Total Quantity of percentage change in total smelting and melting mills employments=** 22900 * -0.1544= 3535.86

Total Smelting and Melting Employees = Total Employment based on All Sized - Total Quantity of percentage change in total smelting and melting mills employments

- **For the Year 2015-16:**
- **Total Smelting and Melting Employees=** 22900-3535.86= 19364

Table 2.15: Calculation of the Total Employment in Smelting and Melting Mills

S. No.	Year	Tonnage Imported @ per Year	Melting and Smelting Mills Utilization quantity @ 20% of tonnage imported	Total Employment based on all Sized	Percent Change (Base Year=2014-15)	Total * % Change	Total Melting and Smelting Employees
		A	B = A * 0.20	C	D = (B2015-B2014) / B2014	E = C * D	F = C-E
1	2014-15	1670851	334170.2	22900	-	-	22900
2	2015-16	1412864	282572.8	22900	-0.1544	-3535.86	19364
3	2016-17	1380947	276189.4	22900	-0.1735	-3973.31	18927
4	2017-18	1670516	334103.2	22900	-0.0002	-4.59137	22895
5	2018- 19	335241	67048.2	22900	-0.7994	-18305.3	4595
6	2019-20	100827	20,165.48	22900	-0.6992	-21518.1	1382
7	2020-21	1146555	229,311.00	22900	-10.3715	-7185.7	15714

2.3.4.4 Breakdown of indirect employment in machinery parts and industrial nits in Pakistan

This section deals with the calculation of the total number of employees in the machinery parts and related industrial units in Pakistan. The machinery parts and industrial units also utilize the ship steel for further processes. Table 2.16 summarized the information about the calculation of total employees in machinery parts and related industrial units for the year 2014-15 to 2020-21. The first two columns indicate the number and the years of the study. The third column A shows the range of employees in the machinery parts and industrial units industry in Pakistan. The range of employees in consistent with the range of employees hired by the ship recycling industry in Pakistan. The fourth column B provides information about the calculation of the average number of employees in machinery parts and industrial units for the respective years 2014-15 to 2020-21. The column B has been calculated by taking the average of the ranges of employees given in Column A. The last column C shows the total number of employees for all the years. The number is constant here due to the higher number of employees in higher tonnage imported year and used for the actual number of employees in machinery parts and industrial units in table 2.36. Mathematically; the column B can be calculated as follows:

Average Employees= Highest Number of Employees + Lowest Number of Employees/ 2=

- **For the year 2014-15:**

Average Employees = 20000+25000/2= 22500

Table 2.16: Calculation of Total Employees in Machinery Parts and Industrial Units

S. No.	Year	Range of Employees (A)	Average of Range (B)= Average of (A)	Total Employees (C)
1	2014-15	20000-25000	22500	22500
2	2015-16	15000-20000	17500	17500
3	2016-17	15000-20000	17500	17500
4	2017-18	20000-25000	22500	22500
5	2018- 19	12000-15000	13500	13500
6	2019-20	10000-12000	11000	11000
7	2020-21	12000-15000	13500	13500

The table 2.17 reveals information about the calculation of total average number of employees in machinery parts and industrial units in Pakistan from 2014-15 to 2020-21. The first two columns communicate information about the serial number and the respective years. The third column A communicates the total tonnage imported for the respective years. The fourth column B reveals information about the ship steel utilized by the machinery parts and industrial units in Pakistan. The column B has been calculated by multiplying the total tonnage imported for the respective years with 4% or 0.04 for the calculation of total tonnage used by the machinery parts and industrial units in Pakistan. The fifth column C provides information about total employees in machinery parts and industrial units calculated in table 2.16. The sixth column D provides the information about the percentage change in the quantity of steel supplied from ship breaking industry in Pakistan. The column D has been calculated by subtracting the value of machinery parts and industrial units steel in 2014-15 from the value of machinery parts and industrial units steel in 2015-15 and divide by the value of machinery parts and industrial units steel in 2014-15. Further, the base years for the calculation of percentage change is considered as 2014-15 for all the years. The seventh column E shows the information about the total change in employees over the years. The column E has been calculated by multiplying the total number of employees in column C and the percentage change in the value of machinery parts and industrial units steel in column D. The last column F provides information about the calculation of the average total number of employees in Machinery parts and industrial units. The Colum F has been calculated by subtracting the total change in employees over the years in columns E from the total employees in Machinery parts and Industrial units in column C.

Mathematically; it can be calculated as follows:

The ship steel utilized by the machinery parts and industrial units in Pakistan = Total Tonnage Imported by the Ship breaking Industry in Pakistan * 4% or 0.04

- **For the Year 2014-15:**
- **The ship steel utilized by the machinery parts and industrial units in Pakistan**= 1670851 * 0.04= 66834. 04 metric tons

The percentage change in the quantity **of steel supplied from ship breaking industry in Pakistan= {(**The value of machinery parts and industrial units steel in 2015-16) - (the value of machinery parts and industrial units steel in 2014-15)}/ the value of machinery parts and industrial units steel in 2014-15

- **For the year 2015-16:**
- **The percentage change in the** quantity **of steel supplied from ship breaking industry in Pakistan=** {(56514.56)-(66834.04)}/66834.04= -0.1544 or -15.44%

The total change in employees over the years = the total number of employees in column C * the percentage change in the value of machinery parts and industrial units steel in column D

- **For the Year 2015-16:**
- **The total change in employees over the years=** 22500* -15.44% or -0.1544= -3474.1

The average total number of employees in Machinery parts and industrial units= (The total employees in Machinery parts and Industrial units) – (The total change in employees over the years)

- **For the year 2015-16:**
- **The average total number of employees in Machinery parts and industrial units**= 22500-3474.1= 19025.9

Table 2.17: Calculation of Total Employment in Machinery Parts and Industrial Units

S.No.	Year	Tonnage Imported @ per Year (A)	Machinery Parts and Industrial Units @ 4% of tonnage imported (B)= A* 0.04	Total Employees (C)	Percent Change (Base Year=2014-15) (D)= (B2015-B2014)/B2014	Total * % Change (E)= C* D	Total Employees in Machinery Parts and Industrial Units (F)= C-E
1	2014-15	1670851	66834.04	22500	-	-	22,500
2	2015-16	1412864	56514.56	17500	-0.1544	-3474.1	19,026
3	2016-17	1380947	55237.88	17500	-0.17351	-3903.9	18,596
4	2017-18	1670516	66820.64	22500	-0.0002	-4.51117	22,495

5	2018- 19	335241	13409.64	13500	-0.79936	-17985.6	4,514
6	2019-20	100,827	4,033.10	11000	-0.6992	-21142.23903	1358
7	2020-21	1,146,555	45,862.20	13500	-10.3715	-7060.270485	15440

2.3.4.5 Breakdown of employment in wood and agree items

This section provides information about the calculation of employment in 'wood and agree items' recovered from the ship recycling industry operating in Gadani from 2014-15 to 2020-21. The ship also consists of wood, electrical and other items, which further provide the employment opportunities to the workers associated with industry in the overall value chain involved.

The table 2.18 has provides information about the calculation of total employment in 'wood and agree items'. The first two columns provide information about serial number and the years. The third column A provides the information about the total tonnage imported from 2014-15 to 2020-21. The fourth column B provides information about the calculation of quantity of wood and agrees items in terms of metric tons recovered from the total tonnage imported. The column B has been calculated by multiplying the total tonnage imported with 1% or 0.01. The fifth column C represents the total lump sum employees in the respective years in wood and agree items. The number in column C has been taken as fixed due to their involvement in the wood and agree items supplied from multiple sources. The sixth column D shows information about the percentage change in the value of wood and agree items supplied from ship breaking industry in Pakistan. The column D has been calculated by subtracting the value of wood and agree items in 2014-15 from the value of wood and agree items in 2015-16 and dividing by the value of wood and agree items in 2014-15. The 2014-15 has been considered as base year for the calculation of the percentage change for the respective years. The seventh column E shows information about the calculation of total percentage change in employment over the years. The column E has been calculated by multiplying the total lump sum employees in column C and the percentage change in the value of wood and agree items supplied from ship breaking industry in Pakistan in Column D. The last column F shows the calculation of average number of total employees in wood and agree items. The column F has been calculated by subtracting total percentage change in employment over the years from total lump sum employees.

Mathematically; it can be calculated as follows:

Quantity **of wood and agree items recovered from the total tonnage imported=** total tonnage imported * 1% or 0.01

For the Year 2014-15:

- Quantity **of wood and agree items recovered from the total tonnage imported=** 1670851 * 1% or 0.01= 16708.51 Metric Tons

Percentage change in the value of wood and agree items supplied from ship breaking industry in Pakistan= (value of wood and agree items in 2015-16) – (value of wood and agree items in 2014-15) / value of wood and agree items in 2014-15

For the Year 2015-16:

- **Percentage change in the value of wood and agree items supplied from ship breaking industry in Pakistan=** {(14128.64) - (16708.51)} / 16708.51

Total percentage change in employment over the years= (Total lump sum employees in column C) * (percentage change in the value of wood and agree items supplied from ship breaking industry in Pakistan in Column D)

For the Year 2015-16:

- **Total percentage change in employment over the years=** 1000 * -15.44 % or -0.1544 = -154.4046

Average number of total employees in wood and agree items= (total lump sum employees) – (total percentage change in employment over the years)

For the Year 2015-16:

- **Average number of total employees in wood and agree items=** 1000-154.4046= 845.5954

Table 2.18: Calculation of Total Employment in Wood and Agree Items

S. No.	Year	Tonnage Imported (A)	Wood and Agree Items @ 1% of total tonnage (B)= A*0.01	Total Lump sum Employees (C)	Percent Change (Base Year=2014-15) (D)= (B2015-B2014)/B2014	Total * % Change (E)= C*D	Total Employees in Wood and Agree Items (F)= C-E
1	2014-15	1670851	16708.51	1000	-	-	1000
2	2015-16	1412864	14128.64	1000	-0.1544	-154.4046	845.5954
3	2016-17	1380947	13809.47	1000	-0.1735	-173.5068	826.4932
4	2017-18	1670516	16705.16	1000	-0.0002	-0.2005	999.7995
5	2018- 19	335241	3352.41	1000	-0.7994	-799.3591	200.6409
6	2019-20	100,827	1,008.27	1000	-0.9397	-939.655	60
7	2020-21	1,146,555	11,465.55	1000	-0.3138	-313.78979	686

2.3.5 Calculation of Total Employment and Socio-economic Contribution by the Ship Recycling Industry in Pakistan

This section sums-up the total employment generated by the ship recycling industry in Pakistan from 2014-15 to 2020-21 and calculates the socio-

economic footprint viz-a-viz the size of total dependent population. The section further discussed the calculation of socio-economic contribution by the ship recycling industry in Pakistan.

Table 2.19 reveals information about the calculation of total employment created by the ship recycling industry operating in Gadani Pakistan. The table further provides the data about the dependent population on the ship recycling industry in Pakistan.

The first two columns of table 2.19 indicate information about the number and years of the study. The second column A calculates the total number of employees associated with the ship recycling industry in Pakistan. The column A has been calculated on the basis of direct and indirect employment in the ship recycling industry. The last column B calculated the dependent population of the ship recycling industry in Pakistan. The column B has been calculated by multiplying the total number of employees with 7.

Mathematically; it can be calculated as follows:

Total Value Chain Dependent Population= Total Value Chain Employment * 7

For the Year 2014-15:

- **Total Value Chain Dependent Population=** 490951.1760 * 7= 3436658

Table 2.19: Calculation of the Total Employment and Socio-Economic Contribution by the Gadani Ship Recycling Industry in Pakistan

S. No.	Year	Total Value Chain Employment (A)	Total Value Chain Dependent Population (B)=A*7
1	2014-15	490951.1760	3436658
2	2015-16	417475.7363	2922330
3	2016-17	409006.7349	2863047
4	2017-18	490862.2855	3436036
5	2018-19	127499.3661	892496
6	2019-20	62799	439593
7	2020-21	346812	2427685

2.3.5.1 Breakdown of Socio-economic Contribution for Direct Employees associated with Gadani Ship Recycling Industry in Pakistan

This subsection has further broken down the calculation of dependent population size of the country linked with direct employees attached with Gadani ship recycling industry in Pakistan. The section covers the socio-economic contribution created by the ship recycling industry directly attached in multiple industries from 2014-15 to 2020-21.

Table 2.20 summarizes calculation of total direct employees' dependent populations on Gadani ship recycling industry in Pakistan. A standard multiplier factor of 7 was used to calculate the population size against the number of employs. The first two columns represent the information the number and years of the study. The third column A shows the total direct employees in trucking industry who supply ship materials from Gadani to Karachi. The fourth column B communicated information about the calculation of total dependent population on trucking industry. The column B has been calculated by multiplying the total trucking employees with 7. The fifth columns C provided information about the total number of employees in hoteling industry operating at Gadani. The sixth column D has been provided information about the calculation of total dependent population on hoteling industry operating at Gadani. The column D has been calculated by multiplying the total hotels employees with 7. The seventh column E depicts the information about the total number of direct employees in Gadani ship recycling industry in Pakistan. The eighth column F provided the calculation of total dependent population of total direct employees on Gadani yard. The column F has been calculated by multiplying the total number of direct employee with 7.

Mathematically; these were calculated as following:

Total Dependent Population on Trucks from Gadani to Karachi= Total Direct Employees * 7

For the Year 2014-15:

- **Total Dependent Population on Trucks from Gadani to Karachi=** 861.6798 * 7 = 6032

Total Dependent Population on Gadani Hotels= Total Employee at Gadani Hotels * 7

For the Year 2014-15:

- **Total Dependent Population on Gadani Hotels=** 100 * 7 = 700

Total Dependent Population on Gadani Yard= Total Direct Employees at Gadani Yard * 7

For the Year 2014-15:

- **Total Dependent Population on Gadani Yard=** 22500 * 7 = 157500

Table 2.20: Methodological Breakdown of the Calculation of Socio-economic Contribution in Direct Employment Association with Gadani Ship Recycling Industry in Pakistan

S.No.	Year	Total Direct Employment on Trucks (A)	Total Dependent Populations on Transportation (B)= A*7	Total Hotels at Gadani Yard (C)	Total Dependent Populations on Gadani Hotels (D)= C*7	Total Direct Employees at Gadani Yard (E)	Total Dependent Population Size upon Direct Employees at Gadani Yard (F)=E*7
1	2014-15	861.6798	6032	100	700	22500	157500
2	2015-16	728.6325	5100	80	560	17500	122500
3	2016-17	712.1725	4985	80	560	17500	122500
4	2017-18	861.5070	6031	100	700	22500	157500
5	2018-19	172.8882	1210	45	315	13500	94500
6	2019-20	51.9980	364	45	315	11,000	77,000
7	2020-21	591.2935	4139	80	560	17,500	122,500

2.3.5.2 Breakdown of socio-economic contribution for in-direct employees associated with Gadani Ship Recycling Industry in Pakistan

This section focuses on the breakdown of the calculation of socio-economic contribution by the Gadani ship recycling industry through the provision of indirect employment in many ancillary industries across the country. The section has calculated the total dependent population of indirect employees in re-rolling mills, construction, smelting and melting, machinery parts and industrial units, and wood and agree items from 2014-15 to 2020-21.

The table 2.21 summarizes the breakdown of the calculation of the dependent population on indirect employees linked with Gadani Ship recycling industry in Pakistan. The first two columns have provided the information about the number and years of the study. The third column A has provided the information about the total number of employees in re-rolling mills in Pakistan. The fourth column B gives the information about the calculation of the dependent population on the re-rolling mills. The column B has been calculated by multiplying the total number of employees in re-rolling mills with 7. The fifth column C has provided the number of employees in trucking sector who supply the ship materials from Karachi to country wise. The sixth column D has communicated the information about the calculation of dependent population on the trucking industry. The column D has been calculated by multiplying the total number of employees in trucking industry with 7. The seventh column E has provided the average number of employees in steel stores. The eighth column F depicts the information about the calculation of total dependent population on the average steel stores. The column F has been calculated by multiplying the total number of employees in steel stores with 7. The ninth column G has revealed the data about the total number of employees in

construction industry in Pakistan. The tenth column H indicated the evidence about estimation of dependent population on construction industry in Pakistan. The column H has been calculated by multiplying the total number of employees in construction industry with 7. The eleventh column I has shown the information about the total number of employees in trucking sector who supply steel from steel store to end users. The twelfth column J has revealed the evidence about the estimation of dependent population on trucking industry. The column J has been calculated by multiplying the total number of employees in trucking sector with 7. The thirteenth column K has shown the total number of employees in smelting and melting mills in Pakistan. The fourteenth column L has displayed the calculation of the dependent population of smelting and melting mills. The column L has been calculated by multiplying the total employees in smelting and melting mills with 7. The fifteenth column M showed the evidence about the total number of employees in Machinery parts and industrial units. The sixteenth column N showed information about the estimation of dependent population on machinery parts and industrial units. The column N has been calculated by multiplying the total number of employees in machinery parts and industrial units with 7. The seventeenth column O revealed data about the total number of employees in wood and agree items. The last eighteenth column P indicated about calculation of dependent population on wood and agree items. The column P has been calculated by multiplying the total number of employees in wood and agree items with 7.

Mathematically; it was calculated as following:

Re-rolling Mills Dependent Population= Total Re-rolling Mills Employees * 7

For the year 2014-15:

- **Re-rolling Mills Dependent Population=** 30160 * 7= 211120

Trucks from Karachi to Countrywide Dependent Population= Trucks from Karachi to countrywide employees * 7

- **For the year 2014-15:**
- **Trucks from Karachi to Countrywide Dependent Population=** 430.8399 * 7= 3016

Steel Stores Dependent Populations= Steel store Employees * 7

- **For the Year 2014-15:**
- **Steel Stores Dependent Populations=** 25000 * 7= 175000

Construction Sector Dependent Population= Construction Sector Employees * 7

- **For the Year 2014-15:**
- **Construction Sector Dependent Population=** 156642.28 * 7= 1096496

Trucking Sector Dependent Population from Steel Stores to End Users = Trucking Sector Employees from Steel Stores to End Users * 7

- **For the Year 2014-15:**
- **Trucking Sector Dependent Population from Steel Stores to End Users =** 208856.38 * 7= 1461995

Smelting and Melting Mills Dependent Population= Smelting and Melting Mills Employees * 7

- **For the Year 2014-15:**
- **Smelting and Melting Mills Dependent Population=** 22900 * 7= 160300

Machinery Parts and Industrial Units Dependent Population= Machinery Parts and Industrial Units Employees * 7

For the Year 2014-15:

Machinery Parts and Industrial Units Dependent Population= 22500 * 7= 157500

Wood and Agree Items Dependent Population= Wood and Agree Items Employees * 7

For the Year 2014-15:

- **Wood and Agree Items Dependent Population=** 1000 * 7= 7000

Table 2.21: Breakdown of the Calculation of Socio-economic Contribution in In-direct Employment Association with Gadani Ship Recycling Industry in Pakistan

S. No.	Year	Re-rolling Mills Employment (A)	Re-rolling Mills Dependent Population (B)=A*7	Employment on Trucks (C)	Dependent Populations on Trucks (D)=C*7	Miscellaneous Steel Stores Employees (E)	Miscellaneous Steel Stores Dependent Populations (F)=E*7	Construction Employment per Year (G)	Construction Dependent Populations (H)= G*7	Trucks Employment per Year (I)	Trucks Dependent Populations (J)= I*7	Smelting & Melting Mills Employment (K)	Smelting & Melting Mills Dependent Populations (L)= K*7	Machinery Parts and Industrial Units Employment (M)	Machinery Parts and Industrial Units Dependent Populations (N)= M*7	Wood and Agree Items Employment (O)	Wood & Agree Items Dependent Population (P)= O*7
1	2014-15	30160.00	211120.00	430.8399	3016	25000	175000	156642.28	1096496	208856.38	146195	22900.00	160300	22500.00	157500	1000.00	7000
2	2015-16	25503.16	178522.11	364.3163	2550	25000	175000	132456.00	927192	176608.00	123625	19364.14	135549	19025.90	133181	845.60	5919
3	2016-17	24927.04	174489.25	356.0863	2493	25000	175000	129463.78	906246	172618.38	120832	18926.69	132487	18596.10	130173	826.49	5785
4	2017-18	30153.95	211077.67	430.7535	3015	25000	175000	156610.88	1096276	208814.50	146170	22895.41	160268	22495.49	157468	999.80	6999
5	2018-19	6051.33	42359.30	86.4441	605	25000	175000	31428.84	220002	41905.13	293336	4594.68	32163	4514.42	31601	200.64	1404
6	2019-20	1820	12740	26	182	25000	175000	9453	66168	12603	88224	1382	9673	1358	9504	60	422
7	2020-21	20696	144873	296	2070	25000	175000	107490	752427	143319	100323	15714	109999	15440	108078	686	4803

2.4 The Value Chain Analysis

This section explains the socio-economic contribution and utilization of the steel collected from the ship recycling industry at Gadani, which is almost used in all industries across the country. The main supply of ship steel goes to the re-rolling mills in Hub located in district Baluchistan and Karachi. The Gadani steel also goes to Lahore, Wazir Abad, Sialkot, and Gujranwala in Punjab. The ship steel also goes to Gujjar Gari, Chakdara, Peshawar in Khyber Pakhtunkhwa, and Quetta in Baluchistan.

Primarily, the re-rolling mills are the main beneficiary of ship steel in the country. The re-rolling mills convert the ship steels into beneficial forms like bars which are used in the construction industry. The beneficial steel is ultimately used by the end consumers in form of steel cutlery, garters for the construction of houses, concrete slabs etc. The steel can be used for multiple purposes ranging from construction to end users' products.

2.4.1 Overall Summary of Employment and Socio-economic Contribution

Gadani ship recycling industry is playing an important role in the provision of employments opportunities and livelihood to multiple segments of the society. It is providing direct employment opportunities at Gadani yard and in the industries directly related to the yard. They also provide indirect employment opportunities at Pakistan re-rolling mills and ancillary industries.

The employment mix of the industries has multiple ethnicities and diversities across the country as the workers belong to Khyber Pukhtunkhwa, Punjab, Sindh, Baluchistan and Gilgit Baltistan.

2.4.1.1 Overall Summary of Employment

Table 2.22 summarizes the summary of overall employment generated by the Gadani yard in terms of direct and indirect employment from 2014-15 to 2020-21. The table ranges from the employees directly involved in the yard to the employees providing the supply of steel items to the end users. The main employments consists of Gadani yard employees, employees at hotels in Gadani, transport, Pakistan re-rolling mills, construction industry, smelting and melting industry, wood and agree items, other machinery parts and industrial units and miscellaneous stores employees.

Table 2.22 shows that the industry is providing highest employment opportunities to 862 persons in 2014-15 and 2017-18 to the transportation industry from Gadani to Karachi. The table also shows the average number of employment opportunities to the transportation sector having the number of 729 and 712 in 2015-16 and 2016-17 respectively. The table further shows the

lowest number of employment opportunities in 2019-20, having 52 workers in the transportation of steel from Gadani to Karachi.

Table 2.22 also depicts a highest number of employment opportunities in hoteling industry located in Gadani yard in 2014-15 and 2017-18 having 100 employees. The table also shows the average number of employment opportunities 80 employees in 2015-16 and 2016-17. While, the table further shows the lowest number of employment opportunities of 45 persons in hoteling industry at Gadani yard in, 2019-20.

Table 2.22 recorded the highest number of 22500 direct employees by the Gadani yard in 2014-15 and 2017-18. The table also recorded the average number of employees in the Gadani yard of 17500 employees in 2015-16 and 2016-17. The table further recorded an employment opportunities of 13500 in 2018-19. The table recorded the lowest number of employment opportunities to 11000 persons by the Gadani yard directly involved in ship recycling activities in 2019-20.

Table 2.22 conveys the total number of the employees in Pakistan re-rolling mills. The table conveys that the re-rolling mills have employed a highest number of 30160 and 30154 employees 2014-15 and 2017-18 respectively. The table also conveys that the re-rolling mills employed an average number of 25503 and 24927 employees in 2015-16 and 2016-17 respectively. The table further conveys the lowest number of employees of 6051 in 2018-19, and 1820 in 2019-20 by the re-rolling mills.

The table 2.22 exhibits the indirect employment created by the ship breaking industry in terms of the transportation of the steel plates from the Karachi to country wise. The table exhibit a highest number of employment opportunities to 431 persons in 2014-15 and 2017-18 in the transportation industry. The table also shows an average number of employees by the transportation industry of 364 and 356 in the respective year 2015-16 and 2016-17. The table further reveals the lower number of 86 employees by the transportation industry in 2018-19. The table marginally exhibits the lowest number of 26 employees by the transportation industry in 2019-20.

Table 2.22 expresses the average number of employees by the miscellaneous steel stores for the period 2014-15 to 2020-21. It shows an average number of fixed 25000 employment in the steel stores for all the years. The number is fixed due to the supply of steel from multiple sources i.e. ship breaking, melting and Pakistan steel mills.

Table 2.22 depicts the construction industry indirect employment created by the use of steel supplied by Pakistan re-rolling mills in terms of the steel used in construction of the houses in the country. The table shows a highest number of

employment opportunities in construction industry to 156642 and 156611 persons in 2014-15 and 2017-18 respectively. It also depicts an average number of construction employees of 132456 and 129464 in the respective year of 2015-16 and 2016-17. It further reveals the lower number of 31429 employees in the construction industry of year 2018-19. The table marginally appears the lowest number of 9453 employees by the construction industry in 2019-20.

Table 2.22 depicts the indirect employment created by the supplying of steel materials to the construction sector for the periods 2014-15 to 2020-21. The table shows a maximum number of 208856 and 208815 employees in the transportation sector for the construction industry in respective year 2014-15 and 2017-18. It also reveals an average number of 176608 and 172618 employees by the transportation industry for the year 2015-16 and 2016-17 respectively in the transportation sector. It further shows the minor number of 41905 and 143319 employees by the transportation sector in 2018-19. The table additionally shows that the minimum number of 12603 employees in 2019-20 by the transportation sector.

Table 2.22 shows the average number of employees in the smelting and melting industries through the steel supplied from the shipbreaking industry operating at Gadani yard. The table manifests a greater number of 22900 and 22895 employees in the respective year of 2014-15 and 2017-18. It also depicts a regular number of 19364 employees in 2015-16 and 18927 employees in 2016-17 for the smelting and melting industry in Pakistan. It further reveals a smaller number of 4595 and 15714 employees for 2018-19. Also, the table shows the lowest number of 1358 employees by the smelting and melting industry in 2019-20.

Table 2.22: Summary of Overall Employment Generated by Gadani Ship Recycling Industry in Pakistan

S.No.	Year	Total Direct Employment on Trucks @2 Persons per Truck	Total Hotels at Gadani Yard	Total Direct Employees at Gadani Yard	Total Re-rolling Mills Employees	Total Indirect Employment on Trucks @2 Persons per Truck	Average Miscellaneous Steel Stores	Total Employees at Construction Industry Per Year	Total Trucks Employment per Year	Total Smelting and Melting Mills Employment	Total Other Machinery Parts and Industrial Units Employment	Total Wood and Electronics Items Employment	Total Value Chain Employment
1	**2014-15**	862	100	22500	30160	431	25000	156642	208856	22900	22500	1000	490,951
2	**2015-16**	729	80	17500	25503	364	25000	132456	176608	19364	19026	846	417,476
3	**2016-17**	712	80	17500	24927	356	25000	129464	172618	18927	18596	826	409,007
4	**2017-18**	862	100	22500	30154	431	25000	156611	208815	22895	22495	1000	490,862
5	**2018-19**	173	45	13500	6051	86	25000	31429	41905	4595	4514	201	127,499
6	2019-20	52	45	11,000	1820	26	25000	9453	12603	1382	1358	60	62799
7	2020-21	591	80	17,500	20,696	296	25000	107490	143319	15714	15440	686	346812

Table 2.22 further intimates an average number of employees by the other machinery parts and industrial units for the period 2014-15 and 2020-21. It shows a larger number of 22500 and 22495 employees for the respective year of 2014-15 and 2017-18 in the other machinery parts and industrial units. It also reveals a usual number of 19026 and 18596 employees for the respective year 2015-16 and 2016-17. The table further intimates the smaller 4514 and 15440 number of employees in 2018-19. However, the table intimates the least number of 1358 employees for the period of 2019-20 in the other machinery parts and industrial units.

Table 2.22 also reveals the quantity of employment information in the wood and agree items recovered from the recycling of ships for the period 2014-15 to 2020-21. The table reveals a highest number of 1000 employees for the period of 2014-15 and 2017-18. It table also reveals a typical number of 846 and 826 employees in 2015-16 and 2016-17 respectively. It further reveals the lower number of 201 and 686 employees for the respective year of 2018-19. Though, the table additionally reveals the minimum number of 60 employees in 2019-20 by the wood and agree items in the ship recycling industry in Pakistan.

The last column of table 2.22 expresses the total overall employment opportunities established by the Gadani ship recycling industry in Pakistan for the period 2014-15 to 2020-21. The table 2.22 shows that the Gadani yard has produced the highest number of 490951 and 490862 employment opportunities for the respective year of 2014-15 and 2017-18. It also expresses the average number of 417476 and 409007 employment opportunities for the year 2015-16 and 2016-17 by the yard. It further depicts the lower number of 127499 and 346812 employees for the year 2018-19. It marginally expresses the lowest overall number of 62799 employees for the year 2019-20 by the ship recycling industry operating in Gadani.

2.4.1.2 Overall Summary of Socio-economic Contribution

The section provides the overall summary of socio-economic contribution by the Gadani ship recycling industry in Pakistan. The contribution explains the dependent populations on the Gadani yard. The dependent population consists of the family members of direct employees working in the yard, hoteling employees, employees engaged in transportation of ship steel and other materials from Gadani yard to Karachi. While, the indirect employees' dependent population consists of the family members of workforce in re-rolling mills, transportations, constructions, average number of stores dependent populations, smelting and melting, other machinery parts and industrial units, wood and agree items of the Gadani ship recycling industry in Pakistan.

The first column of table 2.23 summarizes the average number of dependent population on the Gadani hotels for the period 2014-15 to 2020-21. The table

shows the highest dependent population on the Gadani hotels was 700 for the period 2014-15 and 2017-18. The table also shows the average number of 560 dependent populations on the hotels operating in Gadani yard for the period 2015-16 and 2016-17. The table further shows the lower number of 315 dependent populations on Gadani hotels for the years 2018-19 and 2019-20.

The second column of the table 2.23 recorded the average number of dependent population on the transportation industry of ship materials from Gadani to Karachi. The table recorded a highest number of 6032 and 6031 dependent population for the respective years 2014-15 and 2017-18. The table also recorded an average number of 5100 and 4985 dependent population for the year 2015-16 and 2016-17 respectively. The table further recorded the lower number of 1210 dependent population for 2018-19. While for 2019-20, the table recorded the lowest number of 364 dependent population on the transportation industry which are engaged in the supply of ship materials from Gadani to Karachi.

The third column of the table 2.23 explains the dependent population on the direct employees working in Gadani yard for the period 2014-15 to 2020-21. The table conveys for the year 2014-15 and 2017-18 a highest number of 157500 dependent populations directly on the yard. The table also witnessed an average number of 122500 dependent populations on the Gadani yard in 2015-16 and 2016-17. The table further witnessed a smaller number of 94500 and 122500 dependent population directly on the yard for the period 2018-19. While, the table witnessed lowest number of 77000 dependent populations directly linked with the yard for the period 2019-20.

The fourth column of table 2.23 indicates the dependent population of the re-rolling mills in Pakistan on the Gadani ship recycling industry for the period 2014-15 to 2020-21. The table indicates the maximum dependent population of 211120 and 211078 for the respective year 2014-15 and 2017-18. The table also indicates an average number 178522 and 174489 dependent population on re-rolling mills in Pakistan for 2015-16 and 2016-17 respectively. It further indicates a lower number of 42359 dependent populations on re-rolling mills for the fiscal year 2018-19. Whereas, it additionally indicates a lowest number of dependent population of 12740 for the year 2019-20 on the re-rolling mills in Pakistan.

The fifth column of the table 2.23 conveys the dependent population of the transportation industry used for the supply of ship steel from Karachi to the whole country for the period 2014-15 to 2020-21. The table conveys a larger number of 3016 and 3015 dependent population on the transportation of ship steel from Karachi to whole country for the respective year 2014-15 and 2017-18. It also conveys an average number of 2550 and 2493 dependent population on the transportation industry for the year 2015-16 and 2016-17 respectively.

The table further conveys the lessor number of 605 dependent population size for the year 2018-19. Similarly, the table conveys the least number of 182 dependent populations for the year 2019-20 in the transportation industry of the steel from Karachi to the whole country.

The sixth column of the table 2.23 communicates the information about the average number of dependent population on miscellaneous steel store. The information covers the period from 2014-15 to 2020-21. The data shows an average dependent population of 175000 for all the periods, identical due to the nature of handling of steel supplied by multiple industries including ship breaking and Pakistan steel mills etc.

The seventh column of table 2.23 manifest the data about the average number of dependent population on construction industry steel supplied by the re-rolling mills in Pakistan for the period 2014-15 to 2020-21. The table manifests the top number of 1096496 and 1096276 dependent populations on construction industry for the respective years of 2014-15 and 2017-18. It also manifests an average number of 927192 and 906246 dependent populations on the construction industry for the period 2015-16 and 2016-17 respectively. It further manifests a lower number of 220,002 dependent population on the construction industry for the respective year 2018-19. Whereas, the table marginally manifest the lowest number of 66168 dependent populations on construction industry steel supplied by the re-rolling mills in Pakistan.

The eight column of the table 2.23 depicts the data about the dependent population of transportation industry in terms of supply of the steel to ultimate users. The column covers the data about the socio-economic contribution created by the supply of steel to the construction of houses for the period 2014-15 to 2020-21. The table shows the greatest number of 1461995 and 1461702 dependent populations for the respective years 2014-15 and 2017-18. It also shows an average number of 1236256 and 1208329 dependent populations on transportation industry for the year 2015-16 and 2016-17 respectively. It further shows the lower number of 293,336 and 1,003,236 dependent populations for the respective year of 2018-19. Though, the table additionally provides information about the total number of 88,224 dependent populations on the transportation industry of the provision of steel materials from stores to the end users.

The ninth column of the table 2.23 reveals information about the dependent population on smelting and melting industries, utilized the steel recovered from the ship recycling industry in Gadani. The table reveals a greatest number of 160300 and 160268 dependent populations on the smelting and melting industries for the respective years 2014-15 and 2017-18. It also reveals information about average number of 135549 and 132487 dependent populations on industries for the year 2015-16 and 2016-17 respectively. It

further reveals the data about the total lower number of 32163 dependent population for the respective years 2018-19. Likewise, the table marginally reveals the lowest number of 9673 dependent populations for the year 2019-20 on the transportation industry of supply of steel materials to end users.

The tenth column of the table 2.23 provides information about total number of dependent population on the other machinery parts and industrial units utilized the steel supplied from the Gadani ship recycling industry in Pakistan. The table provides information about the total number of 157500 and 157468 dependent populations for the respective year of 2014-15 and 2017-18. It also provides information about an average number of 133181 and 130173 dependent populations on other machinery parts and industrial units for 2015-16 and 2016-17 respectively. It further reveals information about the lower number of 31601 dependent population for the respective years 2018-19. The table additionally provides the data about the lowest number of 9504 dependent populations on the other machinery parts and industrial units for the year 2019-20.

Table 2.23: Summary of Overall Socio-economic Contribution by Gadani Ship Recycling in Pakistan

S. No.	Year	Total Dependent Populations on Gadani Hotels	Total Dependent Populations on Gadani Yard Transportation	Total Dependent Populations of Direct Employees on Gadani Yard	Total Re-rolling Mills Dependent Population	Total Dependent Populations of Transportation- Indirect Employment	Avergae Steel Store Dependent Populations	Total Construction Industry Dependent Populations	Total Transport Dependent Populations	Total Smelting and Melting Mills Dependent Populations	Total Other Machinery Parts and Industrial Units Dependent Populations	Total Wood and Electronics Items Dependent Population	Total Value Chain Dependent Population
1	2014-15	700	6032	157500	211120	3016	175000	1096496	1461995	160300	157500	7000	3436658
2	2015-16	560	5100	122500	178522	2550	175000	927192	1236256	135549	133181	5919	2922330
3	2016-17	560	4985	122500	174489	2493	175000	906246	1208329	132487	130173	5785	2863047
4	2017-18	700	6031	157500	211078	3015	175000	1096276	1461702	160268	157468	6999	3436036
5	2018-19	315	1210	94500	42359	605	175000	220002	293336	32163	31601	1404	892496
6	2019-20	315	364	77000	12740	182	175000	66168	88224	9673	9504	422	439593
7	2020-21	560	4139	122500	144873	2070	175000	752427	1003236	109999	108078	4803	2427685

The eleventh column of the table indicates the data about the dependent population of wood and agree items for the period of 2014-15 to 2020-21. The table reveals a maximum number of 7000 and 6999 dependent populations for the respective year of 2014-15 and 2017-18 on the wood and agree items. It also shows an average number of 5919 and 5785 dependent population for the year 2015-16 and 2016-17 respectively. It further indicates the lower number of dependent population of 1404 for the respective years of 2018-19. It additionally shows the information about the lowest number of 422 dependent populations on the wood and agree items recovered from the recycling of ships in Gadani yard.

The last column of the table 2.23 shows the overall dependent population on the Gadani ship recycling industry in Pakistan. The table covers the time period for 2014-15 to 2020-21. The table provides information about the highest number of dependent population of 3436658 and 3436036 for the respective years of 2014-15 and 2017-18. The table also provides an average number of 2922330 and 2863047 dependent populations for the year 2015-16 and 2016-17 respectively. It further provides the lower number of dependent population of 892496 for the respective year of 2018-19. Furthermore, the table provides the data about the lowest number of 439593 dependent populations for the year 2019-20 on the ship recycling industry Gadani.

a. Breakdown of Direct Employment

The direct employees include skilled and unskilled workers having permanent and / or daily wages labour employment nature. Table 2.24 shows the direct employment at Gadani yard for the period 2014-15 to 2020-21. The direct employment consists of three parts: 1st part includes the number of employees directly attached with the industry; the 2nd part includes the number of employees attached with the transportation industry from Gadani to Karachi, while 3rd part includes the employees attached with the hoteling industry at Gadani. The transportation and hoteling industry employees have been included in direct employment due to the direct attachments and dependency on the Gadani yard.

The table 2.24 shows that the transportation industry has provided the highest employment opportunities of 861.7 and 861.5 employees in 2014-15 and 2017-18 respectively. It also shows the average provision of employment opportunities in transportation industry ranging 728.6 to 712.2 in 2015-16 and 2016-17 respectively. It further shows the lowest number of employees in 2018-19 and 2019-20 having 172.9 and 51.9 employees respectively in the transportation industry.

The table 2.24 also depicts the number of employees attached with hoteling industries operating in Gadani. The table witnessed a highest number of

employees in 2014-15 and 2017-18 having the number of 100 employees attached each year. It also provides information about the average the number of 80 employees in hoteling industries in 2015-16 and 2016-17 respectively. The table reveals about the lowest number of 45 employees in 2018-19, 2019-20 and 2020-21 respectively.

The table 2.24 also provides data about the total number of employees directly attached with the Gadani shipbreaking industry. The table shows the highest number of employees hired by the industry is 22500 in 2014-15 and 2017-18 respectively. It also shows the average number of 17500 employees in 2015-16 and 2016-17 respectively. The table shows the lowest number of employees of 11000 in 2019-20.

The table 2.24 shows total direct employment of Gadani shipbreaking yard. The table reveals a highest number of 23,464 employees respectively in 2014-15 and 2017-18. The table also witnessed the 18,309 and 18,292 numbers of employees respectively in 2015-16 and 2016-17. It further shows the total number of 13,718 and 18,171 employees for the year 2018-19 and 2020-21 respectively. The table shows the lowest 11,097 total number of employees in 2019-20 by the Gadani shipbreaking industry.

Table 2.24: Direct Employment at Gadani Yard

S.No.	Year	Total Direct Employment on Trucks @2 Persons per Truck	Total Hotels Employment at Gadani Yard	Total Direct Employees at Gadani Yard	Total Direct Employment attached with Gadani Yard (Hotels, Transportations and Direct Employees)
1	2014-15	861.7	100	22,500	23,462
2	2015-16	728.6	80	17,500	18,309
3	2016-17	712.2	80	17,500	18,292
4	2017-18	861.5	100	22,500	23,462
5	2018-19	172.9	45	13,500	13,718
6	2019-20	51.9	45	11000	11,097
7	2020-21	591.2	45	17500	18,171

i. Gadani Shipbreaking Direct Employees Dependent Population

This section provides detail about the dependent population linked with direct employees at Gadani Ship Recycling Yard. Table 2.25 shows the dependent populations of transportation, hoteling industry and direct employees at the Gadani yard.

Table 2.25 summarizes the details of direct dependent populations of hoteling industries operating in Gadani. The table witnessed a highest number of 700

populations each year population dependent on hoteling industry in 2014-15 and 2017-18. It also shows information about the average the number of dependent 560 populations on hoteling industry in 2015-16 and 2016-17. It further shows the lowest number of 315 dependent populations in 2018-19, 2019-20 and 2020-21 respectively.

Table 2.25 shows the dependent populations of transportation industry involved in transportation of steel and other items from Gadani to Karachi. It has recorded the highest number of dependent population of 6032 and 6031 populations in 2014-15 and 2017-18 respectively. The table also recorded the average 5100 and 4985 dependent populations on transportation industry in 2015-16 and 2016-17 respectively. It has further recorded the lowest number of 1,210 and 364 dependent populations in 2018-19 and 2019-20 respectively in the transportation industry. It has provided the evidence about the 4139 dependent populations in 2020-21 on transportation industry.

Table 2.25 also provides data about the total number of dependent population directly involved with the Gadani shipbreaking industry. It shows the highest number of 157,500 dependent populations each year on the industry in 2014-15 and 2017-18. It also shows the average dependent populations of 122,500 in 2015-16 and 2016-17 directly on the industry. The table further shows the dependent population of 122,500 for FY 2020-21 on shipbreaking industry at Gadani. Finally, the table shows the lowest dependent population of 77,000 in 2019-20 on the industry.

Table 2.25 shows total direct dependent populations on Gadani shipbreaking industry which includes the direct employees attached with the industry, transportation and the hotels at Gadani yard. The table revealed a highest number of dependent populations of 164,232 and 164,231 respectively in 2014-15 and 2017-18 on Gadani industry. It also shows the average dependent population of 128,160 and 128,045 in 2015-16 and 2016-17 respectively on the yard. The table further shows the total dependent populations of 96,025 and 127,199 for the year 2018-19 and 2020-21 respectively on Gadani shipbreaking industry. The table also summarizes the lowest dependent population of 77,679 in 2019-20 on Gadani shipbreaking industry.

Table 2.25: Dependent Populations of Gadani Shipbreaking Direct Employees

S.No.	Year	Total Dependent Populations on Gadani Hotels	Total Dependent Populations on Gadani Yard Transportation	Total Dependent Populations of Direct Employees on Gadani Yard	Total Direct Dependent Population on Gadani Yard
1	2014-15	700	6,032	157,500	164,232
2	2015-16	560	5,100	122,500	128,160
3	2016-17	560	4,985	122,500	128,045
4	2017-18	700	6,031	157,500	164,231
5	2018-19	315	1,210	94,500	96,025
6	2019-20	315	364	77000	77,679
7	2020-21	315	4139	122500	127,199

b. Breakdown of Indirect Employment

This section provides detailed breakdown of the indirect employment associated with the Gadani ship recycling industry in Pakistan. The indirect employees includes employees working in Pakistan re-rolling mills, constructions industry, smelters/steel melting, transportation industry, wood & agree items, and other industries including machinery parts and industrial units.

i. Pakistan Re-rolling Mills Indirect Employment

This section summarizes the indirect employment created by the Pakistan re-rolling mills in which the steel supplied from the Gadani ship recycling industry. Table 2.26 explains the data about the indirect employment in three industries i.e. direct employees at re-rolling mills, employees in transportation industry which supply steel from Karachi to whole country, average number of miscellaneous steel store employees. Table 2.26 further shows the total number of employment created by the re-rolling mills in Pakistan.

The first column of table 2.26 explains the number of indirect employees working directly in the re-rolling mills for the period 2014-15 to 2020-21. The table shows that the re-rolling mills has provided a maximum employment opportunities to 30160 employees directly associated with re-rolling employees for the year 2014-15 due to favorable business and legal environment. It also shows the lowest number of 1,820 employees for the year 2019-20 due to change in the legal and international environment for the import of tonnage across the globe.

The second column of table 2.26 provides information about the indirect employment created by the transportation industry through the supply of steel from Karachi to the whole country for the period 2014-15 to 2020-21. It provides a maximum number of 431 employment opportunities for the year 2014-15 and

2017-18 created in transportation industry due to the supply of steel from Karachi to remaining country. The data shows a direct relationship between the employment created in transportation industry and tonnage imported per year. The table further shows a lowest number of 49 employees in the transportation industry due to the lower tonnage imported for the year 2019-20.

The third column of the table 2.26 communicates an average number of employees in the miscellaneous steel store for the period 2014-15 to 2020-21. The table shows a fixed number of 25000 employees working in the steel stores for all the years. The numbers are kept constant due to the engagements of the employees in the supply of steel from re-rolling mills as well as other sources.

Table 2.26: Employment at Pakistan Re-rolling Mills and Associated Sectors

S.No.	Year	Total Re-rolling Mills Employees	Total Indirect Employment on Trucks	Average Miscellaneous Steel Stores Employees	Total Indirect Employment on Re-rolling Mills
1	2014-15	30160	431	25000	55591
2	2015-16	25,503	364	25000	50867
3	2016-17	24,927	356	25000	50283
4	2017-18	30,154	431	25000	55585
5	2018- 19	6,051	86	25000	31138
6	2019-20	1,820	49	25000	28486
7	2020-21	20,696	102	25000	32221

The last column of table 2.26 indicates the overall indirect employment created by the Pakistan re-rolling mills and associated industries/or sectors. The indirect employment is the summation of the employees directly engaged in re-rolling mills, transportation and steel stores. The table shows that indirect employment created through re-rolling mills were highest for the year 2014-15 having 55591 numbers of indirect employees. The numbers were highest due to favorable tax policies, stable exchange rate and higher demand for the steel. The table further provides information about the lowest number of 28486 employment opportunities created by Pakistan re-rolling mills and associated industries. The number was lowest due to the change in the taxation regimes and devaluation of Pakistani rupees.

ii. Pakistan Re-rolling Mills Indirect Employment Dependent Population

This subsection deals with the socio-economic contribution created by the re-rolling mills in Pakistan. The socio-economic contribution includes the dependent population in the direct re-rolling mills, transportation industry, and average steel stores.

Table 2.27 summarizes the dependent population on Pakistan re-rolling mills and their associated industry for the period 2014-15 to 2020-21.

The first column of table 2.27 presents information about the dependent population of the direct employees attached with re-rolling mills in Pakistan. It shows that the average dependent population of the re-rolling mills were highest i.e. 211,120 in the year 2014-15. It shows direct link with the tonnage imported for the said year due to favourable legal and business environment. It further shows a lowest dependent population of 187,922 for the year 2019-20 and indicates the consequences for the fluctuations in taxes and devaluation of Pakistani rupees.

The second column of the table 2.27 provides information about the dependent population of the transportation industry which supplies steel from Karachi to the whole country. The data covers the period 2014-15 to 2020-21.

The second column of the table 2.27 indicates a greatest number of 3016 dependent populations on the transportation industry in the year 2014-15. It linearly shows the relation between the supply of steel and transportation demand. The table further provides information about the lowest number of 182 dependent population on the transportation industry which clearly indicates the reduction in the supply of steel hence reduce the demand for the transpiration sector.

Table 2.27: Dependent Population on Pakistan Re-rolling Mills and Associated Sectors

S. No.	Year	Total Re-rolling Mills Dependent Population	Total Dependent Populations of Transportation-Indirect Employment	Average Steel Store Employees Dependent Populations	Total Dependent Population of Indirect Employment of Re-rolling Mills
1	2014-15	211120	3016	175000	389136
2	2015-16	178522	2550	175000	356072
3	2016-17	174489	2493	175000	351982
4	2017-18	211078	3015	175000	389093
5	2018- 19	42359	605	175000	217964
6	2019-20	12740	182	175000	187922
7	2020-21	144873	2070	175000	321942

The third column of the table 2.27 communicates information about the average number of dependent population on the steel stores in the country for the year 2014-15 to 2020-21. The table shows a fixed number of 175000 dependent populations on the steel stores operating country wise. The number is fixed due to the fixed number of employees taken for the steel stores.

The last column of table 2.27 reveals information about the overall dependent population on the Pakistan re-rolling mills and attached sectors. The data provides information about 2014-15 to 2020-21. The table witnessed a highest number of dependent populations of 389136 for the year 2014-15. The number was higher due to the higher supply of the steel from the ships. The table further reveals information for the year 2019-20 having lowest dependent population of 12740 on re-rolling mills and associated industry. The number is lower due the lower supply of steel from the ships in Pakistan.

iii. Construction Industry Indirect Employment

This subsection focused on the indirect employment created in construction industry that depends on supply materials based on ship steel through the re-rolling mills value chain involved. The data in this section considered the steel supplied from Pakistan re-rolling mills as an input for the construction industry and provides employment opportunities to multiple segments of industry.

Table 2.28 provides information about the indirect employment created construction industry through supplying steel from Pakistan re-rolling mills. The data covers the period for 2014-15 to 2020-21.

The first column of table 2.28 provides information about the total employment created in the construction industry. The table shows a highest number of 156642 employees in the construction industry for the year 2014-15. The number is higher due to the provision of steel supply and the more demand by the construction industry. It further shows the lowest number of 9453 employees in construction industry in the year 2019-20. The number has been reduced due to the reduction in the supply of steel from re-rolling mills in Pakistan.

The second column of the table 2.28 shows an average number of employees in the transportation industry through supplying of steel from the steel stores to the end users for the period 2014-15 to 2020-21. It shows that in 2014-15 the transportation industry witnessed a highest number of 208856 employees. The number was higher due the higher demand from the end users. The table further shows the lowest number of 12603 employees in the transportation industry for the year 2019-20. The number of employees is lower due to the lower demand from the construction industry.

Table 2.28: Construction Industry and Associated Sector Employment

S.No.	Year	Total Employees at Construction Industry Per Year	Total Trucks Employment per Year	Total Employment in Construction Industry including Transportation
1	2014-15	156642	208856	365499
2	2015-16	132456	176608	309064
3	2016-17	129464	172618	302082
4	2017-18	156611	208815	365425
5	2018- 19	31429	41905	73334
6	2019-20	9453	12603	22056
7	2020-21	107490	143319	250809

The last column of the table 2.28 shows the overall number of employees in the construction and transportation industry for the year 2014-15 to 2020-21. The data in table shows a highest number of 365499 total employees in the construction and transportation industries for the year 2014-15. The number of employees is higher due to the more supply of steel from Pakistan re-rolling mills and more demand from the construction industry. It further provides information about the construction and transportation industries for the year 2019-20 having lowest number of 22056 employees. The number of employees is lower due to the lesser supply of steel from the re-rolling mills and demand from the construction industry.

iv. Dependent Population on Construction Industry

This section focuses on the socio-economic contribution created by the construction industry. Table 2.29 summarizes the information about dependent population on construction industry and associated sectors for the period 2014-15 to 2020-21.

The first column of table 2.29 concludes about the dependent population on the construction industry for the year 2014-15 to 2020-21. The table shows a highest number 1096496 dependent population on the construction industry for the year 2014-15. The number of dependent population is higher due to the higher demand from the consumer about the re-rolling mill steel. The table further shows for the year 2019-20 a lowest number of 66168 dependent populations on the construction industry. The number is lower due to the reduction in the demand from the consumer and supply of steel from the re-rolling mills in Pakistan.

Table 2.29: Dependent Population on Construction Industry and Associated Sectors

S.No.	Year	Total Construction Industry Dependent Populations	Total Transport Dependent Populations	Total Dependent Population in Constructions Industry including Transportation
1	2014-15	1,096,496	1,461,995	2,558,491
2	2015-16	927,192	1,236,256	2,163,448
3	2016-17	906,246	1,208,329	2,114,575
4	2017-18	1,096,276	1,461,702	2,557,978
5	2018- 19	220,002	293,336	513,338
6	2019-20	66168	88,224	154,392
7	2020-21	752,427	1,003,236	1,755.662

The second column of the table 2.29 reveals information the dependent population on the transportation industry associated with the supply of steel to the construction industry for the year 2014-15 to 2020-21. The table reveals a maximum number of 1461995 dependent populations on the transportation industry for the year 2014-15. The number is higher due to the higher demand from the construction industry. For the year 2019-20, it further reveals a minimum number of 88,224 dependent populations on the transportation industry. The number of dependent population is lower due to the lower demand from the construction industry for the supply of steels.

The last column of the table 2.29 indicates the information about the total dependent population on the construction industry and associated sector. The table indicates the number of 2558491 highest dependent populations on the construction industry and associated transportation sector for the year 2014-15. The number indicates highest due to more demand by the construction industry for the steel of re-rolling mills in Pakistan. While, the table further indicated a lowest number of 154,392 dependent populations on construction industry and associated sector. The number is higher due to the more demand from the construction industry for the steel of Pakistan re-rolling mills.

v. Smelting and Melting Industry Indirect Employment

This section focused on the indirect employment generated by the smelting and melting mills in Pakistan. The indirect employment data covers the time period 2014-15 to 2020-21.Table 2.30 summarizes the information about indirect employment created by the smelting and melting mills in Pakistan. The table shows a highest number of 22900 employees in the smelting and melting mills for the year 2014-15. The number is higher due to the more supply of steel from the ship recycling industry and more demand by the melting and smelting mills in Pakistan. For the year 2019-20, the table reveals a lowest number of 1382 employees in the mills.

Table 2.30: Employment in Smelting and Melting Sector

S. No.	Year	Total Smelting and Melting Mills Employment
1	2014-15	22900
2	2015-16	19364
3	2016-17	18927
4	2017-18	22895
5	2018-19	4595
6	2019-20	1382
7	2020-21	15714

vi. Dependent Population on Smelting and Melting Industry

This section deals with the socio-economic contribution by the smelting and melting mills in Pakistan through calculating the dependent population for the years 2014-15 to 2020-21. Table 2.31 summarizes the information about the dependent population on the smelting and melting mills in Pakistan. Table indicates the highest number of 160300 dependent populations on the smelting and melting mills in Pakistan for the year 2014-15. The higher number shows the more employment in the smelting and melting mills. Table further indicates for the year 2019-20 a lowest number of 9673 dependent populations on the smelting and melting mills in Pakistan. The number is lower due to the reduction in the employment opportunities in the smelting and melting mills in Pakistan.

Table 2.31: Smelting and Melting Industry Dependent Population

S. No.	Year	Total Smelting and Melting Mills Dependent Populations
1	2014-15	160300
2	2015-16	135549
3	2016-17	132487
4	2017-18	160268
5	2018-19	32163
6	2019-20	9673
7	2020-21	109999

vii. Employment in Machinery Parts and Other Industrial Units

The section discusses about the employment created by machinery parts and other industrial units by utilizing the steel recovered from the ship recycling industry in Pakistan. The data covers the period 2014-15 to 2020-21.Table 2.32 concludes about the indirect employment created by the machinery parts and other industrial units in Pakistan by employing the steel recovered from the ship recycling in Gadani. Table shows a highest number of 22500 employees in the machinery parts and other industrial units for the year 2014-15. The number is

higher due to the more supply of ship steel to the machinery parts and other industrial units in Pakistan. The number is also higher due to the more demand from the industries. Table 2.32 further witnessed a lowest number of 1358 indirect employees in the machinery parts and other industrial units for the year 2019-20. The number is lowers due to the reduction in ship steel and demand by the machinery parts and other industrial units.

Table 2.32: Employment at Machinery Parts and Other Industrial Units

S. No.	Year	Total Other Machinery Parts and Industrial Units Employment
1	2014-15	22500
2	2015-16	19026
3	2016-17	18596
4	2017-18	22495
5	2018-19	4514
6	2019-20	1358
7	2020-21	15440

viii. Machinery Parts and Other Industrial Unit Employment- Industry Indirect Employment Dependent Population

The current section is focused on the socio-economic contribution created by the machinery parts and other industrial units for the period 2014-15 to 2020-21. Table 2.33 summarizes the dependent population on the machinery parts and industrial units which utilizes the ship steel. The table shows a higher number of 157500 dependent populations on the machinery parts and other industrial units for the year 2014-15. The number is higher due to the higher employment dependency on the sector. Table for 2019-20 indicates a lowest number of 9504 dependent population on the machinery parts and other industrial units in Pakistan. The number is lower due to the lesser engagement of employees in the industry and units.

Table 2.33: Machinery Parts and Other Industrial Units Dependent Population

S.No.	Year	Total Other Machinery Parts and Industrial Units Dependent Populations
1	2014-15	157500
2	2015-16	133181
3	2016-17	130173
4	2017-18	157468
5	2018-19	31601
6	2019-20	9504
7	2020-21	108078

ix. Wood and Agree Items - Indirect Employment

The indirect employment created in wood and agree items by the ship recycling industry in Pakistan are calculated in this section. The section considered the period of 2014-15 to 2020-21. Table 2.34 concludes information about the indirect employment created by the wood and agree items by supplying material from ship recycling in Gadani. Table recorded a highest number of 1000 employees in the wood and agree items for the year 2014-15. The number is higher due to more tonnage imported for the year. Table further shows, for the year 2019-20, a lowest number of 60 employees in the wood and agree items recycled from the ships in Gadani. The number is lower due to lesser import of tonnage for the said year.

Table 2.34: Employment at Wood and Agree Items

S. No.	Year	Total Wood and Electronics Items Employment
1	2014-15	1000
2	2015-16	846
3	2016-17	826
4	2017-18	1000
5	2018-19	201
6	2019-20	60
7	2020-21	686

x. Wood and Agree Items Indirect Employment Dependent Population

The current section is focused on the socio-economic contribution contributed by the wood and agree items for the year 2014-15 to 2020-21. Table 2.35 provides information about the total dependent population on the wood and agree items. Table shows a highest number of 7000 dependent populations on the wood and agree items for the year 2014-15. The number is higher because of the higher employment in the industry. Table further for the year 2019-20 indicates a lowest number of 422 dependent population on the wood and agree items. The number is lower due to the lesser employing in the sector.

Table 2.35: Wood and Agree Items Dependent Population

S. No.	Year	Total Wood and Agree Items Dependent Population
1	2014-15	7000
2	2015-16	5919
3	2016-17	5785
4	2017-18	6999
5	2018-19	1404
6	2019-20	422
7	2020-21	4803

2.4.2 Tax Revenue Generation by Gadani Ship Recycling Industry

This section describes the tax revenue generated / contributed by the Gadani ship recycling industry. Available data covered the period from 2014-15 to 2019-20. The tax revenue collected over the years is directly dependent on the tonnage imported.

Table 2.36 shows the amount of tax by the ship recycling industry in Pakistan for the period 2014-15. Table summarizes the information about the number of ships imported, the tonnage imported and the tax revenue collected by the government per year.

Table shows that the industry has imported a highest number of 137 ships having 1670851 metric tonnages for the year 2014-15. The industry has paid a tax amount of 12.6 billion rupees for the same year to both provincial and federal governments. It also shows that the industry has imported 117 ships possessing 1412864 metric tonnages for the year 2015-16. The government collected an amount of 11.3 billion rupees tax from the industry for the same year. Table further shows that the industry has imported approximately similar number of 118 ships containing 1380947 metric tonnage for the year 2016-17. The industry paid a tax amount of 11.6 billion rupees to the governments. Further, it shows for the year 2017-18 a slightly higher number of 123 ships and 1670516 metric tonnage imported by the Gadani ship recycling industry in Pakistan. The government has been collected a highest amount of 16.3 billion rupees tax from the industry.

Conversely, the industry has substantially reduced the import of ships to 43 along with 335241 metric tonnages for the year 2018-19. The government tax revenue also decreased to 4.8 billion rupees for the same year. The industry has imported a lowest number of 29 ships and 100827 metric tonnages for the year 2019-20. Further, the government has collected a lowest amount of 1.5 billion rupees for the same year.

Table 2.36: Details of Tax Revenue Generation from 2014-15 to 2019-20

S.No.	Year	No of Ships Imported Per Year	Tonnage Imported	Revenue Paid (PKR in Billions)
1.	2014-15	137	1,670,851	12.6
2.	2015-16	117	1,412,864	11.3
3.	2016-17	118	1,380,947	11.6
4.	2017-18	123	1,670,516	16.3
5.	2018-19	43	335,241	4.8
6.	2019-20	29	100827.39	1.5339
7.	2020-21	134	1,146,555	13.7309
8.	2021-22	142	1,183,610	23.11

Figure 2.3 shows the tax revenue generated by the government for the period 2014 to 2021. It shows that the government has collected an amount of rupees 12.6 billion in 2014-15 from the ship recycling industry in Gadani. The figure shows an approximately flatter tax revenue line for the next two years. The figure further depicts that the government has collected a highest amount of tax revenue collected by the governments in 2018-19. The tax revenue was higher due to the change in the regimes of taxation in the country. The tax revenue of the governments steeply reduced after 2017-18 due to the unfavorable governments taxation policies. The tax revenue of the government reached to a lowest level in 2019-20 due to the reduction in the number of ships and tonnage by the ship recycling investors.

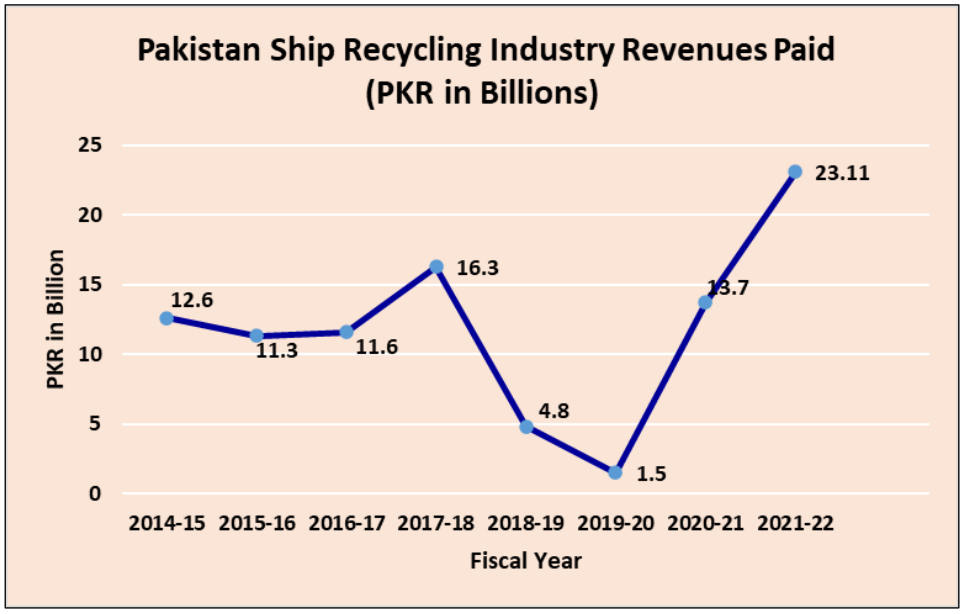

Figure 2.3: Revenue paid by Gadani Ship Recycling from FY 2014-15 to 2021-22

2.4.3 Share of Steel Plates towards Steel Demand, and Market Stabilization and Consumer Protection

The steel used by the end users in Pakistan are supplied from two main sources, primarily from the steel mills and ship recycling industry. The steel supplied from the steel mills considers as A class steel. The A class steel is used in high buildings and other important places. While the steel supplied by the ship breaking is considered as B class steel. The B class steel is used in the foundry, cutlery, garters, building constructions up to 05 floors and other related industries.

The country overall annual steel demand is approximately 06 million tons as per the State Bank of Pakistan. The data about the country steel demand is given in table 2.37, which was provided by the Pakistan ship breaking Association (PSBA). Table summarizes the demand for steel from other and

ship sources. Further, the officials provided that the country overall steel demand is approximately 05-5.5 million tons in which 1.5 million tons are supplied by the ship steel and 3.5-4 from other steel industries.

Table 2.37: Contribution and Market Stabilization of Steel Plates in the Protection of Consumer Steel Demand

S.No.	Total Pakistan Steel Demand	Other Industries Steel Supply	Re-rollabe Steel Materials from Shipbreaking Supply	Percentage
1	5-5.5 Million Tons	3.5-4 Million Tons	1.5 Million Tons	27.2727

Table shows that the ship steel plays an important role in the fulfillment of steel demand. Table shows that an approximately 27.27 percent of total demand is fulfilled by the ship steel and the remaining 72.73 percent demand is fulfilled by other sources. The percentage shows a substantial quantity supplied from the ship steel. The substantial quantity of steel clearly shows an important role in the stabilization of the steel market. It stabilizes the prices of the steel in the market and protect consumer from the higher steel prices.

2.4.4 Consumption Wise Breakdown of Gadani Ship Steel

This section provides consumption wise breakdown of Ship Steel viz-a-viz various industrial segments involved in the overall value chain. The section discusses about the different sectors in which the steel recovered from the ships are used. Table 2.38 summarizes the percentage of ship steel breakdown in different sectors as per the Pakistan shipbreaking Association. The officials provided information that the ship steel is 70 % used in re-rolling mills, 20 % in smelters and melters, 4% machinery parts and other industrial units, and 1 % wood and agree items.

Table 2.38 further provides information about the quantity of tonnage used in different sectors for the period 2014-15 to 2020-21. The first column shows that out of 1670851 metric tonnages imported 1,253,138.25 metric tons was used in rerolling mills, 334,170.20 metric ton used in smelters and melters, 66,834.04 metric ton in machinery parts and industrial units, and 16,708.51 metric ton used in wood and agree items for the year 2014-15.

For the year 2015-16, the table provided that out of 1412864 metric tonnage imported, 1059648 metric tons was used in rerolling mills, 282572.80 metric ton used in smelters and melters, 56514.56 metric ton in machinery parts and industrial units, and 14128.64 used in wood and agree items.

Further, for the year 2016-17, the table reveals that out of 1380947 metric tonnages, 1035710.25 metric tons was used in rerolling mills, 276189.40 metric ton used in smelters and melters, 55237.88 metric ton in machinery parts and industrial units, and 13809.47 metric ton used in wood and agree items.

Furthermore, the table 2.38 also shows for the year 2017-18 that out of 1670516 metric tonnages imported, 1,252,887 metric tons was used in rerolling mills, 334,103.20 metric ton used in smelters and melters, 66,820.64 metric ton in machinery parts and industrial units, and 16,705.16 used in wood and agree items.

Additionally, the table 2.38 indicates that out of 335,241 metric tonnages imported, 251430.75 metric tons was used in rerolling mills, 67048.20 metric ton used in smelters and melters, 13409.64 metric ton in machinery parts and industrial units, and 3352.41 metric ton used in wood and agree items for the year 2018-19.

Marginally, the table 2.38 manifest for the year 2019-20 that out of 99,819.12 metric tonnage imported, 75,620.54 metric tons was used in rerolling mills, 20,165.48 metric ton used in smelters and melters, 4,033.10 metric ton in machinery parts and industrial units, and 100,8.27 metric ton used in wood and agree items.

Table 2.38 also conveys the total tonnage imported for the first six months of 2020-21 calculated 1,135,089.45 metric tons in which, 859,916.25 metric tons was used in rerolling mills, 229,311.00 metric ton used in smelters and melters, 45,862.20 metric ton in machinery parts and industrial units, and 11,465.55 metric ton used in wood and agree items.

Table 2.38: Industry Wise Breakdown of Imported Recycled Ship Tonnage

		Fiscal Year	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
S.No.	Industry	Tonnage Imported (%age)	1,670,851	1,412,864	1,380,947	1,670,516	335,241	100,827	1,146,555
1	Consumption in Re-rolling Mills	70-75%	1,253,138.25	1,059,648.00	1,035,710.25	1,252,887.00	251,430.75	75,620.54	859,916.25
2	Smelters and Steel Melting	20%	334,170.20	282,572.80	276,189.40	334,103.20	67,048.20	20,165.48	229,311.00
3	Other Industries including Machinery Parts and Industrial units	4%	66,834.04	56,514.56	55,237.88	66,820.64	13,409.64	4,033.10	45,862.20
4	Wood and Agree Items	1%	16,708.51	14,128.64	13,809.47	16,705.16	3,352.41	100,8.27	1,146,5.55
Total		**100%**	1,670,851	1,412,864	1,380,947	1,670,516	335,241	99,819.12	1,135,089.45

2.5 Conclusions and Recommendations

Gadani ship recycling industry is considered as a vital industry in the maritime economy. The industry has a long history, dating back the pre-existence of Pakistan. The industry has witnessed a leading role in 1980's but due to the negligence by the government, the industry has lost its reputation. The geographical location of the industry has given a competitive advantage over other industries in the region having the potential of a leading industry. Currently, it is ranked on 3rd number after India and Bangladesh. FY 2014-15 revealed highest contribution in terms of steel tonnage as well as catering the dependant population size of 3,436,658 household persons through its direct and indirect value chain involved.

The industry imported highest tonnage of steel, approximately 1,670,851 tons in FY 2014-15, and imported the lowest tonnage in FY 2019-20,amounting to 100,827 tons. The industry has provided direct employment opportunities to about 100 employees working in the hoteling industry operating at Gadani yard during 2014-15. The industry also provided 862 personnel employment opportunities to the trucking sector, which supplied the ship materials from Gadani to Karachi during FY 2014-15. The industry further provided the highest number of employment opportunities during FY 2014-15 i.e. 22,500 persons who worked directly in the Gadani yard.

Further, the Gadani yard has also provided indirect employment opportunities through the re-rolling mills, transportation sector, steel stores, construction sector, smelting and melting mills, machinery parts & industrial units, and wood & agree items. The re-rolling mills employed 30,160 employees in 2014-15 for the production of steel bars from the ship steels. The transportation industry, which supplies the ship steel from Karachi to countrywide provided a highest number of approximate 430 employment opportunities in 2014-15. The average miscellaneous steel store which utilizes the re-rolling mills steel provided a highest number of 25,000 employment opportunities across all years. The main user of the re-rolling mills steel is the construction industry which has provided a highest number of 156,642 employment opportunities per year in 2014-15 to the workers engaged in construction activities. The construction industries are supplied steel through trucks which further provided employment opportunities to 208,856 persons in 2014-15. The ship steel is also used by the smelting and melting industries which provided employment opportunities in 2014-15. The ship steel further provides raw materials and machinery parts to other industrial units and provided employment opportunities to 22,500 people in the year 2014-15. Lastly, the wood and agree items recovered from the ships have also provided 1000 employment opportunities in 2014-15. Hence, the ship recycling

industry has provided highest employment opportunities in form of direct and indirect employment of 490,951 in 2014-15.

Though ship recycling industry has contributed in terms of employment, it also equally contributes to the ship steel demand and tax revenues. The overall country's steel demand is approximately 5 to 5.50 million tons in which approximately 1.5 million tons is contributed by the ship steel. Ship recycling industry has also paid a huge amount of 16.3 Billion rupees to Government of Pakistan on account of taxes in FY 2017-18.

Based on the facts and figuresit is concluded that this industry has a very significant socio-economic contribution in the development of country. Following is recommended for development and flourishing of green ship-recycling in:

a. The federal government needs to recognize the ship recycling industry as a separate industry, under the Ministry of Industries with a strong affiliation/connectivity with Ministry of Maritime Affairs.
b. The federal government needs to encourage and incentivize the investment in ship recycling industry in Pakistan
c. The government needs to develop a special regulation for the handling of ship recycling industry in Pakistan
d. The federal government should simplify the tax structure reforms and ease of doing business in the ship recycling industry of Pakistan.

Section 3
Ship Recycling Site Analysis

SECTION 3: SHIP RECYCLING SITE ANALYSIS

3 ANALYSIS OF GADANI SHIP RECYCLING SITE

3.1 Ship Recycling Procedure

In recycling process, the first step is to park the ship through beaching method at a ship dismantling facility area on the shoreline of Gadani shipbreaking yard. After the clearing of toxic materials, the cutting process begins. Initially, big pieces are cut, which are then brought onto dry land for further cutting. The remaining part is then also brought to the dry land. However, this procedure varies from region to region depending upon beach aesthetics and available resources. There is a variety of methods used to park a ship prior to ship breaking process, which includes berthing, dry-docking, alongside, beaching and lifting towards dry land over a slip-way or through marine air bags.

Method of parking the ship followed at different ship recycling sites is dependent upon the suitability of geographical characteristics (nature of soil, climate, tidal range, sea currents etc.), along with infrastructure, environment, legislation, capabilities of workforce and costs of the operation[11]. Brief description of commonly used ship dismantling or recycling methods is given below:

3.1.1 Beaching Method

Beaching is a commonly used method in majority of places in India, Pakistan and Bangladesh. In this method, the ships are beached during spring tides in the inter-tidal zone by their own power or by tow. The size of the ship to be recycled is restricted by the beach slope, tidal range and material of the beach (a beach consisting of rocks or coarse causes hurdles and not suitable for beaching of the ship).

After getting statutory clearances, removal of items including insulation, machineries, furniture, tools, fuel oil, electrical fixtures etc. happens. Initially, the ships are cut vertically into large pieces using LPG-Oxygen torches. Pieces being cut which weigh hundreds of tons are then carried by crawler cranes to dry area. These pieces are then cut into marketable sizes and transported through trucks in order for dispatch to buyers. The remnants (i.e. the partially

[11] Gujarat Maritime Board, "EIA and EMP for Proposed Upgradation of Existing Ship Recycling Yard at Alang Sosiya, Gujarat."

cut ship) are pulled nearer to the shore using shore-based winches to ease material handling [12].

Figure 3.1: Beaching Method at Gadani Yard (January 2021)

3.1.2 Berthing Method

Berthing is another method of parking which involves breaking of ships berthed along quays. The ships are tied alongside a quay and cut into pieces while floating. Detachable materials/ items are removed and cutting process takes place using oxygen-acetylene or oxygen-LPG torches. Pieces weighing up to 5 tons are cut and let down onto the quay using ship-board or shore-based cranes. Quarter of the ship left after cutting the rest is then brought onto dry land through winching for further breaking [13].

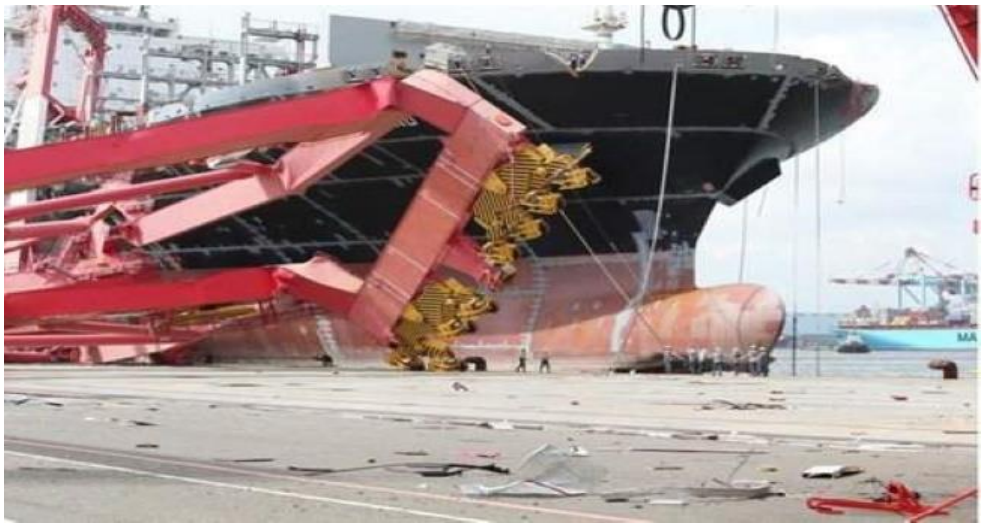

Figure 3.2: Berthing Method

[12] Mishra, "Non-Entry into Force of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009: An Analysis from the Perspective of India, Pakistan and Bangladesh."
[13] Hossain, "Ship Recycling Practice and Annual Reusable Material Output from Bangladesh Ship Recycling Industry."

3.1.3 *Dry-docking Method*

In this method, ships are broken up within docks which can be either graving or floating docks. The ship is properly positioned after moving into a graving or a submerged floating dock. If ship is moved inside a graving dock then the dock gates are shut and the water is driven out. In case of a floating dock, the dock is elevated and bringing the ship out of the water. Afterwards the ship is cut as per tradition [14].

Figure 3.3: Dry docking method at Swansea, Wales

3.1.4 *Air bag Method*

This method requires the ship to be winched onto dry land through a slipway of inflatable rubber bags. When the ship is settled on dry land over a queue of keel-blocks then air bags are detached. Usual cutting practices then take place. The principle of this method is altering the sliding friction into rolling friction. Winches, marine airbags and rigging are the basic instruments required for carrying out air bag method [15].

3.1.5 *Slip-way Method*

In slipway method, the ship or the vessel is driven on to the concrete/masonry slipway which connects shore and the sea. Typically, this method is adopted in areas with easily predictable low tidal flow. Normally, sections from the ship are removed using remote cranes and the ship is progressively dragged on the dry

[14] Hossain.

[15] Sunaryo and Pahalatua, "Green Ship Recycle Yard Design."

land as it is lightened. Since the tide is constant, predictable and steady, water front is present where the access and lifting activities take place[16].

3.1.6 Alongside Parking

The ship is halted in a sheltered harbor on a quay or wharf and dismantled in a vertical or top down manner piece by piece. Pieces are removed through cranes starting with the upper pieces till the lowest part of the hull. The remnant is then taken to the dry dock for final cutting. Countries such as China and Myanmar, which have areas with calm waters, usually follow this method [17].

3.2 Beaching Method – A Business as Usual case at Gadani

Ship recycling is a complex and cumbersome process involving several steps. There are several techniques for ship recycling, with different costs and degrees of social and environmental effects associated as per UNEP 2013. Beaching is the most dominant parking method for dismantling or recycling of ships which takes advantage of natural beaches with mudflats and high tidal zones while requiring minimum infrastructure and level of skills in the workforce. Deep sea level also results in no or lesser waiting time for ships to be brought onshore. However, this procedure also contaminates the seawater with oil and grease around the Gadani yard in Pakistan [18]

Beaching is the method used to park the ship so that the process of breaking takes place. After getting statutory clearances from Baluchistan Development Authority (BDA) and custom, movable items including insulation, machineries, furniture, tools, fuel oil, electrical fixtures etc. are detached. Ships or vessels can uphold their balance by lightening its weight, ballasting and de-ballasting in order to be winched nearer to the beach. In this method, the ships are beached during spring tides in the inter-tidal zone by their own power. Ships are driven at their maximum possible speed onto the beach over the mudflats. In case ships fail to make it to the beach and are stuck on the mudflats, they are winched using chains or heavyweight steel wires at the subsequent favorable tide.

Following the stranding, ships are cut vertically into large pieces beginning from its “Bow (Nall or nose)” using LPG-Oxygen torches. As the steel and other items are extracted from the ship through gas or oxygen cutting, the remnants (i.e. the partially cut ship) are pulled nearer to the shore using shore-based winches

[16] Hossain, “Ship Recycling Practice and Annual Reusable Material Output from Bangladesh Ship Recycling Industry.”
[17] Hossain.
[18] Nikkei Asia, “Pakistan’s Shipbreaking Yards Face Sea Change.”

to ease material handling. Pieces being cut which weigh hundreds of tons are then carried by crawler cranes to dry area. After being brought onshore, these pieces are then cut into smaller, marketable sizes and transported through trucks in order for dispatch to buyers. The engine of the ship is cut at the end.

Figure 3.4: Mechanized winches used for beaching method at Gadani Yard (January 2021)

Figure 3.5: Cutting of ship for recycling at Gadani Yard (January 2021)

Figure 3.6: Ship Remnants dragged nearer using shore-based winches at Gadani (January 2021)

3.3 Characteristics of Gadani Beach

Gadani is a coastal town of Lasbela district situated in the Southern part of Balochistan, which is around 50km away from country's largest city, Karachi, in the province of Sindh. Shipbreaking yard at Gadani is globally the third largest shipbreaking yard with a 10 km long beach front. The yard comprises of 132 plots, and all are solely dedicated to ship breaking practices. As claimed by the PSBA members, it is particularly a low tide beaching yard with a tide level of 3.2m. High tide at Gadani beach comes at least once in a day while it takes many days for high tides to come in India. Hence, there is lesser waiting time for high tide in Pakistan which is beneficial as compared to India.

Normally, the size of the ship to be beached for recycling is restricted by the beach slope, tidal range and material of the beach. Wide mudflats and high tidal ranges make Gadani a 'hotspot' for ship recycling. The slope of this low tide beach has two major impacts; reduction of the cost of transportation and time to break a ship. Deep sea and sandy beaches elevate the importance of Gadani yard for ship recycling process as ships are not required to wait due to the deep-sea beach. Silky sandy beach facilitates in beaching process as the sand slips from under the ship which aids in bringing it forward.

Figure 3.7: Gadani Beach (January 2021)

3.4 Comparison of Gadani Ship Beaching Method with Practices at Regional and International Yards

There are several methods available to park a ship onshore for shipbreaking. Different methods are followed in different parts of the world depending upon the geography, sea morphology, resources and environment. Beaching is the most common method of parking the ship for its recycling, which is found predominantly in South Asian countries including Bangladesh, Pakistan and India [19].

Beaching is considered as the most viable method to be adopted for parking of the ships at Gadani yard in Pakistan. According to this method, a ship is lightened of cargo and ballast and is driven at its maximum speed during high tide. Following the parking of ship onshore, workers cut it into large pieces which are then dragged onto dry land for further cutting. However, this method varies from the methods being adopted in European countries.

Some countries follow a uniform method in all their facility areas while some adopt different methods in different facility areas. This information is

[19] Galley, *Shipbreaking: Hazards and Liabilities*.

summarized in table 3.1 below which is extracted from the Official Journal of European Union [20].

Table 3.1: Parking Methods at Ship Recycling Facilities under the European List

Country	Ship Recycling site / location	Existing Parking Method
Belgium	Scheepszatestraat, Ghent	Alongside (wet birth), slope
Denmark	Kystvejen, Munkebo	Drydock
	Rolshøjvej, Grenaa	Alongside, drydock
	Langerak, Frederikshavn	Alongside, slipway
	Sandholm, Frederikshavn	Slipway
	Vikingkaj, Esbjerg	Alongside, Drydock
	Grusvej, Esbjerg	Drydock
Estonia	Kopli, Tallinn	Afloat at the quayside and in the floating dock
Spain	Port of "El Musel" , Gijon	Dismantling Ramp
France	ZI du Malaquis, Rue François Arago	Alongside, Drydock
	Boulevard Jules Durand, Le Havre	Floating and slipway
	Quai de Bacalan, Bordeaux Cedex	Alongside, Drydock
	Kerbriant, Plouigneau	Alongside, Drydock
Italy	Calata Boccardo, Genova	Alongside, Drydock
Latvia	Kapsedes street 2D, Liepāja	Alongside (wet berth), Drydock
Lithuania	Minijos, Klaipėda	Alongside (wet berth)
	Minijos, Klaipėda	Alongside (wet berth)
	Nemuno g. Klaipėda	Alongside (wet berth)
	Minijos, Klaipėda	Alongside (wet berth)
The Netherlands	Prof. Gerbrandyweg, Rotterdam-Botlek	Drydock
	Estlandweg, Nieuwdorp	Preparatory actions along the quayside, lifted onshore for scrapping
	Havenweg, Gravendeel	Wet mooring and Slipway
Norway	Sløvågen, Dalsøyra	Alongside, slipway, dry/wetdock
	Raunesvegen, Nedre Vats	Alongside
	Angholmen, Feda	Drydock (indoors), slipway
	Stokksundveien, Revsnes	Alongside
	Eldøyane, Stord	Alongside (wet berth), slipway
	Lutelandet Offshore, Korssund	Alongside
	Hanøytangen, Hauglandhella	Alongside, floating slipway, Drydock
Portugal	Aveiro	Drydock
Finland	Navirentie, Naantali	Alongside, Drydock
United Kingdom	Hartlepool, Cleveland	Wet berth
	Leith, Edinburgh	Dry dock and wet berth
	Queen's Island, Belfast	Dry dock and wet berth

[20] European Commission, "Commission Implementing Decision (EU) 2020/1675 of 11 November 2020."

3.5 Existing Ship Recycling Plots, Ownership and Land Rights at Gadani Yard

Gadani yard is comprised of 132 shipbreaking plots. Majority of these plots are on lease from private land owners and remaining are functioning on state/government owned land. The Baluchistan Development Authority (BDA) is the governmental department, which is in charge of maintaining physical infrastructure within the province.

As reported by the PSBA member, out of 132 plots, 100 plots are owned by private individuals, mainly the Baloch waderay (except for 5 to 7 plots). Other 32 plots are owned by the BDA, which are leased out to private shipbreaking firms. However, for all the 132 plots, BDA is responsible for ensuring development irrespective of the ownership. It is because BDA charges tax for this purpose from all the plot operators at Gadani beach yard. PSBA members were not satisfied with the developments made by BDA as only day light operations are possible due to unavailability of electricity. Overall, government does not invest in the development of lands and dichotomy exists between waderay and the BDA. However, it has been seen at Gadani that the BDA is working on a project on the subject of Modernization of Gadani Ship Breaking and Recycling Industry and Development of Allied Facilities.

3.6 Analysis of Alternatives

Ships can be parked using different methods for the purpose of ship recycling which include berthing, beaching, alongside, dry docking and slipway. The method adopted for parking varies from place to place depending upon access to infrastructure, geography, environment, legislation and skills of the workforce.

3.6.1 Alternative Parking Methods

Beaching is the most widely used method of parking the ships in most of the locations in Bangladesh, India and Pakistan. In this method, ships are parked when the tides are at higher magnitude. The ships are balanced by ballasting or de-ballasting and lightening the weight by eliminating removable items. Ships are then winched towards the shore and progressive cutting process takes place.

Typically, there is limited knowledge about safety regarding this method which causes accidents such as explosions, fatal injuries, causalities and lifetime disabilities. Although beaching is economically preferred method with infrastructure and machinery such as winches, material handling equipment and cranes, its environmental and safety oriented social concerns call for attention to adapt a proper standard operating procedure (SOP).

Figure 3.8: Winching of ship using beaching method at Gadani Yard (January, 2021)

On the other hand, berthing method involves breaking of ships berthed along quays and cut while being afloat. Quarter of the ship left after cutting the rest is then brought onto dry land through winching for further breaking. The cutting practices are to be carefully planned to prevent the ship from unbalancing and capsizing. However, requirements for this method include availability of quay, facilities for ship berthing, shore-based cranes and further material handling equipment. The size of the ship to be cut depends upon the length of the quay and directional restrictions for arriving at quay. Moreover, infrastructure is essential for the parking of hull bottom.

Berthing method is considered relatively more environmentally sound than the beaching method as it involves apparently lesser safeguards. However, entry of oil spills and other residual materials into the sea have more or less same likelihood than that of beaching method. Most of the wreckage produced on boarding the ship can be brought onshore for proper disposal. Moreover, as the berthing of ship is done along a quay, it is also possible to make arrangements for night shifts conveniently. Materials extracted from the ship are required to be transported over roads to material storing and sorting places located at a short distance, hence improving efficiency and saving fuel costs.

Another method being followed is dry-docking in which the ship is sailed into a graving dock and the water is pumped out making the dock dry for the ship dismantling process. Alternatively, ships are also sailed into water-logged floating dock where the ship is balanced prior to cutting. It is an environmentally sustainable method as spillages are limited to the dock and the material spilled

can be collected, sorted or disposed of at ease. But it is an expensive method as compared to beaching as it requires more infrastructure including dock and other related equipment. Size of the ship to be broken is restricted by the dimensions of the dock available. However, it is economically preferable to utilize dry docks for the sake of repairing and building ships than for breaking them. In this method, entry of oil spills and other residual materials into the sea have more or less same likelihood than that of beaching method.

In air bag method, the ship is lifted towards dry land through a slipway of rubber bags. This method needs substantial infrastructure though lesser than the requirement of dry-docking method and demands for highly skilled workforce to winch the ship towards dry land. This method greatly reduces the chances of water pollution as all operations are performed in dry area. It is comparatively easier to contain and gather leaked oil and other waste material in pumping operations. However, this method also allows achieving efficiency while working around the clock.

In alongside method, the ship is stopped on quay in a sheltered wharf and the pieces are detached by crane in a top-down manner. The local effect of any contamination is likely to be augmented in this technique as there is no tidal dispersion effect. However, this indicates that concentrations can be appropriately observed, controlled and cleaned if needed. This method is widely used in China while assuring safe ship recycling. The merits and demerits of different ship parking methods at various recycling facilities are summarized in Table 3.2.

Table 3.2: Merits / demerits of different ship parking methods at recycling facility

Attribute	Beaching	Dry-docking	Berthing	Air-bag	Slip-way
Size of Ship	Restricted only by tidal range at site	Restricted by dimensions and specifications of dry dock	Restricted by navigational constraints and quay length	Restricted by load bearing capacity of airbags	Restricted
Infrastructure Requirement	Minimum, only mechanical material handling equipment required	Drydock and mechanical material handling equipment required	Quay and mechanical handling equipment required	Winches, air-bags, air compressors, keel blocks and mechanical handling equipment required	Civil infrastructure, winches and mechanical handling equipment required
Working efficiency	Low as mobile machinery has to be withdrawn during high	Round the clock working possible. Material	Round the clock working possible. Material	Round the clock working possible. Material	Round the clock working possible. Material

Attribute	Beaching	Dry-docking	Berthing	Air-bag	Slip-way
	tides. Working during day time only. Recovered material has to be carried / winched across hundreds of m of inter-tidal zone.	sorting and storage areas may be located close by.	sorting and storage areas may be located close by.	sorting and storage areas may be located close by.	sorting and storage areas may be located close by.
Time Required	Fast	Fast but less than that for beaching	Slow	Fast	Fast
Effect of stormy weather	Rough seas may restrict deployment of men and machines and increase pollution	No effect	May have some effect	No effect	No effect
Pollution potential	Maximum	Minimum	May be high but can be controlled to some extent	Low	Low
Time for casualty evacuation	Has to wait till low tide.	Minimum delay	Minimum delay	Minimum delay	Minimum delay

Source: EIA and EMP for proposed upgradation at Alang, India [21]

3.6.2 Comparison of Gadani Beach with other Locations inside Pakistan

In Pakistan, shipbreaking began in 1947, prior to independence, on the Gadani beach [22]. Beaching of ships was made easy due to the sandy beach (unlike the muddy beach in Bangladesh) and deep-sea level. The industry flourished after the country became independent and was at its maximum during 1970s and 1980s.

It is still reported by yard owners at Gadani that it is the most suitable location for shipbreaking as it has vast space so that land is not a constraint for the size of ship to be broken. Ships are not required to wait as Gadani has deep sea beaches. Ships can be easily pulled here as the beach has a favorable aesthetic for beaching as it is neither muddy nor very loose. Sandy beach facilitates in pulling the ship onshore as the sand slips from below the ship and brings it forward. The level of water is deep in Gadani so the ships are not

[21] Gujarat Maritime Board, "EIA and EMP for Proposed Upgradation of Existing Ship Recycling Yard at Alang Sosiya, Gujarat."
[22] Kumar, "Ship Dismantling: A Status Report on South Asia."

required to wait. In contrast, ships at other shipbreaking yards have to wait for weeks or even months for high tides so that the ship can be brought to beach.

According to PSBA members, it is particularly a low tide beach with a tide level of 3.2m and high tides are predictable with timings being noted. The slope of this low tide beach helps to reduce the cost of transportation, and time to break a ship. Gadani ship-breaking yard is also suitable for containers because high weight containers require low tide to break them. Moreover, to tackle oil pollution, Gadani ship-breaking yard is effective than India and other Asian countries because of its low-level tide. The majority of ships come from July to December at Gadani yard for dismantling.

On the other hand, the approval for establishment of shipbreaking yard at Gwadar has been made which is 600km away from Gadani. Government claims this initiative to be strategically of great importance which will create employment for the locals and boost revenue of the provincial economy [23]

However, PSBA members are not in favor of shipbreaking yard in Gwadar as the cost of transportation in Gwadar would be very high under the China-Pakistan Economic Corridor (CPEC) as compared to Gadani. Moreover, the "ideal" characteristics of beach at Gadani cannot be matched with the nature of beach in Gwadar.

3.7 Conclusion and Recommendations

Shipbreaking is one of the most dangerous occupations with most harmful environmental health impacts in the world. It is mainly carried out in the informal sector with minimum inspection and safety checks. This section discussed and analyzed a number of available methods for parking the ships as pre-requisite for ship recycling process. Beaching is the most feasible method which, although requires minimum infrastructure, but raises a serious question about environment and health safety concerns. Moreover, existing location of shipbreaking i.e. Gadani ship recycling yard is found to be the most suitable location considering the nature of beach and other contributing factors like transport cost in comparison with Gwadar.

There are various methods of parking the ship out of which, beaching is the one which is being followed in Bangladesh, Pakistan and India. This is a traditional or business as usual method, neglecting its harmful impacts. However, this method is not being followed in EU countries as they are more concerned with environmental impacts of their ship recycling practices. High economic cost is involved in those methods just like dry-docking. The issue of land ownership

[23] Business Recorder, "The Second Ship-Breaking Yard."

and rights is present, while the focused talks with PSBA members also revealed that stakeholders are not in favour of shipbreaking to take place at Gwadar under CPEC. Following are the recommendations:

- There is a need of long-term policy decision by the Federal Government for ship recycling through beaching method at Gadani
- Outstanding land issues are to be resolved and facilities should be provided by BDA,
- Although establishment of a new Ship recycling yard at Gwadar under CPEC has implications and concerns of economic operators in the value chain given the high transportation costs, an export oriented ship recycling facility may be considered at Gwadar.

Section 4

Ship Recycling Process at Gadani Yard

SECTION 4: SHIP RECYCLING PROCESS

4 SHIP RECYCLING PROCESS AT GADANI YARD

4.1 Ship Recycling Process at Gadani Yard

Ship dismantling or ship recycling is a process of breaking down a ship at the end of its life tenure for selling its parts - largely the steel. Worldwide, the shipping industry depends upon the developing nations to dispose of emeritus vessels and ships through ship breaking[24]. The shipbreaking procedure starts after a lengthy way for reaching the final destination at Gadani coast. Usually, end of life ships are bought through an intermediary who facilitates dealing between local yard and the international owner. These brokers are typically residing in Dubai, Hamburg or Singapore, having expertise in purchasing scrap ships from shipping companies with an aim to resell them. Change of flag into a convenient one is also a common practice. Loan is then received by the yard from local bank which is to be paid back in six months- approximate time needed for ship to be broken[25].

Primary way to break a ship is to cut it apart into numerous different parts prior to further breaking. During interviews at Gadani shipbreaking yard, it was revealed by the field supervisors that shipbreaking plan is not usually developed formally and it is in the minds of workers. However, after surveying various different shipbreaking plots at Gadani yard, a process flow diagram was attained from one plot owner, which is drawn in figure 4.1.

Parking/ placement of ship at facility area is the prerequisite step for ship breaking for which ‘beaching’ is the method used at Gadani shipbreaking yard. The ship is set offshore by the captain, waiting for perfect time for beaching by its own power at maximum speed during high tide. The engine is shut down and the ship is made steady by dropping the anchor. Once the ship is brought to its exact position within cutting zone, its inspection is done and oils are removed by experts to clear the tanks. To prevent explosions in the yard, the fuel tanks are completely drained by removing all the flammable materials. Primary cutting of ships into parts according to its structural design then begins by the workforce. The big parts are pulled onshore using motorized winches for secondary and tertiary cutting.

[24] Pasha et al., “Assessment of Ship Breaking and Recycling Industries in Bangladesh—An Effective Step towards the Achievement of Environmental Sustainability.”
[25] Khan, “Shipbreaking: Mapping the Value Chain in Gaddani Pakistan.”

Some informative documents were also extracted from different companies operating at Gadani. Detailed matrix elaborating the process flow chart (figure 4.1) is also attached as Annex C. Details of all the steps involved are given in the table comprising of responsible persons, related procedure, quality parameter, acceptance criteria and legal applicable requirement.

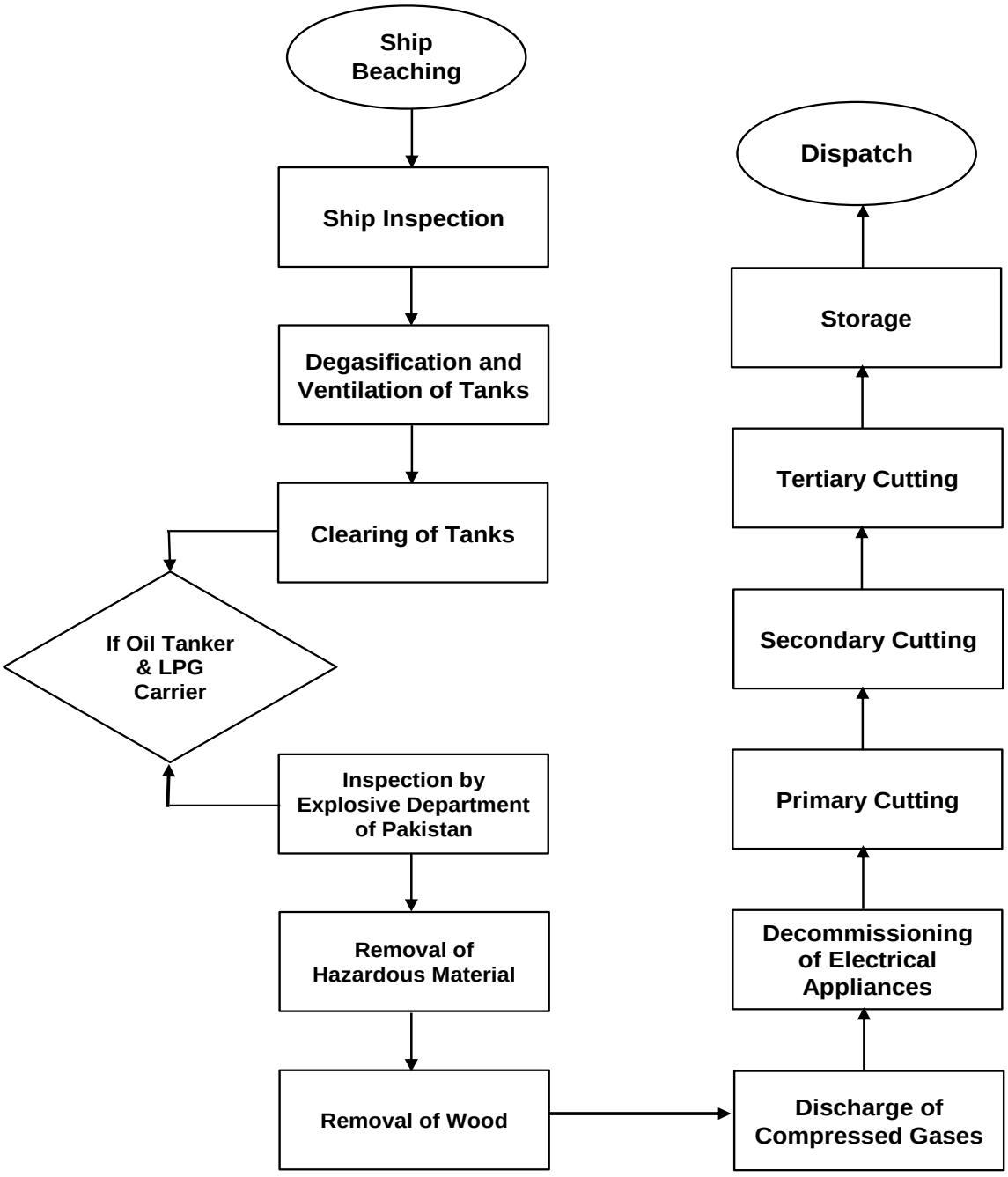

Figure 4.1: Process flow chart followed at Gadani Shipbreaking Yard

There are number of administrative procedures set in motion by the time ships arrive in the international waters of Pakistan. BDA supervises this industry and Balochistan Environmental Protection Agency (BEPA) is in charge of vessel

check and confirming it as gas-free. According to this act, ship breaking at Gaddani or at any other location in the coastal zone of Baluchistan shall abide by all the concerned obligations under the “Basel Convention on the Control of Trans-boundary Movements of Hazardous Waste and their Disposal”, Rotterdam Convention “on the prior Informed Consent (PIC) Procedure for certain Hazardous Chemicals and Pesticides in International Trade” and other relevant Treaties/Protocols and provisions of this Act. [26]. Table 4.1 shows environmental, health and safety management and monitoring plan of M/S Salam International Company operating at Gadani shipbreaking yard. This plan is technically sound good and needs to be adopted at all recycling facilities at Gadani Yard. However, such a plan is being followed for all ships for breaking purpose at Gadani, but in an informal way. Generally, different methods are used to determine the air quality, drinking water, noise level, soil quality, hazardous environmental, health & safety management and monitoring plan of non-hazardous solid waste.

Despite the fact that country is signatory to various international conventions such as Basel Protocol, no policy framework exists to cope with the environmental and safety issues of this industry. Although, Pakistan is involved in shipbreaking for decades, there was merely any legal provision until in 2012, Balochistan Environmental Protection Act promulgated. Legal and miscellaneous requirements matrix has been developed by the yard which is attach as Annex D.

[26] Khan.

Table 4.1: Environmental, Health and Safety Management and Monitoring Plan

S No	Environmental, Health & Safety Aspects	Environmental, Health & Safety Impacts	Method	Monitoring Parameter / Management	Monitoring Frequency	Responsibility
1.	Air Quality	Air Contamination, Suffocation, Nasal Track Inflammation, Fainting, Difficulty in breathing, Lungs damage and damage to plant's photosynthesis ability	Ambient air analyzer	SO_2, NO_2, CO, CO_2, VOCs, PM_{10}, PM_{25}	Annually	QHSE Manager/ Yard Manager or Designee
		Difficulty in breathing Lungs damage Anemia	Portable Exhaust or stack gas analyzer	Emission of CO, NO_X, SO_X, and H_2S	Annually	QHSE Manager. Yard Manager or Designee
		Fainting instant death, Suffocation due to presence of toxic gases or low level of oxygen	Gas Monitoring	O_2, H_2S, CH_4 and CO	Before entry to confined spaces	QHSE Manager. Yard Manager or Designee
2.	Noise Level	Threshold Shift by high Noise exposure such as; Hearing loss and Deafness	Using sound pressure level meter	Noise level	Annually	QHSE Manager. Yard Manager or Designee
3.	Drinking Water	Water-Borne Diseases, Water Scarcity/ Dehydration, Skin infections	Tests of drinking water quality	**Microbial Analysis:** Total Bacterial Count. Total Coliforms, E-coli, Fecal Coliforms, Fecal Streptococci and Coliforms, **Chemical analysis:** Temp, Ph, Hardness, TDS, TSS, Calcium	Annually	QHSE Manager. Yard Manager or Designee
4.	Soil Quality	Soil Contamination	Test for soil quality	Oil and grease	Annually	QHSE Manager. Yard Manager or Designee
5.	Hazardous & Non-Hazardous Solid Waste	Health hazards related to solid waste generated. Property loss Unaesthetic conditions	Incineration or any other disposal method recommended by BEPA	Hazardous waste will not be mixed with non-hazardous Transfer and dispose of hazardous solid waste will be done by BEPA approved contractors	As per the requirement	QHSE Manager. Yard Manager or Designee

4.2 Products and Wastes

Storage areas, tanks and compartments of a ship may possess hazardous substances like oils, fuels, Asbestos, Lead, PCBs and other harmful wastes. In various cases, a facility will dispose of certain items due to the presumption that those items contain hazardous materials. Generally, waste materials are dumped in the nearby areas of the yard. In such circumstances, the employer is supposed to use suitable engineering controls to confirm the proper protection of workers from exposure involved in removal. For the sake of protection against harmful wastes and environmental protection, the Hazardous Substances Rules (2003) under the Pakistan Environmental Protection Act (PEPA) (1997) as well as the Baluchistan Environmental Protection Act 2012 are applicable to the shipbreaking industry. Various aspects regarding environmental, health and safety are assessed using different methods which are shown in table 4.1.

4.2.1 Removal of movable articles

Different movable items like mattresses, bathroom accessories, wood etc. are all removed.

4.2.2 Removal of oils and other liquids

Ships mostly contain oils, fuels and various other combustible materials. Removal of the liquids including fuels and oils from the ship normally happens throughout the ship breaking process. Water may gather because of rain, use of cooling water in hot work space or firefighting action during the shipbreaking process which needs to be removed properly. BEPA is responsible for checking and declaring the ship as gas-free.

4.2.3 Removal of Equipment (reusable)

Different equipment like anchors, fixtures and chains are removed at priority. Large reusable parts like engine are extracted when they become accessible. Propellers are also removed in order to ease the pulling of hull into shallow water.

4.2.4 Disposition of Asbestos and PCBs

Materials containing asbestos are usually extracted in two stages. Prior to cutting away a segment of the ship, the asbestos material is cleared from portions that are yet to be cut and also from those portions which are readily accessible. Outstanding materials are cleared onshore. Asbestos is mainly found in engine rooms, hence, it takes the longest for asbestos removal.

4.2.5 Surface Cleaning

After clearing the asbestos, paints, combustible materials and PCBs, the preservative coatings are to be stripped from outside prior to initiate cutting process. Materials on the outside walls which is hard to remove and need specific preparation like grit blasting or flame removal of paint.

4.2.6 Cutting of Metal

Final cutting stage begins after a thorough preparatory phase. In the cutting phase, superstructure, upper decks and systems are cut first, then main back deck and lower decks are cut afterwards. In Pakistan, cutting is usually done manually with the use of cutting torches, but may be done with saws and shears for nonferrous metals. After cutting the large parts of ship, they are lifted through crane and brought to ground. Those large parts are then cut into specific sizes and shapes as demanded by the buyers to whom the scrap is supplied. As weight of the structure is lightened due to continuous cutting, the residual hull floats higher to expose and reach lower areas of the hull. Eventually, the remnants are pulled ashore and cut.

4.2.7 Recycling of Materials

Metals including Aluminium, steel, Copper, Copper alloys, and Lead are the major types of metals representing the bulk of scrap metal. Other metals are sold to scrap metal brokers or re-melting firms after being sorted. Steel is the most common metal used in the construction of ships and armor plate is the most common type of scrap present. There is a wide variety of steel being used in ships which include; high strength steels, stainless steel, mild steel and numerous cast iron forgings with distinct values in the recycled metal market. With the use of separators and shredders, precious metals like copper in electric cable may be recovered.

4.2.8 Waste Materials

There is a sufficient amount of waste materials contained by the ships. It refers to the materials that have no significance in domestic recycling market. Wastes include fabrics and small items (like switches and motors), paint flakes, acoustic insulation and thermal, gaskets and detritus produced during the process. As witnessed and informed by the plot owners at Gadani shipbreaking yard, there is no proper channel for proper disposal of waste materials and it is haphazardly being dumped on land.

4.3 Requirement of Social, Environmental and Workplace Safety

Shipbreaking has become a major occupational and environmental health issue worldwide. Shipbreaking activities are majorly concentrated in the developing South Asian countries as they prioritize economic development over labor

justice and environmental protection[27]. It is one of the most hazardous of occupations, with excessively high levels of mortalities, injuries and work-related ailments. Shipbreaking is a tough and cumbersome process because of the structural complexity of the ships. It creates various environmental, safety and health threats. It is hardly subjected to safety controls or inspection as it is carried out mainly in the informal sector. Workers are generally deprived of personal protective equipment during work and have less training. Poorly supervised work operations, inadequate safety checks, and greater chances of explosions make work situations dangerous. Ships generally have excessive amount of toxics like lead, ozone depleting substances, asbestos, PCBs and heavy metals. The toxins negatively impact workers' health and destroy nearby coastal ecosystem. Access to healthcare facilities is very limited for the workers and inadequate housing; wellbeing and sanitary services worsen the plight of the workers[28].

The current shipbreaking industry and its practices seriously threaten the surrounding natural environment as dangerous waste materials are discharged from the broken ships which are being dumped into the nearby area with no adequate waste management system. Resultantly, the air, soil and water at shipbreaking areas are greatly polluted. Biodiversity of the terrestrial and marine ecosystems are also susceptible. In addition, cutting of trees to create more space for shipbreaking activities lead to augment the negative externalities on the environment[29].

4.4 Safety & Health Practices and Environmental Measures at Gadani Yard

Within Pakistan's scenario, shipbreaking remains a hazardous industry for workers as well as environment. Workers have to work in hostile and dangerous environment with scarce facilities. Majority of the workers, roughly 6,000 workers at Gadani accept the jobs at their own risk[30]. During conversations with workers at Gadani shipbreaking yard, it was claimed that they do not have adequate sanitation and housing facilities. They are not provided with proper PPEs and were exposed to harmful work. They had covered their mouths with scarves due to the non-providence of masks. There are few safety regulations, and certainly no contracts or insurance to cover life risks, although BDA charges an amount of 25 rupees monthly for provision of health facilities. If a worker expires during work, only hope for his family is that the labor union will

[27] Kutub et al., "Ship Breaking Industries and Their Impacts on the Local People and Environment of Coastal Areas of Bangladesh."
[28] ILO Pakistan, "Decent Work Country Programme II - Annual Report."
[29] Kutub et al., "Ship Breaking Industries and Their Impacts on the Local People and Environment of Coastal Areas of Bangladesh."
[30] Environmental Justice Atlas, "Dirty and Dangerous Shipbreaking in Gadani, Pakistan."

work out the meager amount of 200,000 rupees, and that too is usually not confirmed.

During the visit, there was a fire explosion in the ship when labor force was at work within the ship. There was no proper mechanism to distinguish the fire and it was quite a normal situation for the workers and supervisors, bearing the risk of accidental injuries or death. During discussions with PSBA members, it was revealed that Gadani shipbreaking yards are still not fulfilling the standards of EU and HKC for the certification. They also realized that Gadani lacks the primary facilities including access to medical services, sewage system, electricity, clean drinking water and public infrastructure. Although, variety of sign boards showing different safety and health precautions were found within the yards. However, workers at Gadani yard severely lack formal education, so are unable to read the precautions. There is a lack of formal training for workers while team trainings are also inadequate.

Figure 4.2: Health precautionary board at Gadani shipbreaking yard, 2021

Figure 4.3: Assembly point board at a Gadani shipbreaking facility area 2021

4.5 Comparison of Existing Practices at Regional and International Yards

In the history, ships were recycled where they were manufactured: primarily in North American and European shipyards. After the 1970s, the shipbreaking industry moved to the areas with weaker enforcement mechanisms and legal frameworks due to stringent environmental and social protection laws in developed countries globally. Later on, during 1980s, the industry was relocated to South Asia which has resulted in economic development of that region. There was poor enforcement or even non-existence of coastal zone management laws, and no investment in infrastructure was required for a business to start. According to the World Bank Report, it is due to the match between demand and supply side conditions and attributes including: abundant labor supply, low wages and weaker regulations regarding health, occupation and environment are the significant factors[31].

Shipbreaking yards are functioning at different locations mainly in South Asian countries. In India, the industry is majorly operating at Alang in the State of Gujarat. There are also shipbreaking yards in Mumbai, Sachana, Azhikkal and Kolkata. In Bangladesh, the industry is functional on a beach in Sitakunda situated to the north of the port of Chittagong. In Pakistan, the industry is operating in Gadani, Lasbela district of Baluchistan; the geographical characteristics vary from beach to beach, which results to differences in operational practices at yards. During the course of this study, the state of existing practices was examined for operations in South Asian countries. Table

[31] World Bank, "The Ship Breaking and Recycling Industry in Bangladesh and Pakistan."

4.2 provides index score based state of green ship recycling practices at South Asian facilities.

Table 4.2: Index score based state of green ship recycling at South Asian facilities

Green Ship Recycling Index of South Asia			
Parameter	**Pakistan**	**India**	**Bangladesh**
Sandy Beach	5	5	0
Progress on HSE Certifications	3	4	0
Social Safeguards (Wages & Compensations)	3	3	1
Living Conditions	1	1	1
Infrastructure & Utilities	1	1	1
Mechanized Operations	4	4	1
Inventory of Hazardous Material	3	3	0
Recycling Plans & SOPs	3	4	1
HKC Preparedness	2	2	1
EU Certification	0	2	0
Overall Average	**2.5**	**2.9**	**0.6**
Scale: *0 = None to 5 = Very Good*			

As far as the regulatory framework, the political atmosphere and the economy are concerned, there are substantial differences between the three shipbreaking countries; however, the yards function under similar situations with respect to environmental, health and safety conditions at workplace. In these three countries, beaching is the method used to park the ships for the breaking. The beaching method does not allow to fully containing pollutants. Hazardous waste management is not adequately documented and managed.

Treatment, Storage and Disposal Facility (TSDF) has been established in Alang for the industry, but burning of waste on beaches is still being accounted and the imported quantities of hazardous waste and those disposed of properly are not recorded in a clear way. Moreover, ambulances and fire fighters in case of emergency are difficult to reach the ships on the beach. In addition, small cranes can be used to lift equipment on the beach; heavy machinery can just be used on smooth ground like on a pier or in port area. Resultantly, all three South Asian shipbreaking locations depend on the gravity method in which large steel pieces are put down by their own weight and crash onto the beach or into the water.

Shipbreaking is a hefty and perilous industry, exposing workers to high chances of accidents and work-related injuries/diseases. Large proportion of the labor force in these three locations is migrated from poorer areas of the countries. Workers are usually hired on daily wages with no permanent contract. They generally live in shanties near to the yards. Majority of the workers lack formal education and adequate training for the harmful tasks such

as asbestos removal. In all three countries, there is no proper recording or documentation of accidents and deaths as there is no systematic health screening of the workers and data is unavailable.

According to the ILO, shipbreaking has been developed as an environmental health problem and it is one of the most hazardous jobs worldwide. Fatalities and other serious accidents are normal in all three locations: workers falling from great heights, steel parts striking workers, fires, explosions, and workers' exposure to hazardous materials such as asbestos or toxic fumes. Over the last decade, in Chittagong, 210 workers have died while working at the shipbreaking yards. The International Law and Policy Institute's 2016 report states that 470 workers lost their lives between 2005 and 2012, and between 2013-2018, approximately 50 deaths were recorded in Alang. At Gadani, minimum 51 deaths were registered. However, actual number may exceed this figure as most of the deaths are not recorded due to lack of record maintenance.

In developing countries, establishing a balance between economic growth, environment and human rights in encouraging development and industrialization has remained a challenge for policymakers. The shipbreaking industry is a sector which has been greatly pressurized by the stakeholders globally and domestically to operate in a sustainable manner. Taking into consideration the issues of environmental pollution and the labor rights in the shipbreaking yards, Ship Recycling Regulation (EU-SRR) Code was evolved by the European Union Commission which is in action since December 30, 2018. Its requirements include: the ship owners can send their ships to certified green yards only; European ship owners are accountable for one third of end-of-life vessels that are dismantled in the South Asian shipbreaking yards. Lack of adequate waste reception facilities, health and safety services for workers, and support from ship owners to deliver the required documentation are the reasons for which not a single shipbreaking yard from Pakistan, India and Bangladesh has stepped into the green yard list of the EU-SRR. This restricts the ship owners to send their ships to South Asia shipyards.

Since last decade, active implementation of international conventions including Basel Convention, 1989 and guidelines set by the International Maritime Organization (IMO) and ILO to respond to several issues in the shipbreaking is increasingly highlighted. The Basel Convention emphasizing the "Control of Transboundary Movements of Hazardous Wastes and their Disposal" was established in 1992 and controls the trade of harmful waste materials. It is relevant for ship breaking as ships' structure normally contains hazardous materials.

However, instead of executing the Basel Convention, South Asian shipbreaking industry stressed for another less strict legislative tool at the IMO. Accepted in 2009, the HKC has not yet been implemented in India but it has been ratified in 2019. There has been a proliferation of the so-called "Statements of Compliance" with the HKC, statements which are issued on a business-to-business basis and just another effort to get rid of the harmful and unsustainable practices by the industry in South Asia.

Efforts have been made at different levels in Pakistan, India and Bangladesh to endorse HKC. It has been claimed by the PSBA members that they are still working to comply with the HKC standards and ratify it. The Japan International Corporation Agency (JICA) is in agreement with the Indian government to provide assistance to the shipbreaking yards functioning in Alang to meet the requirements of HKC. However, beaching method is not rejected by JICA and it is currently being contested after the approval of agreement upon Environmental Impact Assessment.

If the shipbreaking yards do not progress and make a shift to sustainable shipbreaking practices, then alarming situation will prevail for the South Asian countries. Domestic politics, lobby and power dynamics play a major role in hindering a move towards green ship recycling in these countries. However, some of the shipbreaking yards in South Asia may succeed to pass through the regulatory process but fail to sustain in the long-run. Majority of the betterments have been done in the shipbreaking yards of India, such as, a landfill site and TSDF have been established and the Gujarat Maritime Board (GMB) has assured the construction of a hospital near to the yards and same has been reported by the PSBA members that a hospital is under construction in the yards area.

4.6 State of Best Practices for Green Ship Recycling at Gadani Yard

There is a possible alternative to hazardous shipbreaking: ship recycling. It is considered as the most environmentally sound and economically viable way of disposing of the ships at retirement. The dirty shipbreaking activities have caused the dumping of toxic materials like asbestos and PCBs at different spaces including beaches. Increase in awareness about maritime environment has brought several changes in this process and the concept of "green ship-recycling" emerged globally. It lessens the amount of waste and keep the beaches safe from the wastes due to shipbreaking hence reducing its negative impacts on the environment.

According to PSBA members, Gadani shipbreaking yard employs approximately 30,000 to 40,000 workers and 100 to 150 workers are assigned to work on a single ship. However, it varies with the size of ship as ships with lesser LDT take less time than with higher LDT. No woman or

children were found to be working there and prohibition of employing workers below the age of 18 years was displayed on various places in Gadani. Majority of the labor working there is migrated from different provinces and some are from the Baluchistan province as well.

Although there is a higher degree of mechanization in Gadani, still there is a need for much stronger modernization in this industry. State of working conditions, safety and waste management at Gadani is still in conflict. Some of the workers were provided with PPEs. Health care services are not properly equipped to cope with the extent and nature of injuries usually in ship breaking. Just first aid is provided to workers on spot without any trained medical staff. Ultimately, in case of serious injury, the worker must be taken to Karachi, and the consequential delays for treatment can cause death.

The eventual aim will be the application of the International Convention for the Safe and Environmentally Sound Recycling of Ships in every country. However, other relevant international tools executed in national law have connections with the shipbreaking industry also. These tools include the Basel Convention of 1989 on the “Control of Trans-boundary Movements of Hazardous Wastes and their Disposal”, the Stockholm Convention, 2001 on “Persistent Organic Pollutants”, and the Montreal Protocol of 1987 on Ozone Depleting Substances, as well as occupational safety and health issues under the ILO. All of these encourage the necessary infrastructure for safe and environmentally sound management of harmful materials and wastes caused by shipbreaking.

While having discussion with PSBA members, they clearly showed their openness to dialogue and interest in learning about HKC. While the convention is still at primary stages, they are making efforts to achieve the prescribed standards. However, different certifications are attained by the plot owners at Gadani. During the site visit, some of the certificates were extracted from them which are shown in figure 4.4.

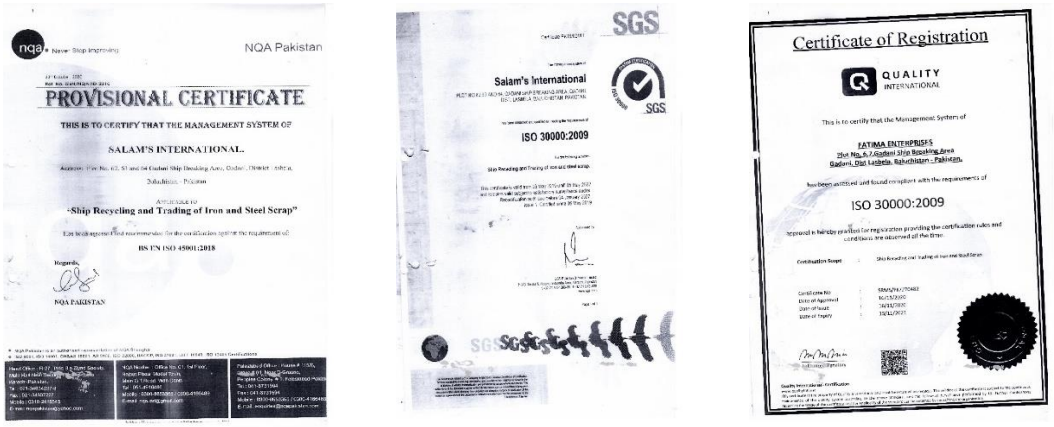

Figure 4.4: ISO Certificates of Plot Owners at Gadani

4.7 Relevant Stakeholders

Shipbreaking or the process of dismantling retired ships for the sake of disposing or scrapping has become a target for stakeholder scrutiny. Its negative environmental and social effects include miserable working conditions and environmental destruction. Though beaching is the most criticized method of parking the ship but it is commonly used in South Asia. Controversial shipbreaking not only involves the dredging and shipping industries, but a variety of other industries from consumer services to utilities.

Several conventions have openly addressed the matter of shipbreaking, additional alterations and ratifications to which pose regulatory implications for companies. In the meantime, the European Parliament may start charging penalties on EU ship owners who sell their ships for breaking in the developing countries, indicating its strengthening stance on debatable shipbreaking.

There is a long list of stakeholders involved in this cumbersome process of shipbreaking which include workers, ship owners, brokers, cash buyers and consultants, the Federal and Provincial Governments and authorities and the representatives of the shipbreaking industry in Pakistan (BDA, BEPA, Planning Commission of Pakistan, PSBA, trade unions). List of PSBA members is attached as Annex-E. Stakeholders' pressure for green ship recycling is increasing, arising reputational risks for companies.

4.7.1 Concerns of Stakeholders

Like other industries, shipbreaking operations majorly impact the environment. Ships contain massive hazardous materials which cause threats to the environment. These materials can contaminate the sea water, the soil and the atmosphere. Though beaching may prove to be an economically efficient method of parking the ships but it has harmful environmental consequences since ships are exposed to natural atmosphere. It also creates hurdles for coastal and ocean biodiversity and to local communities as well. Hence, shipbreaking activities create alarming situation for the environmentalists also.

Shipbreaking activities expose the workers to various harmful substances including PCBs, asbestos and other toxic materials. Those workers which are in thousands are at the verge of suffering from occupational injuries, diseases and lifetime disabilities. Unfortunately, there is no hospital in the area of Gadani. A dispensary is established which is not well equipped to treat major injuries. In case of serious accidents, workers are to be transported to hospitals in Karachi. Moreover, there is no provision of proper sanitation, clean water for drinking at adequate house for living as majority of labor is migrated. All of them are not equipped with PPEs which increase their risk of accidents.

In Pakistan, labor laws are characterized as having several loopholes with less scope and limited coverage, old provisions, complexities and duplicity, and non-compliance with the latest International Labor Standards. These challenges affected the application of laws and ultimately the strength of Government to report on ILS [32]. The country lacks policy framework at federal or provincial level to deal with the challenges related to environment and safety in shipbreaking industry. Despite the fact that shipbreaking industry is active since decades in the country, there was no legal provision until 2012.

While discussing the concerns of international organizations, two conventions address the environmental hazards linked with shipbreaking; HKC and the Basel convention. PSBA members have stated that they are preparing for HKC right now. However, BDA charges the tax from all the plot owners but they were not satisfied with the provision of physical infrastructure provided to them by the BDA. Figures 4.5 to 4.8 show current practices at selected plots at Gadani during the month of January 2021.

Figure 4.5: A glimpse of working condition at Gadani (January 2021)

Figure 4.6: A glimpse of working condition at Gadani (January 2021)

[32] ILO Pakistan, "Decent Work Country Programme II - Annual Report."

Figure 4.7: Workers using PPEs at Gadani (January 2021)

Figure 4.8: A glimpse of working condition at Gadani (January 2021)

4.8 Conclusion and Recommendations

Shipbreaking operations pose serious threats to the environment, health and safety of the workers as they have to bear miserable working and living conditions. This industry is mainly concentrated in South Asian countries due to weak environmental, labor laws and low wages. From past years, due to continuous criticism about poor working conditions and environmental damage resulted from shipbreaking; some of the Economic Operators are working to upgrade their facilities at Gadani Yard. However, there is a need of it to be publicly documented because up-to-date independent reports are unavailable and the claimed improvements' proofs are not available to public scrutiny. Shipbreaking industry is crucial due to its significance in the economy as a whole, and sustainable management can lessen the health and environmental effects of these industries. Due to the lack of adequate technology and equipment as well as deficient law enforcement, proper waste handling procedures are not followed. Following are the recommendations:

- Provision of required infrastructure and basic amenities at Gadani Ship Recycling Yard by the federal and provincial governments.
- Provision of adequate healthcare facilities to the workers and an ambulance service, by the federal and provincial governments.
- Need for training, capacity building and awareness creating for the workforce to ensure safe and clean operations. It should be done by the Economic Operators at the Yard.
- Shipbreaking yard owners should be educated regarding the HKC and EU regulations to promote best practices.
- PSBA members need to prepare their ship recycling facility areas in accordance with HKC requirements.

Section 5
Declining Trends for Ship Recycling

SECTION 5: DECLINING TRENDS FOR SHIP RECYCLING

5 DRIVERS OF DECLINING TRENDS FOR SHIP RECYCLING AT GADANI

5.1 General Overview

The Gadani ship recycling industry had leading role in South Asia during 1970s and 1980s. It is an important and labour intensive but quite challenging informal segment of Pakistan's maritime economy. It has faced many ups and downs during different governance regimes in the past. It had a very serious downward trend since the beginning of FY 2018-19. However, there is a noticeable positive trend observed during the current year (FY 2020-21) in progress.

Due to the negligence by the governments, the industry has not only experienced adverse situations but also a huge reduction in the tonnage imported per year. Earlier, the industry had been shut down up to 2008 due to the government's decision. In recent past, the industry was also badly affected after the inappropriate handling of oil tanker that led a loss of more than 40 workers on the spot. In this regard, the workers' associations and non-governmental human rights agencies have raised voice against inadequate protective measures and necessities at the Gadani Yard.

The Gadani ship recycling industry has been found to lack basic necessities for the workers and people living in Gadani. There is no provision of hospital, utilities and other basic facilities at Gadani Yard area. The industry is deprived of clean drinking water as well other primary facilities. Similarly, there is no provision of electricity, gas, cellular networks and hygienic living facilities at the yard.

Apart from the basic facilities, the industry has also been neglected by the federal as well as provincial governments. The ownership of the plots and working facility at the yards are uncertain due to the ownership by the landlords. There are 132 plots at Gadani out of which, 100 are owned by the landlords while remaining 32 are owned by the government. The absence of proper implementation of the rules and regulations of the federal and provincial governments has resulted in the discouragement of investments for ensuring best practices with clean and safe operations.

Additionally, the tax structure of the federal and provincial governments has also negatively affected the investment in the ship recycling industry at Gadani. The federal and provincial governments have changed the tax regime on time to time basis, which has caused a reduction in the investments as quite visible

with low tonnage import during the recent years particularly from FY 2018-19 onward.

The international obligations also have been noticed to have adverse implications for the import of ships for recycling at Gadani yard. The European Union (EU) regulations, Hong Kong Conventions (HKC), and Basel regulations unfavorably affect the import of ship for recycling purposes at the Gadani yard as these regulations encompass numerous requirements to be fulfilled for the import of EU flag carrier to the Gadani Yard. Whereas there is confusion about the applicability of various international conventions to Ship Recycling.

5.2 Concerns of the Stakeholders

The major primary (direct) stakeholders of Pakistan's Ship-breaking Industry include Economic Operators at Gadani Yard, Pakistan Ship-breakers Association (PSA), workers and trade unions. Whereas, there are various secondary (indirect) stakeholders such as Owners and workers of Re-rolling Mills, Law and enforcement agencies/departments, national and international pressure groups such as Brussels based NGO Ship-breaking Platform, and other international organizations such as IMO, ILO, Basel Convention and European Union.

For the purpose of stakeholder's consultation, research team did two site visits at Gadani Yard and Re-rolling Mills located at SITE Karachi. Views and feedback of concerned direct stakeholders were taken through key informant interviews with the help of a semi-structured questionnaire (Annex-B). A preliminary assessment visit was done on 16 December 2019 and the current state of ship-breaking industry was discussed with the focal person of Pakistan Ship-breakers Association (PSA) Mr. Jawed Iqbal. He highlighted two major concerns i.e. (i) the taxation regime including the amount of applicable tax and the new procedure in practice, and (ii) import of re-rollable scrap which has created more challenging environment for Shipbreakers to compete and generate more demand for ship plates in local market. In a subsequent site visit during January 2021, detailed discussion was done on various aspects. Mr. Jawed Iqbal told, although the federal government in FY 2020-21 budget provided a reasonable relief towards taxation, the other challenge due to re-rollable scrap is still existent.

The other issues highlighted by PSBA officials and members include ownership structure of the plots, lack of facilities at Gadani, the absence of specific ministry, infrastructural facilities, absence of basic utilities, changes in taxation regime by the governments, and financing facilities for ship-breaking industry, which need immediate attention by the federal as well as provincial governments.

The PSBA officials have emphasized on the issue of ownership structure of the plots viz-a-viz the development of modern facilities at the level of economic operators at Gadani Yard. They have explained that the 100 out of 132 plots are owned by the local landlords and there is possibility that the owners may take back the plots which will lead to wastage of investments, whereas the government's plots are not easy to be granted and retained.

The PSBA officials also pointed out the issue of the absence of basic facilities at the Gadani. They have explained that there is no supply of clean water for drinking or domestic consumption at the yard. They themselves bring clean drinking water in disposable bottles or from the Hub bazar.

The Gadani yard also lacks the cellular facilities in twenty first century. There is no mobile cellular and/or Pakistan telecommunication service available. Further, there are no internet facilities at the yard. The Gadani area has the electricity infrastructure but the supply of power is not ensured. The yard is running on generators or the solar systems installed by the operators at the yard. The continuous operations of diesel fired generators cause air pollution. The PSBA members also raised the issue of infrastructure development at Gadani yard. There are no proper carpeted roads present at the Gadani yard. The vehicles travels through traditional ways on broken roods to supply the ship materials to Karachi and countrywide.

They also highlighted that there is no direct ministry involved either at federal or provincial level to deal with the ship breaking industry. Although it is being dealt by different departments for various legal obligations to be fulfilled, there is a lack of comprehensive sector specific policy, strategy and course of action in order to uplift the status of this industry with modern norms. Currently, the ship breaking industry is categorized under manufacturing industry for custom and taxation purposes. The industry is paying huge tax amount but there is no reasonable service provided by the federal and provincial governments viz-a-viz the infrastructure and utilities are concerned at Gadani Yard.

The issue of different taxation policy which adversely affected was also pointed out by the officials. The elimination of previous fixed taxation regimes by the governments and imposition of tonnage based tax led to reduced imports of tonnage over the years. The federal government gave 4.5% tax relief in federal budget 2020-21 by issuing a government SRO. They explained that the industry is facing strict rules for the financing facilities and the time period is also short. There are no long-term financing facilities available for the ship breaking industry in Pakistan so as to develop the infrastructure needs at Gadani Yard.

The worker unions also highlighted the issues of inadequate provision and use of Personal Protective Equipment at the yard, infrastructural issues, lack of residential houses and plots, lack of cellular and basic amenities / utilities.

5.3 Impact of Re-rollable Scrap on Value Chain of Ship Plates

Imported re-rollable scrap has also got importance into steel business in Pakistan. On one hand it is cheaper option having less duties and taxation compare to ship's steel. At the same time, it is not labour intensive option so it puts on stake the livelihood of a large size of workforce at the first stage of the value chain involved into the steel business of end-of-life vessels.

Import of prime quality material as Re-rollable scrap is hurting this industry. This industry needs complete protection as in past there were small melting units and ship-breaking was providing most of re-rollable material. The direct import of re-rollable scrap has no additional advantage over the ship-breaking except for tax benefits. Whereas, Steel from ships acts as market price stabilizer by meeting approximately one third of all local steel requirements thus protecting the consumer interests. It also helps in poverty alleviation by providing direct employment to more than 20,000 workers at Gadani along-with a big indirect pool of workers in its value chain, and supports to their families of nearly 3.5 million household population. Additionally, it contributes substantial tax payments to Federal and Provincial Governments.

During FY 2019-20, the Ship Recycling Industry faced a very serious competing environment due to favourable taxation to imported re-rollable scrap vide FBR Sales Tax SRO 697(I)/2019 dated 29 June 2019. The imported re-rollable scrap has the advantage of adjustable income tax. Overall, it shows an unfair advantage of imported re-rollable steel over the ship steel which increased difficulties for the shipbreakers to generate a required local market demand of ship plates in the presence of more incentive to imported re-rollable scrap thus limiting them to contribute a rightful market share. There was a demand of Shipbreakers that import of re-rollable scrap should either be banned or put custom duty on it along-with increase in amount of regulatory duty so that Ship-breakers can also try to compete.

Although the Federal Government provided some relief to Ship Recycling industry in FY 2020-21, still there is need to revisit taxation regime for the re-rollable scrap and bring it to a level where Ship Recycling Industry is not compromised.

5.4 Impact of Various Taxation Regimes

As per record of Pakistan Shipbreakers Association (PSBA), more than PKR 16 Billions were tax payments from 1.67 million metric tons of ship steel reported for FY 2017-18, a significant contribution towards national tax collection. Unfortunately, during the subsequent FY 2018-19, this tax amount had shrunk down to approximately one fourth i.e. PKR 4.8 Billion and the ship recycling tonnage declined to one fifth (0.37 million metric tons).

Figure 2.1 in section 2 of this report has explained the amount of tonnage imported from 2014-15 to 2020-21. It has shown mix trends for the imported tonnage of end of life ships. The industry had imported a highest tonnage of 1,670,851 metric tons in FY 2014-15. Then, the quantity of tonnage was decreased in subsequent year. Later, it increased again in FY 2017-18, which was equivalent to FY 2014-15. From FY 2018-19, there is steep decline in the activity at Gadani Yard, primarily due to the changes in the taxation and dollar inflation in Pakistan.

According to PSBA, there was a 1% withholding / income tax at import stage, which was treated as full and final as turnover tax till the year 2013. In subsequent year, the Government of Pakistan increased this tax amount to a full and final 4.5% at import stage, which was beard by the Economic Operators. However, in Finance Bill 2019, this amount is now being treated as non-adjustable minimum liability, which had created extra burden on shipbreakers and needs to be revisited. There was a strong argument of PSBA that the income tax should be reduced to earlier level of full and final 1% at import stage and / or be adjustable as turnover tax for which liability should be 1.5%. PSBA supported the argument that melters and re-rolling mills discharge their liability as 1.50% turnover tax.

Under Sales Tax Special Procedure Rules 2007, there was a fixed sales tax rate i.e. PKR 9500/MT for the shipbreakers. This rate was applicable on a recoverable percentage of total ship steel i.e. 72.5% and 80% out of total LDT (Light Displacement Tonnage) of dry cargo vessel and tankers respectively. However, this flat rate is no longer continued under the Finance Bill 2019 and 17% sales tax has to be paid at import stage for a recoverable 85% LDT of all kinds of second hand ships. According to FBR Sales Tax SRO 697(I)/2019 dated 29 June 2019, the values of produced goods are specified on ad-valorem basis, which include ship plates value PKR 72000/MT and other imported re-rollable iron & steel scrap value of PKR 47000/MT. Besides, imported re-rollable scrap has also advantage of adjustable income tax. Overall, it shows an unfair advantage of imported re-rollable steel over the ship steel which has increased difficulties for the shipbreakers to generate a required local market demand of ship plates in the presence of more incentive to imported rerollable scrap thus limiting them to contribute a rightful market share. There is a growing demand of Shipbreakers that import of re-rollable scrap should either be banned or put custom duty on it along-with increase in amount of regulatory duty so that Ship-breakers can also try to compete.

The government changed the taxation policy for the shipbreaking industry from 2013-14 onwards. Initially, the government has increased the sales tax at import stage from the former tax structure Rs.4800 to Rs. 9500. The government further increased the income tax at import stage from the previous

tax structure of 1% to 5.5% from 2013 and onwards. The Balochistan Development Authority (BDA) tax was also increased per metric ton for the ship recycling industry from Rs. 50 to Rs.150, 200 and 250 from 2013 onwards.

Similarly, the ship recycling industry has paid a highest amount of tax 16.3 billion PKR to the federal and provincial governments in FY 2017-18. In FY 2017-18, the industry imported approximately equivalent tonnage as was reported for FY 2014-15, however, it paid around PKR 3.7 million extra taxation compare to the amount PKR 12.6 billion taxation for FY 2014-15. This clearly shows a drastic increase of 3.7 billion rupees paid by the ship recycling industry to the federal and provincial governments under changed taxation regime.

Furthermore, the government increased the tax liability in FY 2019-20 by imposing 2% additional custom duty, 17% sales tax at import stage, 4.5% income tax at import stage, PKR 350 as BDA tax per metric ton, and 1% Balochistan Infrastructure tax. The imposition of these taxes reduced the quantity of tonnage imported to the lowest figure of 335,241 metric tons. The industry paid an amount of the lowest PKR 4.8 billion to the governments as a tax liability.

Considering the alarming decline in industrial activity, the Federal Government gave some relief during FY 2020-21 in terms of the reversal of the 2% additional custom duty and reduction in income tax from 4.5% to 2.5%, meaning that the government provided 4% tax relief to the ship breaking industry at Gadani. The tax relief provided a lifeline to the industry. During the site visit in January 2021, a reasonable number of ships' arrival was witnessed that was a good sign for the overall value chain involved.

In a nutshell, frequent changes in tax regime have not only adversely affected the quantity of tonnage imported per year but also affected the contribution by the ship recycling industry to the governments in terms of the tax liability of the federal and provincial governments.

5.5 Impact of Dollar Exchange Rate

Pakistan's economy has faced multiple issues after the 9/11 and Global Financial Crisis 2008-09. These structural breaks not only severely affected the real activities but also financial activities which led to discouraged exports and increased imports. The rise in import put pressure on the Pakistan foreign exchange reserves, which led to devaluation of Pakistan rupee in terms of dollars and other foreign currencies.

During FY 2018-19, the buying of end of life ships was affected due to devaluation of PKR and rising exchange rate thus Pakistanis could not compete with more competitive bidding from Bangladeshi and Indian investors. It is also observed that the new taxation rules of present government have affected the

overall value chain and due to higher price of scrap ships in international market. Figure 5.1 shows the value of 1 dollar in terms of Rupees. It is clearly showing an upward trend in the valuation of dollars but the devaluation of rupees.

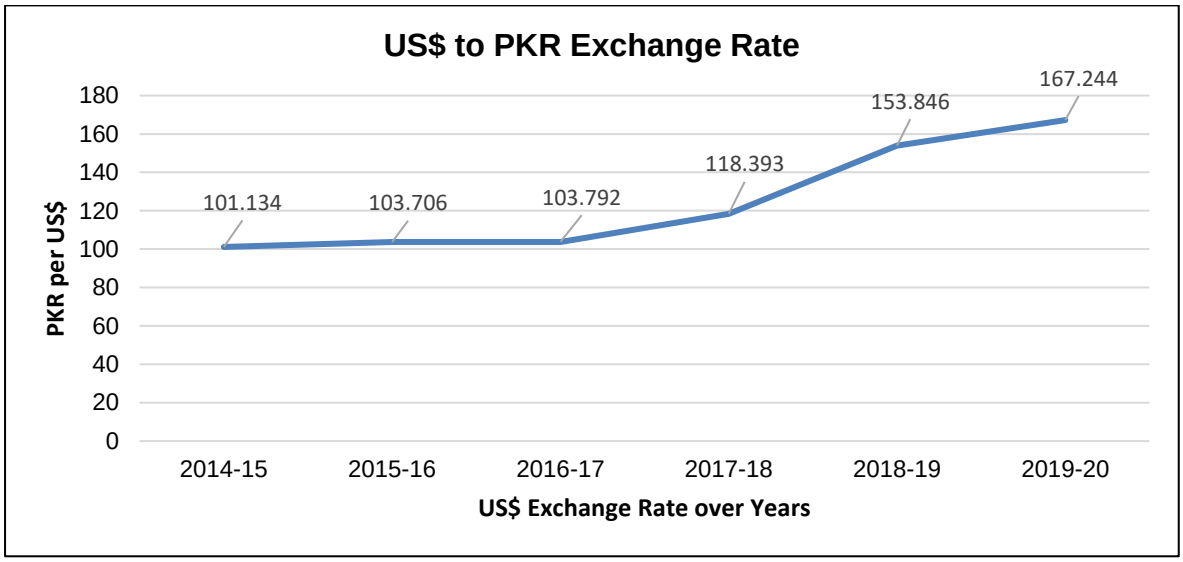

Figure 5.1: US$ to PKR Exchange Rate over Years (Source: www.oanda.com)

5.6 Impact of International Obligations

Clean and safe operations always remained a question mark for Shipbreaking activity on South Asian beaches, due to a number of reasons. In Pakistan, there was a major fire incident at Gadani Yard in 2017, which had a huge death toll. There was another issue of an end-of-life Floating Storage and Offloading (FSO) tanker (named CHERISH) beached at Plot 60 on the shores of Gadani Yard dated 30 April 2021, which was alleged for containing high levels of toxic mercury inside. As per media reports, it was envisaged that Interpol had given warning for the presence of toxic mercury. The issue remained under discussion with different versions at national and international level.

The relevant stakeholders at national and international levels have serious concerns particularly regarding the major issue of legal compliance and adherence with Multilateral Environmental Agreements (MEAs) including the HKC, EU Regulations, Basel Convention and ILO guidelines. Pakistan is neither signatory nor it ratified the Hong Kong Convention. It is observed that there is a lack of clarity about the scope and application of different MEAs particularly the Prior Informed Consent (PIC) instrument under Basel Convention.

Now, the Economic Operators are trying to comply with national legislation and international by achieving certifications of ISO-14001, ISO 9001, ISO 18001 and ISO 30000, evidence are placed in figure 4.4 under section 4 of this report.

5.7 Overview of Existing Infrastructure and Facilities at Gadani Yard

During the site visit, it was observed that there is a lack of infrastructure facilities at the Gadani yard area. There is no proper road infrastructure for the Gadani shipbreaking industry in order to supply the ship materials from Gadani to countrywide. All roads were either muddy or broken. The improper roads have led to multiple issues ranging from accidents to financials losses.

Further, there are no utility facilities available at the yard. There is no gas and electricity in the Gadani yard. The lines of electricity are installed but there is no electricity supply in it. The operators at the Gadani yard either generate electricity through generators or solar systems. The oil recovered from the ships during dismantling process is used in generators for the production of electricity at the yard.

Additionally, the operators at the Gadani yard are also working in traditional constructions. There are no proper residential areas for the workers in the Gadani yard. The laborers are living in shanties and wood houses, which lack proper hygienic conditions. There are no proper restroom and bathroom facilities available for the workers.

5.8 Conclusion and Recommendations

The current chapter has discussed in detail about the drivers of declining trends in ship recycling industry at Gadani. The ship recycling industry has been adversely affected due to the different taxation regimes and appreciation in dollar exchanges. When the government changed the tax structure it led to decrease the import of tonnage over the year. The increase in the value of dollar also decreased the Pakistani rupees value which led to decrease in the tonnage imported per year.

The main concerns of the PSBA members were the change in the policy of tax structures, increase in dollar exchange, and the lack of infrastructural and basic facilities at the yard. The yard lacks basic facilities like clean drinking water, proper residence etc. It is also found that the re-rollable scrap poses negative impact on the ship recycling industry. The other stakeholders have serious concerns regarding clean and safe operations and demand for the ratification of HKC and compliance with national legal instruments. Based on analysis, following are section specific recommendations:

- The federal government needs to decrease the tax structure on the ship recycling industry in Pakistan.
- The federal and provincial governments need to focus on the provision of infrastructural facilities at Gadani.
- The federal and provincial government need to utilize the industrial tax payment for the provision of basic facilities to the workers at the yard

- The government needs to recognize shipbreaking as a proper industry and bring it under the domain of the Ministry of Industries with a strong affiliation / coordination with Ministry of Maritime Affairs.

Section 6

Governance of Gadani Ship Recycling

SECTION 6: GOVERNANCE OF GADANI SHIP RECYCLING

6 GOVERNANCE OF SHIP RECYCLING IN PAKISTAN

6.1 General Overview

This section describes the existing governance mechanism for ship recycling at Gadani ship breaking yards vis-à-vis the industrial needs and required provincial, national and international obligations. Based on consultation with PSBA members and assessment notes of site visit, this section deliberates on various aspects and prospects of public private partnership by exploring the following questions:

a. Why could ship recycling be not recognized as an industry and regulated under the law?
b. Can an incentive-based policy be formulated for management of on-site clean and green ship recycling practices?
c. Whether the GoP has any plan to develop necessary infrastructure and facilities for clean and safe ship breaking at Gadani to mainstream this very important but neglected sector of the Maritime economy and bring it into the national tax net.
d. What may be the likelihood for success of the PPP-BoT mechanism for development of infrastructure and facilities for ship breaking yards at Gadani or any other place?

6.2 Review of Existing Policy, Legal and Institutional Mechanism

The presence of more than hundred ship-breaking plots / facilities at Gadani Yard is an informal and neglected segment contributing significantly through its value chain to industrial economy of Pakistan for the last fifty years. The business as usual scenario depicts that this industry is running through *ad-hoc* mechanism due to lack of specific policy, legal, institutional frameworks and/or regulatory procedures in place. Historically, the important checks were limited to custom clearance, while environmental clearance added recently as legal instrument, which has outstanding issues due to cumbersome procedure and bureaucratic hurdles, as reported by the PSBA members.

6.2.1 The Baluchistan Ship Breaking Industry Rules, 1979

Since these yards at Gadani are situated within the provincial jurisdiction of Balochistan province, an early attempt was made to formalize this industrial segment through "*the Baluchistan Ship Breaking Industry Rules, 1979*" made

under section 30 of the "*Balochistan Development Authority Act, 1974*" of the Government of Balochistan notified vide No. P&D-RO(Ind)4(i)448/78 and published in *'the Baluchistan Gazette'* on 16th September 1979 vide extraordinary registration no. 117 [33]. However, these rules were meant to empower the BDA and are very much limited to handle the leasing of government owned plots for ship breaking purpose at Gadani coast[34]. There is a need to completely revise these rules by incorporating all aspects related to green ship recycling industry, and to bring these in line with international conventions and best practices.

6.2.2 Occupational Safety and Health in Ship Recycling

The fundamental rights provided by the *Constitution of Pakistan, 1973* to its citizens cover the workers in ship breaking sector activity in a number of ways. First and the foremost important element is the constitutional guarantee for fundamental rights, which are applicable to the shipbreaking sector, but needs to be made more specific. While several laws dealing with occupational safety and health of labour exist in Pakistan, their applicability is ship recycling industry is wanting as the majority of the labour is engaged on daily basis and as such don't qualify for many safeguards. There are several legal provisions related to the issues of 'occupational health and safety' (OHS), but there is a lack of single legal arrangement so as to deal the matter in a comprehensive manner. It is quite interesting that the OHS related legislation in Pakistan has its roots to the colonial times, for example the 'Factories Act of 1934', the 'Labourers Act of 1934' and the 'Workmen Compensation Act of 1923'[35]. After independence of Pakistan, legal provisions to operationalize the 'Workmen Compensation Act' were promulgated in 1961, the 'West Pakistan Hazardous Occupations Rules' in 1963, the 'Provincial Employees Social Security (Occupational Diseases) Regulations' in 1967, and the 'Labour Laws (Amendment) Ordinance' in 1972. In order to deal the issue through a single and comprehensive law, the Ministry of Labour and Manpower prepared a draft Act i.e. 'Pakistan Occupational Health and Safety Act' in 2018, but the draft has not yet been debated to have consensus at the level of relevant stakeholders. However, some efforts were made for its promulgation since the year 2018. On 31 May 2006, ILO adopted a Convention on Promotional Framework for Occupational Safety and Health Convention (No. C187) [36] which is also relevant. Despite being the member of ILO, India, Pakistan and Bangladesh have not ratified ILO's C187 yet. GoP should implement clauses of ILO's C187 (2006) and ratify it. There is no harm

[33] Government of Balochistan, "The Baluchistan Ship Breaking Industry Rules 1979."
[34] Iqbal and Heidegger, "Pakistan Shipbreaking Outlook: The Way Forward for a Green Ship Recycling Industry-Environmental, Health and Safety Conditions."
[35] Iqbal and Heidegger.
[36] ILO, "Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)."

to ratify it along-with HKC as both will be complementing each-other and there will be no additional requirements.

6.2.3 Hazardous Waste and Environmental Protection

There are concerns regarding availability and the implementation of rules and regulations to deal with the hazardous waste, environmental protection and the aspects of occupational health & safety (OHS) associated with the end of life ships. Government of Pakistan promulgated the 'Hazardous Substances Rules 2003' under the umbrella of 'Pakistan Environmental Protection Act (PEPA) 1997'. Later, the Government of Balochistan Province promulgated 'Balochistan Environmental Protection Act (BEPA) 2012'. These federal and provincial legislations are applicable to the ship-breaking sector.

6.3 Compliance Status

During the course of this study, it was assessed that the environment and occupational health and safety related legislation has weak enforcement, and its compliance monitoring system is also not adequate. The temporary and contractual job arrangement in prevailing system of recruitment by the 'contractors' particularly at Gadani Shipbreaking Yard also undermines the fundamental rights of the labour. Most of the responsibilities related to environmental and labour issues were devolved to the provincial governments, while some important responsibilities are still under the federal government, following the decentralization process in Pakistan, which began in the year 2011 and being practiced as an outcome of the 18th Amendment in the national Constitution of Pakistan.

Balochistan Environmental Protection Agency (BEPA) and Balochistan Development Authority (BDA) have shared responsibilities regarding shipbreaking, in addition to various ministries on Federal level including the Ministry of Labour and Manpower, the Ministry of Maritime Affairs (MoMA), and the Social Welfare Department. There is a dire need for sector-specific regulations that deal with decent workplace conditions, along-with green, cleaner and safer ship recycling activities, which should be in accordance with the national legislation as well as international obligations. Some relevant examples identify the need for specific regulations: firstly the *Asbestos* related ailments are acknowledged by the legal framework of Pakistan, but there is a need for regulations regarding safe handling of the material on a federal level. Similarly, the issues related to storage, recycling, treatment, and disposal facilities for hazardous wastes are not yet covered by the National Environmental Quality Standards (NEQS) / or the Balochistan Environmental Protection Act.

Clean and safe operations always remained a question mark for Gadani Shipbreaking Yard as the site lacks basic amenities and facilities. There are

concerns observed in media from various stakeholders at national and international level. There was a major fire incident at Gadani Yard that had a huge death toll in year 2017. There was another issue of an end-of-life Floating Storage and Offloading (FSO) tanker (named CHERISH) beached at Plot 60 on the shores of Gadani Yard dated 30 April 2021, which was alleged for containing high levels of toxic mercury inside. As per media reports, it was envisaged that Interpol had given warning for the presence of toxic mercury. The issue remained under discussion with different versions at national and international level.

During site visit at Gadani, it was witnessed that the Economic Operators are trying to comply with national legislation and including the Hong Kong Convention (HKC), EU Regulations and other multilateral environmental agreements international obligations by achieving certifications of ISO-14001, ISO 9001, ISO 18001 and ISO 30000. Pakistan has ratified the Basel Convention; however, a compliance instrument is yet to be established. It is observed that there is a lack of clarity about the scope and application of Prior Informed Consent (PIC) instrument under Basel Convention. Concerned officials at Directorate of Multilateral Environmental Agreement (MEAs) at Ministry of Climate Change, Government of Pakistan have arguments that end-of-life ships do not fall within the purview of Basel Convention. However, this subject comes purely under the scope of 'Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships' known as 'HKC'.

There is a confusion regarding the application of guidelines of Basel Convention as all such work, dealing with Ship Dismantling under Basel Convention, was subsequently shifted by inviting International Maritime Organization (IMO) as part of decision made in seventh meeting of the Conference of the Parties in 2004. It is pertinent that end-of-life ships don't fall within the definition of waste, which is globally recognized. IMO was invited to continue its work for the establishment of mandatory requirements to ensure the environmentally sound management of ship dismantling (Reference: Basel Convention's decision VII/26 on Environmentally sound management of ship dismantling). Subsequently, IMO sponsored Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC) was adopted at a diplomatic conference in Hong Kong, in May 2009.

Although Pakistan is neither signatory nor it ratified the HKC yet, HKC's guidelines are comprehensive and supersedes the Basel Convention. During a consultative session with relevant stakeholders held in January 2021 at Karachi, PSBA members showed their consent towards ratification of Hong Kong Convention by the Government of Pakistan in order to become part for its early compliance strategy. It is a very good portent for the Government of

Pakistan that the concerned stakeholders have positive mind-set towards this important international obligation.

Earlier to HKC requirements, the International Labour Organisation (ILO), a UN agency, had called shipbreaking one of “the most dangerous occupations” in the world. In March 2004, the ILO unanimously endorsed at its 289th session a set of criteria to govern the disposal of ships, for occupational safety and health in shipbreaking operations. Besides, on 31 May 2006, ILO adopted a Convention on Promotional Framework for Occupational Safety and Health Convention (No. C187) which is also relevant. India, Pakistan and Bangladesh have not ratified ILO’s C187 yet. GoP should implement clauses of ILO’s C187 (2006) and ratify it. There is no harm to ratify it along-with HKC as both will be complementing each-other and there will be no additional requirements.

6.4 Institutional Procedures and SOPs in Vogue

Procedure and SOPs for the arrival, beaching and parking of end of life ships at Gadani are important aspects for the governance system at Federal and Provincial level. As per general procedure in vogue, following important steps are observed for end-of-life ships coming to Gadani Yard:

a. Entry in Pakistani waters by furnishing information to JMICC
b. Temporary Stay at Gadani Anchorage
c. Beaching at Gadani Yard facility area
d. Custom clearance
e. Bow cutting upon permission from Balochistan Environment Protection Agency (BEPA) – for ship stability
f. Submission of Initial Environmental Examination (IEE) report to BEPA, under Balochistan Environmental Protection Act 2012 and its subsequent approval
g. Cutting operations after observing necessary approval from BEPA including hot work permission after clearance from Department of Explosives, Circle Office Karachi, Ministry of Industries in case of a Tanker

Figure 6.1 illustrates process flow and various steps being followed at Gadani Shipbreaking Yard after the beaching of a ship, while details are given in ensuing paragraphs.

6.4.1 Responsible Institutions

Balochistan Environmental Protection Agency (BEPA) and Balochistan Development Authority (BDA) have shared responsibilities regarding shipbreaking, in addition to various ministries on Federal level including the Ministry of Labour and Manpower, the Ministry of Maritime Affairs (MoMA), and the Social Welfare Department.

Based on the standard procedure in vogue, it is found that various legal provisions are fulfilled for environmental and safety related aspects pertaining

to arrival, beaching and cutting of ships on the shores of Gadani. However, the issues related to storage, recycling, treatment, and disposal facilities for hazardous wastes are not yet covered by the National Environmental Quality Standards (NEQS) / or the Balochistan Environmental Protection Act.

6.4.2 Purchase and import of end-of-life ship

Pakistani shipbreakers purchase end-of-life ships from international brokerage. Upon purchase, they bring ships to Gadani Yard for recycling purpose. Generally, ships carry information about last port clearance. There is no standard defined rule for the import of end-of-life ships, except for custom clearance alike other imported goods/items coming to Pakistan.

6.4.3 Information to JMICC by Ship's Agents

End-of-life vessels enter into Pakistani waters after informing Joint Maritime Information and Coordination Centre (JMICC) through written communication by their respective ship agents. JMICC is a coordination point to maintain liaison with other departments such as PMSA etc. to monitor movement of ships arriving at the anchorage / port. Recently, after the issue of MT CHERISH, there is a change in procedure and ship agents are required to send information to Pakistan Maritime Security Agency (PMSA) in addition to JMICC. As per general practice for all types of vessels, ship agents email information pertaining to name of the ship, IMO number, flag state, last port, no. of crew and their nationality. Whereas, submission of a valid gas free certificate for man entry and hot work is an additional requirement for the case of a tanker. It is pertinent that JMICC related SOP for entry of ship into Pakistani waters is not legally protected under any rule/regulation. So, there is a need to promulgate a legally protected SOP for it.

6.4.4 Stay at Gadani Anchorage

As per general practice, ships stay at anchorage (undefined outside port limit area for Gadani) after observing JMICC related procedure and wait for suitable tidal time for beaching at Gadani Yard. This stay at anchorage depends upon weather conditions and may vary from 1-10 days in normal circumstances and its depends

6.4.5 Beaching at Gadani Yard facility area

End-of-life ship beaches at a facility area of ship owner located at the shore of Gadani Yard. This is the destination for dismantling operations.

6.4.6 Custom Clearance

As per general practice, relevant government department officials do custom clearance after beaching of a ship at Gadani yard. This process involves verification of ship purchase documents and payments of duties / taxes.

6.4.7 Bow (Nall/Nose) Cutting

Nall is a local name of bow or nose of a ship, and this term is very common for operations at Gadani Yard and also used by Balochistan Environmental Protection Agency (BEPA) in approval letters. Upon beaching, officials of Balochistan Environmental Protection Agency (BEPA) visit and inspect the ship and give written permission for bow cutting. This procedure allows the ship to be stable at the beach site for further procedures. In past, for environmental approvals, this was rationalized foremost important step to stabilize and hold a ship at Gadani shore after beaching operation. Therefore, BEPA agreed upon to allow ship owners for bow cutting before submission of Initial Examination Report (IEE) for subsequent cutting operations upon formal approval of IEE report.

6.4.8 Initial Environmental Examination (IEE) Report

As per section 15 of Balochistan Environmental Protection Act 2012, ship owner is required to prepare IEE report and submit it to BEPA for its approval prior to commence any further operation. IEE approval is granted in a phase wise manner as per *defecto* procedure set by BEPA. IEE approval is always conditional as it mentions requirements to be fulfilled during cutting operations. For bulk carriers, IEE approval is granted in a single step. However, for the case of a tanker, first cold work permission is granted by BEPA and subsequently hot work permission is given after fulfilling requirement from the Department of Explosives, Circle Office Karachi, Ministry of Industries. The stakeholders have concerns about *defecto* lengthy step-wise process while approval process for IEE is a single step procedure under *dejure* provision under section 15 of Balochistan Environmental Protection Act 2012. The stepwise breakdown of the process as per *defecto* procedure of BEPA is a good thing in order to improve and ensure operational safety at workplace. However, provincial government needs to cover it legally through a specific regulation for ship recycling operations, under the Balochistan Environmental Protection Act 2012.

6.4.9 Removal of Hazardous Material, Wood and Agree items

Generally, after cold work permission, hazardous material is removed from the ship along-with extraction of wood and agree items and decommissioning of electrical equipment. Agree items are saleable items and include potable as well as fixed equipment and material such as generators, freezers, air conditioners etc.

6.4.10 Inspection of Tankers by Explosive Department

Degasification, proper ventilation and clearing of tanks are pre-requisite prior to get hot work approval from BEPA against submitted IEE report. Department of Explosives, Circle Office Karachi, Ministry of Industries inspects the ship and issue an NOC which is subsequently submitted to BEPA for issuance of hot work approval.

6.4.11 Cutting Operations

Proper ship cutting operations are started after IEE approval, including hot work permission in case of a tanker. IEE approval always carry necessary environment, health and safety related requirements for which management of shipbreaking facility area is required to ensure best practices through proper work instructions at workplace. Ship is cut down through All items are recovered. Ship is cut down through primary, secondary and tertiary cuttings steps followed by storage at yard. All items are recovered and sold except for some waste material. Removal and dumping of oil sludge is generally done for tankers

6.4.12 Waste Management

There is no proper waste management practice in most of the ship recycling facilities at Gadani Yard. As per practice, waste including sludge is dumped in pits as the Gadani Yard area lacks sanitary landfill site. BDA has allocated an area for landfill site, however, its development plan and allocation of resources are still awaited.

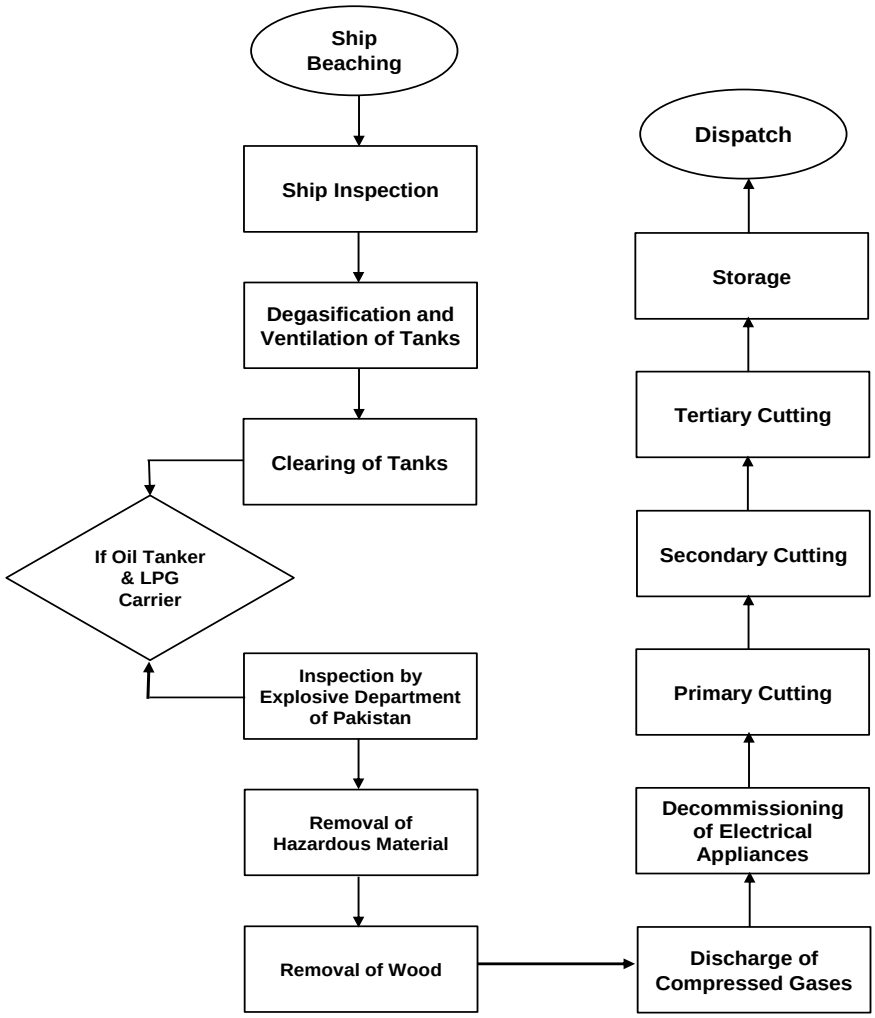

Figure 6.1: Process flow chart followed at Gadani Shipbreaking Yard

6.5 Review of Government's Plan for Development of Infrastructure and Allied Facilities at Gadani Yard

The state of infrastructure and allied facilities is worst at Gadani Yard as the basic domestic and human needs are compromised due to absence of required amenities. So far the Gadani Shipbreaking Yard could not get proper attention by the Federal Government which is perhaps due to absence of sponsoring ministry at the federal level. However, the Government Balochistan commissioned a project titled 'Modernization of Gadani Ship Breaking and Recycling Industry and Development of Allied Facilities' with allocation of 184.237 Million PKR (Figure 6.2) a few years back. Progress on project's work was found un-satisfactory as was observed and reviewed during Gadani Yard visit by the study team members in the month of January 2021. Various stakeholders and expert groups have serious concerns about poor progress on the project.

Figure 6.2: BDA Project Information Board for Modernization of Gadani Yard

6.6 Government's support towards promotion of ship recycling in Pakistan

Recent years' declining trends (particularly from FY 2018-19 onward) in Ship Recycling activity at Gadani Yard have a very strong linkage with the fiscal / taxation policies of current governance regime at federal level in Pakistan, though international market factors also influence the size of operations in globally located yards. It is now an established fact. A noticeable relaxation in taxation during FY 2020-21, granted to this industry along-with enabling policy for construction sector, has provided lifeline to this industry in Pakistan. But, this is not sufficient for the promotion of this important industrial activity.

On the other side, this industrial economy is a neglected maritime sector due to which it has many challenges vis-à-vis the absence of basic facilities and the international obligations to be fulfilled. The objective of the green ship recycling cannot be achieved without coordinated efforts and support from both federal as well as provincial government of Balochistan.

The infrastructure development not only requires fiscal resources and policy as well as legal instruments but also there is a need to have meaningful consultation with relevant stakeholders for viable solution.

6.7 Rationalizing Public Private Partnership for infrastructure facilities

Globally, Public Private Partnership (PPP) has been witnessed with various types of contract agreements / arrangements (often known as PPPs and P3s), or in the UK, Private Finance Initiative, or PFIs) depending on the type of project (for example, a road or a prison), level of risk transfer, investment level and the desired outcome. Agreement types under PPP include Build – Own – Operate (BOO), Build – Own – Operate – Transfer (BOOT), Build – Operate – Transfer (BOT), Joint Ventures (JVs), Design – Build – Finance – Maintain (DBFM), Design – Build, Design – Build – Finance (DBF), Design – Build – Finance – Operate (DBFO), Design – Build – Finance – Maintain – Operate (DBMFO), Design – Construct – Maintain – Finance (DCMF), O&M (Operation & Maintenance) etc.

Pakistan has several examples of public private partnership projects covering various sectoral economies, which were developed mostly on BOT basis. Examples include Karachi International Container Terminals (KICT), Pakistan International Container Terminals (PICT) and South Asia Pakistan Terminals (SAPT) in port infrastructure projects by Karachi Port Trust (KPT); Lahore-Islamabad/Lahore-Karachi Motorways in road infrastructure sector and Lahore Compost Project in waste management sector.

It is fact that most of the existing PPP projects in Pakistan were agreed before the enactment of Federal PPP Authority Act 2017 on 27 March 2017. The PPP Authority Act 2017 provides definitions and guidance for the approval of infrastructure related projects against the proposal of any implementing agency of the Government. Whereas; this federal level legislation needs to be well understood and interpreted well before any kind of arrangement at Gadani Shipbreaking Yard. Considering the powers of PPP Authority under sub-section 2 of Section 4, lists powers of the Authority that create confusion about the federal legal ambit and PPPA's jurisdiction under the prevailing scenario vis-à-vis legal and technical aspects for the shipbreaking activity on a coastal area, where Balochistan Development Authority (BDA) owns commercial plots and legally empowered to award their leases. In case if PPPA Act 2017 applies to infrastructure development at Gadani Shipbreaking Yard then there is a need to have a sponsoring government department. The legitimate right of BDA needs to be examined for all types of land-holding and rights at Gadani Shipbreaking Yard.

Despite various efforts, so far shipbreaking is not recognized as an industry at federal or provincial level and it has no parent ministry, while the existing

provincial rules are very much limited to land lease agreements. For infrastructure development regarding clean and safe operations, there can be public private partnerships (PPP) but it is a big question mark in the absence of parent ministry as a government department is required to materialize PPP under PPP Authority Act 2017. The Federal Government needs to declare this informal sector as an "Industry" with a proper Green Ship Recycling Policy and Strategy. The PSBA members are inclined to have its arrangements under Ministry of Industries and strong ties with Ministry of Maritime Affairs (MoMA).

During January 2021, the various aspects of infrastructure development at Gadani Yard and the matter of public private partnership (PPP) were discussed in-depth with PSBA members and office bearers. The land-rights of the local landlords, plot holdings by BDA and some related controversies to private holdings were found critical in determining the fate of public private partnership for infrastructure development at Gadani Yard. Besides, finance is also among the major issues in developing and maintaining the infrastructure needs for Green Ship Recycling at Gadani Yard. The PSBA members are very much willing to enter into the public-private partnership. However, they have concerns about incentives and government's guarantee particularly for the development of private holdings and the mode of PPP arrangement for BDA owned plots. They desire green incentive scheme, which may be materialized through tax waiver by promulgating a green ship recycling policy instrument and ensuring the competitive edge of ship steel over the import of re-rollable steel. The federal government also needs to settle the land-rights for Gadani Ship Recycling Yard with provincial government as well as private plot owners.

Regarding the shifting the ship recycling activity at an alternate and suitable site on the coastline, PSBA members were of the view that this site has many attracting elements including the favourable natural tidal system, sandy beach and the supply chain etc. They highlighted that there were informal surveys carried out by the economic operators to judge several places along-side the coast-line particularly in and around Port Qasim areas, however Gadani Yard was found the best suitable place. In the context of CPEC and Gwadar Port, they are of the view that export oriented facility may be developed which would be having more prospects considering the Free-Zone status of the Gwadar, while it will be best to continue with Gadani Yard for local needs. So, they have the preference to keep and improve the operations at Gadani Yard. With this, for infrastructure development regarding clean and safe operations at Gadani, the Federal Government may explore public private partnership on Build Operate and Transfer (BOT) basis.

6.8 Conclusion and Recommendations

The ship-breaking at Gadani is still an informal and neglected segment of maritime economy in Pakistan despite its significant contribution through value

chain. The industry is running through *ad-hoc* mechanism due to absence of specific policy, legal, institutional framework and / or procedures in place. There was an attempt to formalize this industrial segment through “the Baluchistan Ship Breaking Industry Rules 1979” under “Balochistan Development Authority Act 1974” (No. X of 1974). However, these rules were meant to empower the BDA and are very much limited to handle the leasing of government owned plots for shipbreaking purpose at Gadani Yard. As far as the constitutional guarantees are concerned, general legal provisions in Pakistan cover the shipbreaking activity in a number of ways but in scattered form and no single comprehensive legal arrangement exist. The national and international stakeholder groups have concerns regarding availability and the implementation of rules and regulations to deal with the hazardous waste, environmental protection and the aspects of occupational health & safety (OHS) associated with the end of life ships. Based on overall findings and conclusion, following are key section specific recommendations:

a. So far, the industry is running through ad-hoc mechanism due to absence of specific policy, legal, institutional framework and / or procedures in vogue. Therefore, there is a need to have comprehensive instructions to deal with all aspects of Ship Recycling. This may include federal and provincial rules as well as ours international obligations, and requirements of various national institutions.

b. There is a dire need for sector-specific regulation that deal with decent work practices and conditions, along-with clean, green and safer ship recycling activities, which should be in accordance with the national legislation as well as international obligations.

c. Pre-determined SOPs for monitoring and responding to various contingencies need to be put in place. This should cover all scenarios from entering of a ship into Pakistani waters to beaching at Gadani Yard etc. Continuous monitoring should be adopted by all relevant institutions in order to avoid any other similar issue in future.

d. Since JMICC related SOP for the entry of ship into Pakistani waters is not documented, a procedure for the functional aspect of JMICC should be laid down properly.

e. Pakistan has yet to become party to Hong Kong Convention, which sets the global standards for safe and environmentally sound ship recycling. Whereas, India has become party to the convention since 2019.

f. GoP needs to implement clauses of ILO’s C187 (2006) and ratify it. There is no harm to ratify it along-with HKC as both will be complementing each-other.

g. In addition, the Federal Government needs to declare this informal sector as an "Industry" with an incentive based National Ship Recycling Policy, a Regulation and a "Green Ship Recycling Strategy”, to allow for the needed transition towards clean and safe ship recycling.

h. Balochistan Environmental Protection Agency (BEPA) needs to ensure environmental compliance against the mandatory requirements as part of approval for Initial Environmental Examination (IEE).

i. As part of Balochistan Environmental Protection Act, there is a need to develop and implement a sector specific regulation and detailed guidance, alike IEE/EIA Regulation 2000 and its guidelines, for the operational aspects of ship-recycling process at a facility area.

j. Recent years' declining trends in Ship Recycling activity at Gadani Yard have a very strong linkage with the fiscal / taxation policies of current governance regime at federal level in Pakistan. A noticeable relaxation in taxation during FY 2020-21, granted to this industry along-with enabling policy for construction sector, has provided lifeline to this industry in Pakistan. But, this is not sufficient for promotion of this important but neglected maritime sector of industrial economy. The objective of green ship recycling cannot be achieved without coordinated efforts and support from both federal and provincial government of Balochistan.

k. The infrastructure development will not only require fiscal resources and policy and legal instruments but also a meaningful consultation with relevant stakeholders for viable solution.

l. The PSBA members are very much willing to enter into public-private partnership. However, they desire green incentive scheme, which may be materialized through tax waiver by adopting a green ship recycling policy and ensuring the competitive edge of ship steel over the import of re-rollable steel. The federal government also needs to settle the land-rights for Gadani Ship Recycling Yard with provincial government as well as private plot owners.

m. In the context of CPEC and Gwadar Port, export oriented facility may be developed which would be having more prospects considering the Free-Zone status of the Gwadar. Therefore, shifting the ship recycling activity at some other site on the coastline is not a feasible option as Gadani has many attracting elements.

Section 7
International Obligations

SECTION 7: INTERNATIONAL OBLIGATIONS

7 ANALYSIS OF INTERNATIONAL OBLIGATIONS FOR GREEN PRACTICES

7.1 General Overview

Ship recycling takes place to fulfill the demand of steel and other material, mainly in the developing countries. Globally, Pakistan, India, and Bangladesh break more than two thirds of the ships when the life of ship comes to its end. Ship dismantling is an inherently hazardous industry; for safe and environmental sound ship recycling, it requires adequate technology and precautionary measures to manage liquid and other hazardous wastes[37]. When a ship's life has ended, it is considered as a source of hazardous waste as the vessel contains chemicals such as polyromantic hydrocarbons, asbestos, toxic metals, polychlorinated biphenyls, and organotin such as tributyltin (TBT), among others.

South Asia still bears the cost in terms of environmental degradation and labor health risks from the hazardous materials originating from the shipbreaking activities. The numbers show that 630 offshore units and ocean-going commercial ships have been sold to different scrap yards in the year 2020 alone [38]. Of these ships and units, 446 were large tankers, cargo, bulkers, and floating platforms; and the ships which have been broken on the three South Asian beaches, the estimated dismantled gross tonnage was approximately 90%. These sites include: Alang in India, Gadani in Pakistan, and Chattogram in Bangladesh, in which 90% of the world's tonnage has been scarped in 2019. However, the adverse effects and consequences from activities in the yards have been observed by many labors – often exploited migrant, many of them children – have also exposed to immense risks.

Based upon health and environmental risks, the industry of shipbreaking is responsible to prevent these risks while dismantling their ships; and the distribution and management of hazardous material should reduce pollution and adverse effects on marine and coastal environment. To achieve this, ship owners are required to follow certain international obligations for green ship recycling practices.

[37] Iqbal and Heidegger, "Pakistan Shipbreaking Outlook: The Way Forward for a Green Ship Recycling Industry-Environmental, Health and Safety Conditions."
[38] NGO shipbreaking Platform, "Platform Publishes List of Ships Dismantled Worldwide in 2020."

7.2 International Obligations

Compliance of international obligations is critically important for the maritime sectoral economies. Conventions of United Nations including International Maritime Organization (IMO) are quite significant particularly for the Ship Recycling. Over the time, concerns have been expressed by the stakeholders at the national and international level over the environmental, health and safety standards in ship recycling industry, particularly in countries employing the beaching method of ship recycling, including Pakistan. Poor enforcement of regulations relating to this activity means that problems with local environmental pollution are common and incidents of workers' injury and fatality are high. This section sums up the implications of various international obligations.

7.2.1 Hong Kong Convention (HKC) for the Safe and Environmentally Sound Ships Recycling.

The most relevant and latest international obligation is the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships known as 'HKC'. HKC was adopted at a diplomatic conference in Hong Kong, China, on 15 May 2009. The Convention elaborates in its articles and regulations a control system for ship recycling, which includes obligations for flag States and ship owners and recycling States and recycling facilities. In May 2010, the seventh session of the Open-ended Working Group welcomed the adoption of the Hong Kong Convention (decision OEWG-VII/12 on Environmentally sound dismantling of ships). Subsequently, in October 2011, the tenth meeting of the Conference encouraged parties to ratify the Convention to enable its early entry into force.

Under the Convention, Parties are required to take effective measures to ensure that ship recycling facilities under their jurisdiction comply with the HKC. Ship recycling yards are required to provide a Ship Recycling Plan, to specify the manner in which each individual ship will be recycled, depending on its particulars and its inventory. Ships will be required to have an initial survey to verify the inventory of hazardous materials, renewal surveys during the life of the ship, and a final survey prior to recycling.

The Convention will only enter into force 24 months after the ratification by 15 States, representing 40 per cent of world merchant shipping by gross tonnage, with a combined maximum annual ship recycling volume not less than 3 per cent of their combined tonnage. HKC is not expected to enter into force before many years due to its strict criteria. So far, seventeen countries (i.e. Belgium, Denmark, Croatia, Spain, Estonia, France, Germany, India, Japan, Malta, Netherlands, Norway, Panama, Republic of the Congo, Republic of Serbia, Turkiye, Ghana) have ratified HKC, - the combined merchant fleets of which

constitute approximately 29.77% of the gross tonnage of world's merchant fleet, and combined recycling volume of the Contracting States during the preceding 10 years is approx. 13.9 million tons i.e. 0.56%.

Unfortunately, Pakistan is neither signatory nor it ratified the HKC. Prime reasons for non-ratification of HKC attributes to absence of any road map by the concerned government and business authority in this regard. The lack of interest to invest by the economic operators, inadequate capacity of the actors and issues pertaining to land rights for the public as well as privately owned plots at Gadani Yard; have further slowed the process.

7.2.2 Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (adopted on 22 March 1989) has been involved in the issue of ship recycling for over a decade. This activity is of particular concern in the sense of Basel Convention as end-of-life ships comprise of an array of hazardous materials – such as asbestos, PCB and waste oils – which can have serious implications for the environment and human health if not managed properly. In 2002, the Basel Convention adopted Technical Guidelines for the Environmentally Sound Management (ESM) of the Full and Partial Dismantling of Ships. The Guidelines provide recommendations on procedures, processes and practices that must be implemented to ensure safe and environmentally sound practices. The Guidelines also advise on monitoring and verification of environmental performance.

As ships destined for dismantling will rarely fly the flag of the state in which they are to be recycled, this activity can represent a transboundary movement of hazardous waste. However, given the global nature of the shipping industry and the practices associated with sending end-of-life ships for recycling, there has been difficulty in applying the provisions of the Basel Convention to ship recycling. Parties have recognised that Basel controls may often be circumvented for ships going for recycling. Thus, at the seventh meeting of the Conference of the Parties in 2004, while Basel Parties trying to get recognised that ship may become waste as defined in Article 2 of the Basel Convention, they also invited the International Maritime Organization (IMO) to continue work aimed at the establishment of mandatory requirements to ensure the environmentally sound management of ship dismantling (Basel Convention's decision VII/26 on Environmentally sound management of ship dismantling). Subsequently, IMO developed HKC for exclusive guidance regarding green ship recycling.

It is observed that there is a lack of clarity about the scope and application of different Multilateral Environmental Agreement (MEAs), particularly about the

Prior Informed Consent (PIC) instrument under Basel Convention. Concerned officials at Directorate of Multilateral Environmental Agreement (MEAs) at Ministry of Climate Change, Government of Pakistan have arguments that end-of-life ships do not fall within the purview of Basel Convention. However, this subject comes purely under the scope of 'HKC'.

It is pertinent that end-of-life ships don't fall within the definition of waste, which is globally recognized. There is a confusion regarding the application of guidelines of Basel Convention as all such work, dealing with Ship Dismantling under Basel Convention, was subsequently shifted by inviting International Maritime Organization (IMO) as part of decision made in seventh meeting of the Conference of the Parties in 2004. IMO sponsored Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC) was adopted at a diplomatic conference in Hong Kong, in May 2009. Although Pakistan is neither signatory nor it ratified the HKC yet, HKC's guidelines are comprehensive and supersedes the Basel Convention.

7.2.3 ILO Guidelines

Earlier to HKC requirements, the International Labour Organisation (ILO), a UN agency, had called shipbreaking one of "the most dangerous occupations" in the world. In March 2004, the ILO unanimously endorsed at its 289th session a set of criteria to govern the disposal of ships, for occupational safety and health in shipbreaking operations. Besides, on 31 May 2006, ILO adopted a Convention on Promotional Framework for Occupational Safety and Health Convention (No. C187) which is also relevant. India, Pakistan and Bangladesh have not ratified ILO's C187 yet. GoP should implement clauses of ILO's C187 (2006) and ratify it.

7.2.4 EU Waste Shipment Regulation

Came in 2006. It bans all exports of hazardous waste to non-OECD (Organisation for Economic Co-operation and Development) countries and all exports of waste for disposal outside the EU/EFTA (The European Free Trade Association).

7.2.5 EU Ship Recycling Regulation (EU SRR)

European ship owners own 35% of the world fleet. Given the reason that a large percentage of these is being dismantled under conditions which are often harmful to workers' health and the environment, European Union promulgated EU Ship Recycling Regulation which was entered into force on 30 December 2013. All new and existing ships of 500 Gross Tonnage and above, either flying an EU Member State flag, or calling at an EU port, must comply with EU SRR. It closely follows HKC text and is designed to facilitate early adoption of Convention. It sets requirements for ship recycling activities, and includes

environmental protection and occupational health and safety standards that go beyond the Hong Kong Convention.

From December 2018, large vessels flying the flag of an EU Member State may be recycled only in safe and sound ship recycling facilities included in the European List of ship recycling facilities ('the European List').

The European List was first established on 19 December 2016, and last updated on 11 November 2020 under Commission's decision EU 2016/2323. The European Commission has added several new yards to the List. With the new update, the European List of ship recycling facilities currently contains 46 yards, including 37 facilities in EU Member States, 8 facilities in Turkiye and 1 facility in the USA. It also contains 36 more applications under certification process; 19 Indian companies, 4 from China, 2 from USA and 11 from Turkiye. None of Pakistani or Bangladeshi company has applied so far.

The EU Regulation would likely influence operations at Gadani Yard to a considerable degree, considering the past trends of EU ships' arrival at Gadani. Generally, flags are changed for end-of-life-ships through flag of convenience such as Panama, Palau, Samoa, Marshal Island etc. However, with growing pressure from EU states against such practices of flag change, the impact would likely be more at Gadani Yard considering the global share of EU state's fleet i.e. 35%.

7.2.6 Inclusion in EU List

EU SRR Article 15(4) introduces a two-step inspection and verification regime. There is a requirement of compliance by ship recycling facilities as set out in Article 13 and certification through *a s*ite inspection by an **independent verifier** with appropriate qualifications. Companies owning or operating a ship recycling facility need to ensure that it is independent and has the necessary qualifications. Following is the list of classification societies which are recognized / accredited by the European Union:

a. American Bureau of Shipping (ABS)
b. Bureau Veritas SA
c. China Classification Society (CCS)
d. Croatian Register of Shipping (CRS)
e. DNV GL AS
f. KR (Korean Register)
g. Indian Register of Shipping (IRCLASS)
h. Lloyd's Register Group LTD (LR)
i. Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK)
j. Polish Register of Shipping (PRS)
k. RINA Services S.p.A.
l. Russian Maritime Register of Shipping (RS)

While individual Gadani Ship-Recycling Facilities should bear the expenses, Government should facilitate their inclusion in European List by patronizing the process through engagement of an approved classification society. **Bahria Classification Society** may strive for its inclusion in European List of classification societies.

7.2.7 Preparedness for International Obligations and Green Ship Recycling Operations at Gadani Yard

During a recent site visit at Gadani, it was witnessed that the Economic Operators are trying to comply with national legislation and international obligations including the provisions of the Hong Kong Convention (HKC), EU Regulations and other multilateral environmental agreements by achieving certifications of ISO-14001, ISO 9001, ISO 18001 and ISO 30000.

During a consultative session with relevant stakeholders held in January 2021 at Karachi, PSBA members showed their resolve towards ratification of Hong Kong Convention and supported the efforts by Government of Pakistan to ensure early compliance strategy for green ship recycling. This is a welcome development for ship recycling sector of Pakistan. However, PSBA members are apparently reluctant to initiate a process for certification of their facility areas against EU regulations. However, compliance with EU Regulations is also important in Pakistani context considering the size of business from EU flag ships and anticipated strict EU rules pertaining to change EU flag for end of life ships through flag of convenience. PSBA members reported that Gadani Yard has experienced 10-15% arrival of end of life ships in past years.

7.3 Requirements under HKC

For safe and environmentally sound ship recycling, the HKC 2009 was adopted in a diplomatic conference held in Hong Kong, China. The HKC Convention particularly sets ship recycling standards and emphasizes to enforce on the flag of vessels and the recycling state. The HKC has been upheld by shipping industry as the solution for the improvement of global shipbreaking conditions. However, the HKC has also been criticized by numerous NGOs and other parties around the globe. Moreover, the HKC trusts on the jurisdiction of state's flag and prone circumvention by flag-hopping to the "grey- and black-listed end-of-life flags" which is popular to the South Asian beaches. Under international maritime law, these flags are known as poor for their implementation [39].

The authorities of South Asian countries have claimed that the current facilities of beaching are already compliant with the requirements of HKC. Ship owners and stakeholders involved in this business are earning extra profits by selling to substandard yards known as "Cash Buyers" and administrations of FOCs on

[39] NGO Ship breaking platform, "Flags of Convenience - NGO Shipbreaking Platform."

the other hand, vested their interests to maintain status quo. This particularly indicating that entire businesses have built a model by Cash Buyers on scraping ships in Gadani, Alang-Sosiya, and Chattogram are most passionate promoters of HKC. Currently, fifteen countries have ratified the HKC convention (countries are mentioned in section 6.2 of international obligations in this chapter). The HKC enters into force after 24 months, after its ratification by fifteen states, representing 40% of global shipping merchant of gross tonnage with the volume of recycling not less than 3% of their combined tonnage. The statement of compliances with HKC SOCs are issued on the basis of business-to-business. [40]

The Hong Kong Convention provides guidance in two segments i.e. requirements for ship owners and for ship dismantling facilities. The requirements for ship recycling facilities, requirements for inventory of Hazardous material, requirements for health and safety, and environmentally sound ship recycling are further elaborated in sub sections.

7.3.1 Requirements for Ship Owner

According to Article 3 the requirement for ship company/owner are applicable until and unless provided application expressly, otherwise HKC shall apply to entitled ship flying with the flag of party or operated by its authority and not Applicable to Auxiliary, warship, and ships less than 500 gross tonnages.

7.3.2 General Obligations under Article 1

According to Article 1, each party shall ensure that ship recycling shall be conducted in order to reducing environmental and health risks.

7.3.3 Control Related to Ship Recycling Under Article 4

It is the requirement of each party that entitled ship flying its flag or if under its authority and the ship recycling facility shall be under its jurisdiction to each party and shall comply with the requirements of forth in HKC.

7.3.4 Surveys and Certification of Ships under Article 5

It is to ensure all parties that ships flying its flag as well as operating shall be subjected to certifications and surveys accepted according to its regulations.

7.3.5 Exchange of Information Under Article 7

The relevant information based on decision of authorization shall be provided to party and organization if it is requested.

[40] NGO shipbreaking Platform, "Platform Publishes List of Ships Dismantled Worldwide in 2020."

7.3.6 Inventory of Hazardous Materials under Regulation 5

Under the Regulation 5, an Inventory of Hazardous Materials is required for all new ships. Whereas, compliance is required for the existing ships with paragraph 1 and not later than 5 years after the entry into force of this Convention, or before going for recycling if this is earlier. The Hazardous Materials listed in Appendix 1, at least, shall be identified when the Inventory is developed.

7.3.7 Controls on Ship Recycling Facilities under Regulation 15 of HKC

Legislations, regulations, mechanism, and standards would be established by each party, and the authorization of ship recycling facilities will be established by each party.

7.3.8 Authorization of ship Recycling Facilities under regulation 16 of HKC

The competent authority shall carry the processes of authorization that includes the documents' verification by HKC and the specified time period would not be more than five years.

7.3.9 Requirements for Ship Recycling Facility under Regulation 17

The ship to which HKC applies accept only;

a. Comply with HKC
b. Meet the requirements of HKC
c. Ships those have been authorized by HKC
d. Availability of documentation of authorization.

7.3.10 *Ship Recycling Facility Management Plan under regulation 18*

Party which authorizes ship recycling facility shall prepare the plan for ship recycling. This plan is then adopted by the appropriate governing body of the recycling company.

7.3.11 Requirement for Prevention of adverse effects on the human health and environment under regulation 19

The procedures for prevention by ship recycling facilities authorized by a party include;

i. The prevention from fire, explosion, risky atmosphere, human health and environment. and many other unsafe activities

7.3.12 Requirement for Safe and Environmentally Sound Management of Hazardous Material under Regulation 20

According to the regulations of 11 or 12, the ship recycling facility authorized by a party will ensure environmental degradation and removal of contained material in a certified ship.

7.3.13 Requirement for Emergency Preparedness and Response Plan Under Regulation 21

The regulation addresses that the plan shall be prepared regarding to the location as well as environment of ship recycling to maintain an emergency.

7.3.14 Requirement for Work Safety and Training under Regulation 22

To ensure work safety and training, these measures would be carried out and include: maintenance, availability, and the use of PPEs during operations of ship recycling.

7.3.15 Reporting on Incidents, Accidents, Occupational Diseases and Chronic Effects.

Under this regulation, the ship recycling party will be responsible to ensure the accurate reporting on chronic disease, accidents, incidents, risk to workers, and other adverse effects to its competent authority.

7.3.16 Requirement for Initial Notification and Reporting Requirements under Regulations 24

Prior to preparing and recycling of ship, the notifications should include following details.

i. name of the State whose flag the ship is entitled to fly
ii. date on which the ship was registered with that State
iii. ship's identification number (IMO number)
iv. hull number on new-building delivery
v. name and type of ship
vi. port at which the ship is registered
vii. name and address of the Ship owner as well as the IMO registered owner identification number
viii. name and address of the company as well as the IMO company identification number
ix. name of all classification society(ies) with which the ship is classed
x. ship's main particulars (Length overall, Breath (moulded), Depth (Moulded), Lightweight, gross and Net tonnage, and engine type and rating
xi. name of all classification society(ies) with which the ship is classed;
xii. inventory of Hazardous Materials; and
xiii. draft ship recycling plan for approval pursuant to regulation 9

7.3.17 Status of ratification

The HKC 2009 is adopted for environmentally sound ship dismantling. After its entry into force of Hong Kong Convention, the maintenance as well as development of inventory of hazardous, that indicates the amount and location of hazardous waste onboard a ship, would be required for a ship over 500 gross tonnages (GT).

By October 2022, seventeen states have ratified HKC. These countries include: Belgium, Denmark, Croatia, Spain, Estonia, France, Germany, India, Japan, Malta, Netherlands, Norway, Panama, Republic of the Congo, Republic of Serbia, Turkiye and Ghana[41].

7.3.18 Views of Stakeholders regarding HKC Ratification and application at Gadani

The ship breakers in Pakistan are fully ready to proceed with HKC. Several ship breakers have already completed majority of physical changes in their yards and introduced the necessary documentary regime as required by the HKC. However, still many facilities cannot complete the process due to following handicaps:

i. Land Ownership issues
ii. Out of 132 recycling facility plots at Gadani Yard, only 32 plots are under BDA ownership, which leased these yards to ship breakers.

The remaining 132 yards owned by several local waders and some of them are not seemingly ready to allow the necessary constructions on these yards, or are demanding huge amounts of money from ship breakers to allow such constructions and changes. Some of the yards also have legal ownership disputes and court cases pending, indefinitely hindering the development. The yards under control of BDA are mostly faced with severe land erosions at the beachside and the supposedly allocated leased 4 acre of land is hardly left to just about 1 acre or so, which means there is no space left for breakers on these yards for the development work & new constructions. BDA has made several promises to provide additional space behind these eroded yards, however they have so far failed to do so due to land disputes with locals.

It must be understood that without finding a solution of the land Issues and long term commitment from all concerned parties, it may not be easy for ship breakers to invest huge fixed sums on these disputed plots, where the future of the occupation is not confirmed. Relevant authorities should play an active role bringing local waders, BDA and ship breakers on table & find amicable and workable solution to this problem without further ado. Yard leases should be made for at least 10-15 years and ship breakers be allowed to freely make

[41] ClassNK, "Ship Recycling Convention (the Hong Kong Convention) | ClassNK - English."

necessary changes/construction on the yards, along with the formulation & introduction of necessary legislative changes. PSBA is ready to sit with authorities and chalk-out a proper plan in this respect. Urgent & immediate set up must be provided for solid waste disposal and management facilities.

While addressing the key issues for the ratification of Hong Kong convention, majority of the respondents/ship breakers highlighted issues related to taxation system and multilayer of taxation including; income tax, tonnage fee to BDA, and land ownership. Feudalism did not allow shipbreakers to enhance its capacity of yards and land is required for the extension of shipbreaking yards. As a result, we have poor infrastructure and unable to expand our economic activities. The import of low graded re-roll able scrap is another major issue also steel smuggling has adversely affected local ship breaking industries of Gadani. Respondents also highlighted the issues related to license for contractor, landfill site, and HSE cultures. The investments ratio under guidance of Hong Kong convention is high for shipbreakers at Gadani. Government's attention is required for funding and to support local ship breaking industries. In addition, lack of enforcement & compliance of the law, lack of government policies towards ship breaking industries are some significant issues to handle, if government ultimately wants to boost this industry. We have insufficient waste management facilities at Gadani, BDA is intended to fulfill this requirement.

7.4 Requirements under EU Regulations

7.4.1 Specifications

The European Union Ship Recycling Regulations (EUSRR) has adopted by European parliament and European Union council on November, 2013. The main objective of EUSRR is to minimize an adverse effect, directly or indirectly related to ship dismantling. According the regulation from 31 December 2018, above 500 gross tonnage commercial vessels under EU-flagged must be recycled by ensuring safe and environmental sound ship recycling that are included in the Approved European List. For the inclusion in European list, any ship recycling facility has to comply with a number of requirements for safe and environmental sound recycling irrespective of its location. Moreover, the operating facilities under EUSRR would be approved by its own authorities for listing. It sets requirements for ship recycling activities, and includes environmental protection and occupational health and safety standards that go beyond the Hong Kong Convention. From December 2018, large vessels flying the flag of an EU Member State may be recycled only in safe and sound ship recycling facilities included in the European List of ship recycling facilities [42].

[42] IMO and others, "Status of Multilateral Conventions and Instruments in Respect of Which the International Maritime Organization or Its Secretary-General Performs Depositary or Other Functions as at 31 December 2003."

The European List was first established on 19 December 2016 and last updated on 22 January 2020. List now contains 46 approved yards; including 37 facilities located in 12 EU Member States and in Norway, 6 facilities in Turkiye and 1 facility in the United States of America. It also contains 36 more applications under certification process; 19 Indian companies, 4 from China, 2 from USA and 11 from Turkiye. None of Pakistani or Bangladeshi company has applied so far [43].

The applications submitted by ship recycling facilities in third countries would be reviewed by European commission. In this backdrop, European union regulations for ship recycling plays a different role and an important function as a market differentiator for ship recycling yards those who invested for proper measures for safety and environmental standards. Whilst, the EUSRR is the extension of 2009 Hong Kong Convention requirements for safe and environmental sound ship recycling, but this extension added some extra safety measure and environmental requirements. Certainly, the standards settled by IMO's Hong Kong Convention are not higher than the EUSRR – because it does not allow beaching methods and related requirements to downstream waste management such as Toxic and rights of labor included. Moreover, ship recycling facilities listed in EU Regulation are at subject to maximum level for its scrutiny; there are third party independent and certification and auditing would be allowed for the submission of complaints. In such a case, these are essential safeguard that are absent in HKC. EUSRR is required only for guaranteeing that ship recycling yards have been certified independently as well as audited up against an acceptable standard.

7.4.2 Requirements for Ship Owners under Article 6

When ship is ready to send for ship recycling the owner should;

i. Provide all relevant information, which is necessary for the development of ship recycling plan, as mentioned in Article 7 to the operators of the ship recycling facility.
ii. The owners of ships should ensure the destined shops to be recycled.
iii. The owners should also ensure that tankers arriving at ship facility with cargo having pump rooms and tanks ready for certification.
iv. The ship owner should provide recycling certificate under guidelines of Article 9 to the operators of the ship recycling facility.
v. Owners should ensure the ship is in compliance with the maintained requirements as well as administration of sate member who's flag ship is flying up until the operator of ship recycling facility accept the ship's responsibility.
vi. The owners should ensure ship distained be recycled, and ships those are listed in European List as guided by Article 6(2)(a).

[43] European Union, "Enviromental Sound Shiprecycling."

7.4.3 General Requirements

The various requirements are addressed in general requirements of EU. These requirements are falling under three headers.

i. General
ii. Health and safety
iii. Environmental

These requirements shall be ensured during ship recycling at ship recycling facility covered in article 13(1)(a) depends on law of the country where facility is located. If specific license and permits are not issued by the competent authority for ship recycling, then applicant can submit other relevant permits or licenses in relation the activities to the company.

7.4.4 Ship Recycling Facility Management Plan.

i. Article 13(1)(e) defines the requirement for Ship recycling plan for the facility area.
ii. It is a plan introduced by HKC. The analysis of the plan of Ship Recycling facility's contents would allow commission for the checking of compliance with the substantial regulation and requirements.
iii. Evidence of compliance shall recommend to refer to relevant parts for ship recycling plan based on requirements and regulations.

7.4.5 Infrastructure Requirements

EU convention defines infrastructure requirements as guided by International Maritime Organization, that ship recycling facility should be designed, constructed, and operated to prevent environmental threats and leakages[44].

7.4.6 Control of Hazardous material under Article 4

Usage of hazardous material or installation applied the guidelines mentioned in Annex I of HKC. Other requirements concerning to laws of Union may needed more measurements without prejudice.

7.4.7 Inventory of Hazardous Material Under Article 5

i. An inventory of Hazardous material will be on board for each new ship. Based on this material will be referred according to Annex II of HKC.
ii. According to the point b of article 32(2) current ships will be comply in the case of ships going for dismantle.

[44] European Commission, "Information from European Union Institutions, Bodies, Offices and Agencies: Article 13(1)(b) of the Regulation."

iii. The hazardous material by Inventory shall be specific to every ship and shall provide the evidence of the complies of ships and restrictions on using or installing shall be under the guidance of article 4.
iv. The hazardous material by inventory has three parts.
    a. List of hazardous material shall be according to Annex I of HKC.
    b. List of waste generated by operations present on board the ship (Part II)
    c. Stores list present on board the ship (Part III).
v. IMO guidelines shall be taking into account, prior to ship recycling.
vi. According to the Article 24, the commission shall be empowered to update list of inventory of hazardous

7.4.8 Requirements for Health Risks and Environment under Article 13(1)(f)

i. The ship recycling facility will avert negative effects of on environment [45] under guidelines provided by IMO and emphasized by regulations for prevention. The facility then required the demonstration of leakage control to ensure its preventing capability. If the prevention is failed despite the design of compliant, operation, and construction of responding to and mitigating any sort of leakage, such as air emission and [46] guidelines for safe and environmental sound ship recycling are defined in Section 3 of IMO 2012.
ii. The section 5 of Basel convention for safe and environment friendly ship dismantlement.
iii. Particularly, this section acknowledged the Management principles for environmentally sound ship recycling and compliances of ship recycling with regulations, based on developed and appropriate infrastructure [47]

7.4.9 Requirement for what is meant by Built Structures for environmental sound ship recycling under Article 13(1)(c).

The facility of ship recycling requires operate from built structure. The major aim of built structure is to enable safety and environmentally sound management for sound recycling of ships, leakage control, safety of workers, containment of hazardous material, and for generated waste while ship recycling.

7.4.10 Requirement with Regard to Article 13, Waste Recovery or Disposal Operations under Article 15(5)

It concerns about sound management of environment that ship recycling company may demonstrate the waste management facility, in which waste

[45] European Commission.
[46] Commission, "Information from European Union Institutions, Bodies, Offices and Agencies: Article 13(1)(b), Article 13(1)(d)(i) and Article 13(1)(l)."
[47] BCS, "The Basel Convention Secretariat's Guidance for Competent Authorities of Ship Recycling Facilities."

would be managed in accordance with human health and protection standards of environment.

7.4.11 Requirement for what Constitutes Compliant Record-Keeping On Incident, Accident, Occupational Diseases and Chronic Effects under Article 13(1)(i).

The article focuses on records and occupational diseases. With the help of annual medical check-ups, the effects of chronic disease can be obtained thorough urine, hair, and blood samples. In addition, through soil, the information regarding origins of disease as well as its chronic effects would be obtained. Moreover, the facility of ship recycling establishes the records of accident, incident, chronic effects, and occupational diseases if it would be requested by its competent authority to reduce level of risks on environment and human health.

7.4.12 Requirement for what Constitutes Appropriate Personal Proactive Equipment under Article 13(1)(i)

This article emphasizes the ship recycling with worker safety measurements. These include, use of personal proactive equipment (PPE), which means that an appliance or device that would be designed against protection of one or more safety and health hazards [48]. In the sense of regulation, the PPE is protection arrangement detailed by the guidelines of IMO and ILO for safety and environment friendly ship recycling (IMO MEPC.(210)63, Section 3.3.4.10, p. 21).

7.4.13 Requirement for Prevention of Adverse Effect On Human Health under Article 13(1)(f).

i. It refers to the guidelines given by ILO's operational arrangements, prevention of forms child labor and to ensure living accommodation appropriately. Otherwise it would be a responsibility of ship recycling company.
ii. The article operates various operational and physical elements including; workers' safety, safety operations, techniques and procedures that should aim to reducing health risks [49].

7.4.14 Requirement for what Constitutes Compliant Record-Keeping On Incident, Accident, Occupational Diseases and Chronic Effects under Article 13(1)(j)

The article focuses on records and occupational diseases. With the help of annual medical check-ups, the effects of chronic disease can be obtained thorough urine, hair, and blood samples. In addition, through soil, the

[48] COUNCIL DIRECTIVE, "EUR-Lex - 31989L0686 - EN."
[49] European Commission, "INFORMATION FROM EUROPEAN UNION INSTITUTIONS, BODIES, OFFICES AND AGENCIES."

information regarding origins of disease as well as its chronic effects would be obtained. Moreover, the facility of ship recycling establishes the records of accident, incident, chronic effects, and occupational diseases if it would be requested by its competent authority to reduce level of risks on environment and human health.

7.4.15 Requirement for Obligations with Respect to Training under Article 13(1)(i).

It focuses the compliance with relevant training requirements, if the implementation with relevant guidelines of ILO and IMO are ensured for safety and environment friendly environment during ship recycling.

7.4.16 Requirement for Emergency preparedness and Response plan under Article 13(1)(h)

i. The plan is based on guidance provided by section 3.3.5 of the IMO for ship recycling by ensuring safe and environmental aspects.
ii. In addition, the guidelines of ILO's section 4.6 and 16 as well as section 6.2 and 4.5 of the Basel convention's technical guidelines for sound management of environment and safety

7.4.17 Issuance and Endorsement of Certification under Article 9

Having clear and successful initial and renewal surveys. According to Part I of the hazardous inventory material and the certificate shall be supplemented to refer to Article 5 (5)(a).

7.4.18 Duration and Validity of Certification under Article 10

The inventory certificate shall be issued according to Article 9 for specified time period that should not exceed 5 years.

7.4.19 Reporting on Incidents, Accidents, Occupational Diseases and Chronic Effects under Article 13(1)(j)

Under this regulation, the ship recycling party will be responsible to ensure the accurate reporting on chronic disease, accidents, incidents, risk of workers, and other adverse effects to its competent authority to increase the level of activities and to reduce risk on human health and environment.

7.4.20 Surveys under Article 8

i. Initial survey for new ship before the putting ships in service.
ii. The renewal survey will be conducted at specified interval period by administration.
iii. Additional survey will be conducted either partial or general depending on situation, if owner of the ships will request.

iv. The final survey will be conducted before the ship recycling and ships being taken out of service.
v. The survey will verify
    a. Inventory of hazardous material
    b. Information regarding inventory of hazardous material that should reflect ship recycling plan properly.
    c. The location where ship will be recycled, should be included in EU's list.

7.4.21 Port State Control under Article 11

According to the directives of 2009/16/EC with their National law, the state member shall apply control provision for ships.

7.4.22 Requirement for Management and Monitoring System Article 13(1)(d)

i. The systems of monitoring and management covers hazardous material, waste, and environmental degradation caused by the activities of ship recycling generally as well as health and safety concerns to protect health risks and adverse effects of environment.

7.5 EU Listing

The European Union Convention provides its "Listing procedures" under article 2(1). The convention intends to apply to ships flying with member states flag. According to Article (2)(a) the ship owners should ensure that shops they are intended to recycled in those facilities listed in European Lists. Moreover, Article 16(1)(b) elucidates that the commission will implement acts for the establishment of EU list of ship recycling facility which are located in third country. Article 15(1) explains that the recycling facilities which are company's owned in third country, and interested to recycle the ship flying with Member state's flag should submit an application to the commission to include in EU list. While under Article (2) with reference to Article (1), in the application the owners should provide the evidences of ship recycling facility and requirements under Article (13) to recycle a ship, and to include the facility into EU list under Article 16.

7.5.1 Benefits and Procedure for Certification to EU listing (role and requirements for Independent Verifiers)

In order to include in the European listing under Article 15(4) §1, ship recycling facilities located in third country should compliance under guidelines of mentioned in Article 13 and shall be certified and shall be inspect by an independent verifier with suitable qualifications. Ship recycling company shall submit certification to the commission in the EU list and after that every five years, upon renewal to include in the EU list. The initial inclusion in the EU list and thereof renewal would be supplemented and would be review on mid-term basis for the confirmation of compliance with guideline provided in Article 13.

The EU regulation explains the role of independent verifier, as they would be tasked with certifying against the facility and the requirements of the regulation. Independent verifier would perform their tasks independently, and to that effect, the contract between ship recycling facility and contractor also they would be entitled the letters to convey all the required activities, checking them, and reporting them on the facility's compliance with regulations and requirements of European Union.

The independent verifier's contractual obligations do not in any way limits the activities or preventing the activities of the later. The list of independent verifiers will not be provided by the commission and it has not been provided in the regulation. In such a case, ship owners or company of recycling facility should directly contract with an independent verifier and ensuring that it has the necessary qualifications.

7.5.2 Status of National, Regional and International Yards in EU Listing

The European Union has updated its list for ship recycling facilities on 11 November, 2020 under its commission's decision (EU) 2016/2323. According to the document countries have updated their status for ship recycling facilities. Denmark and Norway have informed the commission that they have updated their ship recycling facilities located in third country by the competent authority according to the guidelines of Article 14 of the EU regulation No 1257/2013. In addition, the commission is also informed by Norway's Government for their facility to be included in the EU list. The ship recycling facility located in Lithuania has been expired on 17 March, 2020 and EU commission has informed their competent authority not to continue activities regarding ship recycling facilities. In this regard, EU list would be again updated for the removal of such facilities. Latvia's and United Kingdom's authorization for ship recycling facilities have also been expired on 11 June and 2 July 2020 respectively.

European commission has added 4 more yard into its list of ship recycling. These yards include; 2 yards of United Kingdom and two more yard of Turkiye [50]. Pakistan has not decided to ratify European Union regulation or to include its ship breaking facility in the EU Listing.

7.5.3 Plans / Views of PSBA Members for EU Listing

The primary (direct) stakeholders of Pakistan's Ship-breaking Industry include Pakistan Ship Association Agents PSAA, Economic Operators at Gadani Yard, Pakistan Ship-breakers Association (PSA), workers and trade unions. Whereas, there are various secondary (indirect) stakeholders such as owners and workers of re-rolling mills, law and enforcement agencies/departments,

[50] Ovcina, "EU Adds 4 More Ship-Recycling Facilities to Its List as UK Yards Face Brexit-Related Removal - Offshore Energy."

national and international pressure groups such as Brussels based NGO Ship-breaking platform, and other international organizations such as IMO, ILO, Basel Convention and European Union. On 6 January 2021, the current state of ship-breaking industry was discussed with the focal person of Pakistan Ship-breakers Association (PSA) Mr. Jawed Iqbal, and Mr. Asif Ali Khan who showed their major concerns regarding ratifications of Hong Kong Convention (HKC) and European Union regulation (EUR) i.e. (1) they want to ratify Hong Kong Convention because it accepts their beaching methods (2) the do not want to ratify EU regulation because it involves higher investment and beaching method is not accepted for EU regulations.

While addressing the issues related to ratification of EU regulations, majority of respondents elaborated that from 31 December 2018, the recycling of all large sea-going vessels sailing under an EU flag can only take place in yards included in the European list of ship recycling facilities. this is the result of the EU ship recycling regulation – the only legally binding and comprehensive instrument on ship recycling in force in the world today, which aims to make ship recycling greener and safer. The European list contains currently 26 yards, most of them located in the EU, but also in Turkiye and the USA, and additional yards are expected to be included in the list in the future. European ship owners own 35% of the world fleet. Due to the strictness of EU regulations, no Pakistan ship breaking yard is eligible to recycled the EU flagged ship. The basic reason which is hindering to get shipbreaking yards by shipbreakers in compliance with the HKC is the ownership of land on which yards are located.

The major portion of this land belongs to board of revenue Balochistan, which is onward handed over to BDA (the sole authority to look after shipbreaking in Balochistan) for the shipbreaking yards. However, this land was illegally allotted to some locals by member-ii board of revenue Balochistan. All the illegal allotments of state land, made during the period 15th may 1988 to 18th august 1993 were declared illegal & cancelled forthwith under the Balochistan (cancellation of state land allotment) ordinance, 1993, which was promulgated on 14th October 1993.

The ordinance was later on ratified by provincial assembly by act of assembly passed on 15th October 1996, upon which the allotters of the subject land went to the high court of Balochistan in 1989 but lost their case & board of revenue won. The allotters went to Supreme Court of Pakistan and filled a civil petition for leave to appeal no. 2-q of 1990 against the Balochistan high court decision. The Supreme Court of Pakistan refused the leave; hence allotters lost the case forever. However, astonishingly the reverse entries were not made up till today by the tehsildar Gadani in favor of board of revenue/BDA despite the fact that allotters even lost the case at the highest court of Pakistan, i.e. Supreme Court of Pakistan.

In addition to taxation, currency depreciation issues and international obligations, green (clean and safe) operations always remained a question mark for Gadani Shipbreaking Yard. Now, the economic operators are trying to comply with national legislation and international obligations of Hong Kong Convention, Basel Convention and EU regulation by achieving certifications of ISO-14001, ISO 9001, ISO 18001 and ISO 30000. Pakistan Ship Breaking Authority (PSBA) is ready to implement best practices for green Ship recycling but survival of their business is question mark now a day. On other hand, Gadani Yard has many advantages over Bangladesh or Indian facilities, such as sandy beach and favourable tides for a low cost ship breaking method. But, the government has not prioritized this sector and made no investment towards infrastructure development for green operations.

If Pakistan does not comply with EU Regulations, then logically, Pakistan may not be able to purchase the EU Flag ships. However, if we look at our last 10-15 years import of ships, we would hardly see any EU Flag vessel having arrived at Gadani. Moreover, to move towards EU Regulations, we do not have the necessary infrastructure available and it cannot be done at Gadani. The best course of action would be to concentrate more on internationally acceptable HKC, rather than prioritizing EU. Once yards become compliant with HKC, complying with EU regulations will become easier.

7.6 Comparative Analysis of Step Activities at Gadani and Requirements of HKC and EU Regulations for Sustainable Ship Recycling.

Standard Steps	BAU/Practice at Gadani	EU Requirements	HKC Requirements
Parking	• **Permission/Authoriziation to Park at Facility Include** • Beaching a. Pakistan Customs Rule 2001 (3). In the case of non-production of builder's plan under sub-rule (2), the ship shall be surveyed by an approved surveyor to ascertain the light displacement tonnage (L.D.T) prior to beaching as laid down in the public Notice No. 1/1990, date the 3rd February 1990, and No. 2/1990, dated the 30th December,1990, issued by the Collector of Customs, Custom House, Gaddani.	• **Permission/Authoriziation to Park at Facility includes;** a. Ship recycling management plan including techniques and operational controls as guided under Article 13(1)(e). b. Authorization by its competent authority under Article 13(1)(a). • Ship Recycling Plan. a. Analysis of ship recycling plan would allow commission to check the plan as gauided by Article 13(1)(e). • Inventory of Hazardous Material. a. Ship recycling facility sahll ensure inventory of hazardous material for safe and enviroemtal sound ship recycling as guaded under Article 13(1)(g)(i).	• **Authorization includes;** a. Authorized by party tacking the guidelines of the convention for ship recycling. b. Authorization shall be carried by competent autority. • Inventory of Hazaradous Material. a. Hazardous material as guaided by the convention. b. Celrification of ship's cmpliance with regulation 4. • Ship Recycling Plan. • Entry into force a. Entry into force after 24 months of after signing by at least 15 states.
Ship Inspection	a. Balochistan Environmental department (no Secy-Env/2018/65-82) requirement. b. After beaching of above said ships, Balochistan Environmental protection Agency along with Pakistan Custom Balochistan Development Authority and labour department to inspect the ship jointly	a. Article 15(4) introduces two steps inspection and facility's verification to recycle ships flying the flag of an EU Member State. b. Inspection by an independent verifier under requirements mentioned in Article 13. c. the requirement of site inspections by the	a. According to Article 8 of HKC, the ship at any terminal or offshore of another party, the ship's inspection requirement is to authorized by party to determine whether the ship is compliance with HKC or not

Standard Steps	BAU/Practice at Gadani	EU Requirements	HKC Requirements
		Commission or agents according to Article 15 (4)(2).	
Degasification and ventilation of Tanks.	a. Worker Visitor could suffer from suffocation, fainting, and instant death. b. risky to human health due to the exposure of toxic gases.	a. Requirement for Prevention of Adverse Effect On Human Health as mentioned in Article 13(1)(f) b. It refers to the guidelines given by ILO's operational arrangements and prevention from Health Risks. c. Article 13(1)(h): The plan is based on guidance provided by section 3.3.5 of the IMO for ship recycling by ensuring safe and environmental aspects. d. In addition, the guidelines of ILO's section 4.6 and 16 as well as section 6.2 and 4.5 of the Basel convention's technical guidelines for sound management of environment and safety.	a. Not specified in Hong Kong Convention b. Regulations No 19, addresses the requirement for Prevention of adverse effects on the human health.
Cleaning of Tanks	a. workers or visitors and cleaners could be suffering from suffocation and fainting. b. Fatal and bum c. improper handling of oil and oily material.	a. Article 13 defines waste management and cleaning without an adverse effect on Human Health. b. Article 17, 18, 19: advices the reequirements for risks of dangerous waste and ensure health and safety during ship recycling.	a. Regulation 20 advices the requirement of Disposal and waste management at sites should be identified for the identification of sound material management.
Inspection by Explosive Department of Pakistan	a. Balochistan Environmental department (no Secy-Env/2018/65-82) requirements.	a. No specific method in EU convention. b. Emergency preparedness based on guidance provided	a. Not specified requirment but; b. Regulations No 19, of HKC indicates the

Standard Steps	BAU/Practice at Gadani	EU Requirements	HKC Requirements
	b. After authentication of the gas free certificates, the explosive department will be approached by the proponent who will inspect the tanks of the oil tankers with the help of sophisticated electronic equipment to reverify the status of the gas free certificate for hot works.	by section 3.3.5 of the IMO for ship recycling by ensuring safety. c. In addition, the guidelines of ILO's section 4.6 and 16 as well as section 6.2 and 4.5 of the Basel convention's technical guidelines for sound management of environment and safety	requirements including; To prevention from fire, explosion and many other unsafe activities. c. To prevent from risky atmosphere and procedure to monitor and maintained during ship recycling. d. Prevention from adverse effects on human and environment. e. preventing the emission during ship recycling which may have negative impact on human life.
Removal of Hazardous Material (Legal requirment	a. Balochistan Environmental Protection Act 2012, Section 1 Handling of Hazardous Substances – no person shall import, generate, collect, consign, transport, treat, dispose of, store, handle or otherwise use or deal with any hazardous substance except-(a) under a licence issued by the Agency and in such manner as may be prescribed; b. Effective arrangements shall be made in every factory for the disposal of wastes and effluents due to the manufacturing process carried on therein	a. Requirement under Article 13(1)(g)(i) for Containment of Hazardous Materials. b. It is required for the containment of all material of hazardous presented on board throughout the entire recycling processes.	a. Regulation 20 emphasizing the requirement for removal of hazardous material. The ships should be certified as guided by regulation 11 and 12. b. the persons with this particular activity, should be familiar with requirements hazardous material and ship recycling plan of HKC.

Standard Steps	BAU/Practice at Gadani	EU Requirements	HKC Requirements
Removal of Wood		a. Not particular Article for removal of wood, but EU regulations advices for safe portion of wood, steel, and concrete (37)	a. Not particular Article for removal of wood is specified in HKC
Discharge of Compressed Gases	a. workers or visitors and cleaners could be suffering from suffocation and fainting. b. Release of compressed gases into the atmosphere.	a. Emergency preparedness based on guidance provided by section 3.3.5 of the IMO for ship recycling by ensuring safety. b. required pumps to transfer liquids from drainage catch pit (32)	a. Regulations No 21, Requirement for Emergency Preparedness and Response Plan. b. Ensuring the Necessary equipment for the case of an emergency. c. Providing information, coordination and communication plan for an emergency case at the ship recycling facility.
Decommissioning of Electronic Appliances	a. Balochistan Environmental department (no Secy-Env/2018/65-82) requirement. b. After authentication of the gas free certificates, the explosive department will be approached by the proponent who will inspect the tanks of the oil tankers with the help of sophisticated electronic equipment to reverify the status of the gas free certificate for hot works	a. Requirements under Article 13(1)(f) for Prevention of adverse effects on the human health and environment. b. Requirements under Directives of 2002/96/EC of the EU Parliament and council of 27 January 2003 for electrical and electronic equipment (54).	a. Regulation 7 addresses the requirement for technical groups. b. Regulation 1 (7)(1) addresses the requirement for gas free status, removing electrics arc of welding equipment safely. c. However not specified for decommissioning electronic appliances.
Primary Cutting	a. The proponent shall ensure that whenever hot work operation is taking place a responsible individual shall be appointed as fire watch and shall be in duty continuously during	a. Requirement under Article 13(1)(i) for Appropriate Personal Proactive Equipment: b. For primary cutting Article 13(1)(c) advices the build	a. Regulation 22 advices the requirement for Work Safety and Training

Standard Steps	BAU/Practice at Gadani	EU Requirements	HKC Requirements
	such operations During Hot Work cutting. a. cutting of oil blocks b. Lungs Inspection, respiratory track problems c. skin burns d. falls from any height can cause bruising, fractures or may be fatal. e. suffocation, fainting, and instant death f. the most common injuries	structure of ships. it may include but not limited to pontoons, slipways and access ramps, quays, docks.	b. To ensure work safety and training these measure would be carried out the maintenance and use of Personal Protective Equipment.
Secondary Cutting	a. The proponent will ensure that during hot works the workforce on the yard shall wear safety helmets, safety shoes, eye protective glasses and working gloves. b. The proponent will ensure that the workforce on the yards wear face masks/ protective clothing when dealing with asbestos, PCBs, Toxic material or material which generate toxic fumes.	a. It is required that the sequential breakdown of elements and components for secondary dismantling of ships, the workstation shall be equipped especially, for toxic waste and removal of hazardous material. (36)	a. Not specified Article for Secondary cutting in HKC
Tertiary Cutting		**a. Not specified requirement in EU convention**	
Storage	a. Pakistan Petroleum Act 1934, License for storage. Save as provided in section 7, 8 and 9 of the Act and by rule 109 no one shall store any petroleum except under a license granted under these rules: b. Provided that no license shall be necessary for storage in a well-head tank		a. Article 2 defines the requirement for storage of dismantled components and material on site. **b.** floating storage units, Offloading units, and floating production storage**.**

7.7 FOC and Ship Recycling

UNCLOS emphasizes on the responsibility of ships to rest with the vessel's state flag. Hence, all merchant's ships are required to be registered under specific state flag where their regulatory authority falls. For instance, it would be the responsibility of the flag state to inspect the vessel and ensure its seaworthiness, preventive measure for pollution and safety, and certification of the crew. In addition, obligations as well as rights under the international law would mainly imposed on ships/vessels through flag state that would be determinant factor to enforce the standards of FOC internationally. The general rule under FOC is that, there should be a connection between country of the flag under which ships sail and country from the ship is operating.

The registry of flag that do not have requirements of nationality for shipping companies which use their flag – it's because of they don't have any incorporated shipping companies, which provide financial benefit, including lower taxes, are also known as FOCs. According to UNCTAD approximately, world's 73 % fleet has flagged in a country other than beneficial ownership of vessels. So, there is a huge inconsistency between flag states which exercise the control on regulations over fleet of world and those states where ship owners are based. Certainly, US, Japan, China, Norway, and Greece are ranked as top countries owing ships in 2018. In addition, according to UNCTAD Handbook of Statistics[51], 52% of fleet tonnage of the world was accounted by top five ship owing economies. These including, Greece with 18%, Japan 11%, China 11%, Singapore 7% and Hong Kong 5 % respectively. Conversely, 41% of fleet is accounted by European owners, and 6% for North America and world's half tonnage is accounted for Asian companies. Finally, companies from Caribbean, Latin America, and Oceania are all accounted for 1% or less than that.

For end of life ships, the inconsistency between beneficial ownership countries and flag ships is even greater than the operational life of the ship. At the end of life, certain Flag of Convenience are over represented as well as rarely used during ship's operational life. FOCs are basically used for ships in South Asia, when it comes to beach for breaking, rather than for ship recycling facilities anywhere. In recent decades, flag preferences have been analyzed at end of life and flags included; Nevis, Palau, St Kitts, St Vincent, Togo, Tanzania, Sierra Leone, Comoros, and Grenadines are successful flags for ships broken in beaching facilities. However, by the MoUs of Paris, these flags are black or gray listed and they are claimed of their poor implementation of the standards of international maritime. In addition, registries at the end of life such as Comoros and Palau, St Kitts, and Nevis compete each other for offering low cost

[51] UNCTAD, "UNCTAD Handbook of Statistics 2020 - Merchant Fleet."

opportunities and express that no nationality requirement are required to fulfil in order to register under their flags. Typically, this registry procedure is valid for a short period of time, at a special minimal price. However, the certain end of life flags is varying over the years [52].

The top five shipbreaking nations have remained the same for almost a decade, including China, Turkiye, Pakistan, India, and Bangladesh, who have purchased 50% of merchant vessels to break each year [53]. In 2013, ships sold for scrap were 1,119 and 92% of ships have been broken in these top five countries [54]. In this case, different flags are being used by ships to fly when they are coming to Pakistan for breaking. It is a common practice of changing the name and the flag of ship when it comes to dismantle as at end of ships' life, owners are frequently seeking out most indulgent flags. Typical examples of ships and their flags coming at Gadani are SAM, UPSI, Al EZZ ALSAUDI, and MAZA YA-6.

Majority of the owners of European ships are using FOCs during the operational use of ships already for the last voyage. For instance, 90 ships have been sent to Pakistan by Greek companies and these ships have been flagged with other states. In addition, 19 ships were registered and flagged out of 149 European ships in the beneficial ownership's country. Upon beaching, 49 cases of

[52] NGO shipbreaking Platform, "Hong Kong Convention - NGO Shipbreaking Platform."
[53] ITP, "Transport, Top 5: Places Ships Go to Die."
[54] ITP.

European flag including Norway's flag used and updated EU regulation for ship recycling guided as ships shall only be recycled in future if ship is flying the flag of European Union's states [55].

Finally, an attempt to regulate the practices of ship recycling without any obligations for the owners of ships beyond the flag state jurisdiction as well as other incentives for safe and clean ship recycling, will be fail as reflagging at the end of life to non-compliant or non-party or selling ships to a cash buyer, who can do the same, would remain eye-catching solutions for owners of ships to avoided strict rules. Usually, hazardous waste follows least resistance path, and backed by FOCs; the owner of ships would be able to continue to rise their profits at the minimum costs of environment and health.

7.8 ILO and its Requirements for Ship Recycling

The guidelines of International Labor Organization (ILO) provide assistants for shipbreaking to ensure safe and environmental sound dismantling under its agenda of descent work. It actually provides pathway to transform an informal activities of ship breaking into a formal one. The guidelines allow the ship breaking countries and authorities to follow its standards, occupational health and safety measure, code of practices, and working conditions relevant to international organization. The guidelines provide practical recommendations for environmental and health safety to all those stakeholders who are directly or indirectly related with shipbreaking. The guidelines of ILO on ship breaking have been adopted unanimously by tripartite meetings of international experts for safety and health within shipbreaking. Some selected countries and Turkiye participated as well, that was held 7 to 14th October 2003 in Bangkok and Thailand. The essence of this cooperation among all the participating countries has developed a comprehensive consensus on practical implications of the guidelines that has benefitted all those stakeholders of shipbreaking. Finally, the International Labor Organization's governing body has published the shipbreaking guidelines on 289th session in 2004.

7.8.1 General Requirements

The processes of ship breaking can be divided into three main phases including; preparation, deconstruction, and scrapped material management. Furthermore, these can be divided into subdivisions for the identification of the processes of constituent work processes. The adopted practices and processes, accurate information of physical characteristics of the vessels will predict the safe execution of each main phase and danger presented by hazardous waste – then remaining on board or characteristic in the vessel when the vessel would come for breaking. Shipbreakers, in advance must prepare

[55] Iqbal and Heidegger, "Pakistan Shipbreaking Outlook: The Way Forward for a Green Ship Recycling Industry-Environmental, Health and Safety Conditions."

their plan in deconstruction of ship to ensure health and safety of workers. The plan should improve shipbreaking and its working systematically as it will lead to increase productivity and reduce health risks.

All labour related to ship breaking are required to receive an induction and safety training for safe working procedures and issues related to personal protective equipment (PPE). In this regard, plans and actions should be developed and implemented on regular basis, including developing emergency procedures, rescue plans, escape routes and making labour force trained for handling explosion, suffocation, fires, and released hazardous chemical, other adverse effects related to health and environment.

7.8.2 Requirements for Model plan

The competent person should develop a safe ship breaking plan that must contain in-depth knowledge of safe and environmental ship breaking and its procedures for precautionary as well as preventive measure to safeguard the environment and health. All plans for safe shipbreaking must encompasses the activities for identification, operations, processes, and related work for assessment of risks. Furthermore, for safe and environmental sound ship breaking and for vessels shipbreakers are required a shipbreaking plan to advance its operations and review them.

7.8.3 Safety requirements for tools, machines and equipment

According to the guidelines and provision of ILO Machinery convention NO. 119 and recommendation NO.118, all machines, tools, and equipment used in ship dismantling including power-drive, hand, and manual should:

i. Comply with requirements of health and safety as guided by national and international standards, wherever these tools are available
ii. When constructing and designing, take into account the health and safety measures and principles.
iii. Maintain in a good manner overall
iv. Not to be used for outside activities until the competent person not ensures its design for outside usage
v. Used by operators or workers who are trained or authorized.
vi. Provide protective guards and devices as needed accordance with national regulations and laws
vii. Provide clear and comprehensive information and instruction on all aspects to agents, manufacturer, and employers to use and maintain equipment and safe use of them
viii. Design tools and machineries in such a way that allows easy and safe maintenance and repair facilities should be available at worksite
ix. Install equipment and machines to avoid waste and hazardous points stationary and moving parts or objects. If it is not ensured, all hazardous material or moving parts, such as reciprocating components gearing, revolving shafts according to the laws of nation

x. Provide appropriate personal protective equipment for labour/workers operating these tools

7.9 Conclusions and Recommendations

Both Hong Kong Convention (HKC) and European Union (EU) Regulations provide general requirements, health, safety requirements, and environmental requirements for green ship recycling practices. HKC is the most relevant international obligation though EU Regulations has also an immense importance in the context of flag state share in overall ship recycling industry which would likely impact activity in Pakistan. Pakistan has yet to become party to Hong Kong Convention, which sets the global standards for safe and environmentally sound ship recycling. Whereas, India has become party to the convention since 2019. So far, seventeen countries (i.e. Belgium, Denmark, Croatia, Spain, Estonia, France, Germany, India, Japan, Malta, Netherlands, Norway, Panama, Republic of the Congo, Republic of Serbia, Turkiye, Ghana) have ratified HKC, - (the combined merchant fleets of which constitute approximately 29.77% of the gross tonnage of world's merchant fleet, and combined recycling volume of the Contracting States during the preceding 10 years is approx. 13.9 million tons i.e. 0.56%).

PSBA members are willing towards ratification of Hong Kong Convention. This is a welcome development for ship recycling sector of Pakistan. However, PSBA members are apparently reluctant to initiate a process for certification of their facility areas against EU regulations though compliance with EU Regulations is also important in Pakistani context considering European ship owners own 35% of the world's fleet.

Besides, ILO's C187 is also very much relevant which complement HKC. GoP needs to implement clauses of ILO's C187 (2006) and ratify it. There is no harm to ratify it along-with HKC as both will be complementing each-other.

Section 8

CONCLUSIONS AND THE WAY FORWARD

SECTION 8: CONCLUSIONS AND THE WAY FORWARD

8 CONCLUSIONS AND THE WAY FORWARD

8.1 Findings and Conclusions

Gadani ship recycling industry is considered as a vital industry in the maritime economy. Facts reveal that the ship recycling industry of Pakistan had significant contribution both in terms of steel tonnage and catering dependent population size of 3.5 million household persons through its direct and indirect value chain involved. In recent years, it touched its peak during FY 2014-15. The industry has a long history and witnessed its golden days in 1980's. The geographical location of Pakistan's recycling Yard and the nature of beach have given it a competitive advantage over other ship recycling industries in the region. However, the industry lost its standing to other regional yards due to various factors discussed in the preceding chapters. Currently, it is ranked 3rd after India and Bangladesh and is struggling to survive. The factors that led to this decline include negligence by the regulator, lack of ownership by the Federal and Provincial Governments, absence of well-defined governing policy and regulations, no parent ministry, not declared as an industry, currency depreciation, unfair advantage in taxation to imported re-rollable scrap compared to ships brought for scrap, obsolete ship breaking techniques and poor working conditions, stakeholders' capacity gap, non-adherence to international obligations and inadequate infrastructure etc. It is feared that if the remedial measures are not taken timely and comprehensively, the survival of the industry will remain uncertain. On the other hand, if the factors responsible for the decline are timely addressed, the industry has full potential to revive its glorious past and play an active and significant role in national economy. Following are key findings and conclusions.

8.1.1 Economic Contribution

It is pertinent that this industry contributes equally to all the three dimensions i.e. steel demand, tax revenues and employment generation. The overall country's steel demand is approximately 5 to 5.50 million tons in which on average 1.5 million tons is contributed by the ship recycling (excluding the abnormal period). The ship recycling industry has also paid a huge amount of 16.3 Billion rupees to Government of Pakistan in account of taxes for FY 2017-18. The industry has imported high amounts of 1.7 million metric tons of ship steel in FY 2014-15, whereas the industry has imported a lowest tonnage in FY 2019-20 i.e. an amount of 0.1 million metric tons.

8.1.2 Employment Opportunities

Gadani ship recycling industry is playing an important role in the provision of employment opportunities and livelihood to multiple segments of the society. It is providing employment opportunities at Gadani yard and in the industries directly related to the yard. It also provides indirect employment opportunities at Pakistan re-rolling mills and ancillary industries. In the peak year, the ship recycling industry has provided highest employment opportunities in form of direct and indirect employment to approximately 490,951 personnel. The employment mix of the industries has multiple ethnicities and diversities across the country as the workers belong to Khyber Pukhtunkhwa, Punjab, Sindh, Balochistan and Gilgit Baltistan.

In the peak year, the industry provided direct employment opportunities to approximately 24,000 personnel as under:

d. About 22,500 persons who worked directly in the Gadani yard
e. About 862 employment opportunities to the trucking sector
f. About 100 employees working in the hoteling operating at Gadani yard

The Gadani yard has also provided indirect employment opportunities to approximately 467,488 personnel through various sectors as under:

i. Re-rolling mills employed the highest number of 30,160 employees.
j. Transportation industry, which supplies the ship steel from Karachi to countrywide provided the highest number of approximate 430 employment opportunities.
k. The average miscellaneous steel store which utilizes the re-rolling mills steel provided the highest number of 25,000 employment opportunities.
l. The main user of the re-rolling mills steel is the construction industry which has provided a highest number of 156,642 employment opportunities to the workers engaged in construction activities.
m. The construction industries, which require steel are supplied through trucks which further provided employment opportunities to 208,856 persons.
n. The ship steel is also used by the smelting and melting industries and provided 22,900 employment opportunities.
o. Ship steel further provides raw materials and machinery parts and other industrial units and provided employment opportunities of 22,500.
p. Lastly, the wood and agree items recovered from the ships have also provided a number of 1000 employment opportunities.

8.1.3 Sectors Associated in Value / Supply Chain

Steel collected from the ship recycling industry at Gadani is almost used in all industries across the country ranging from construction to end users' products. The value and supply chain of Ship Recycling Industry involves Re-rolling mills,

Smelters & Steel Melting units, wood & agree items, transportation and other ancillary industries including machinery parts & industrial units. Primarily, the re-rolling mills are the main beneficiary of ship steel in the country. The re-rolling mills convert the ship steels into beneficial forms like bars which are used in the construction industry. The main supply of ship steel goes to the re-rolling mills in Hub located in district of Balochistan and Karachi. The Gadani steel also goes to Lahore, Wazirabad, Sialkot, and Gujranwala in Punjab. The ship steel also goes to Gujjar Gari, Chakdara, Peshawar in Khyber Pakhtunkhwa, and Quetta in Balochistan. The ship steel is ultimately used by the end consumers in form of steel cutlery, fan industry, medical instruments, machinery (agricultural and others), garters for the construction of houses, concrete slabs etc.

8.1.4 Parking the Ship for Dismantling

This report has discussed and analysed a number of available methods for parking the ships at a facility area prior to ship dismantling / recycling process. There are various methods of parking the ship out of which, beaching is the one which is being followed in Bangladesh, Pakistan and India. This is a traditional and most feasible method, which requires minimum infrastructure. However, this method raises serious questions about environment, health and safety concerns including its harmful impact on the workforce.

Beaching method is not being followed in EU countries as they are more concerned with environmental impacts of their ship recycling practices. High economic cost is involved in methods like dry-docking and berthing.

The issue of land ownership and rights is present, while the focused talks with PSBA members also revealed that stakeholders are not in favour of shipbreaking to take place at Gwadar under CPEC.

Moreover, existing location of ship recycling i.e. Gadani Recycling Yard is found to be the most suitable location considering the nature of beach and other contributing factors like transport cost in comparison with Gwadar.

8.1.5 Environment, Health and Safety Condition

Ship Recycling is one of the most dangerous occupations with most harmful environmental health impacts in the world. Its operations pose serious threats to the environment, health and safety of the workers as they have to bear dangerous and miserable working and living conditions. At Gadani Yard, it is mainly carried out in an informal manner with minimum inspection and safety checks, and lack of SOPs. Due to the lack of adequate technology, equipment and deficient law enforcement, best practices are not followed.

This industry is mainly concentrated in South Asian countries due to weak environmental, labour laws and low wages. From the recent past, due to continuous criticism about poor working conditions and environmental damages from shipbreaking; some of yards are working to upgrade their facilities. However, there is a need of documented evidence because till-to-date independent reports are unavailable and the claimed improvements' proofs are not available to public scrutiny. Shipbreaking industry is crucial due to its significance to the economy as a whole, and sustainable management can lessen the health and environmental effects of these industries.

8.1.6 Factors Responsible for Declining Trends of Ship Recycling at Gadani

The Ship Recycling at Gadani is still an informal and neglected segment of maritime economy in Pakistan despite its significant contribution through value chain. The industry is running through ad-hoc mechanism due to absence of specific policy, legal, institutional framework and green practices in place. Due to lack of patronage by the governments, the industry has not only experienced adverse situations but also a huge reduction in the tonnage imported per year. Earlier, the industry had been shut down up to 2008 due to the government's decision.

The Gadani ship recycling industry has been found to lack basic necessities for the workers and people living in Gadani. There is no provision of hospital, utilities and other basic facilities at Gadani Yard area. The industry is deprived of clean drinking water as well other primary facilities. Similarly, there is no provision of electricity, gas, cellular networks and hygienic living facilities at the yard.

Apart from the basic facilities, the industry has also been neglected by the federal as well as provincial governments. There are 132 plots at Gadani out of which, 100 are owned by the landlords while remaining 32 are owned by the government. The absence of proper implementation of the rules and regulations of the federal and provincial governments has resulted in the discouragement of investments for ensuring best practices with clean and safe operations.

Additionally, the tax structure of the federal and provincial governments has also negatively affected the investment in the ship recycling industry at Gadani. The federal and provincial governments have changed the tax regime on time-to-time basis, which has caused a reduction in the investments as quite visible with low tonnage import during the recent years particularly from FY 2018-19 onward. The increase in the value of dollar also decreased the Pakistani rupees value, which led to decrease in the tonnage imported per year.

The main concerns of the PSBA members were the change in the policy of tax structures, increase in dollar exchange, the lack of infrastructural and basic

facilities at the yard. The yard lacks basic facilities like clean drinking water, sanitation and proper residence etc. It is also found that the re-rollable scrap poses negative impact on the ship recycling industry.

The non-compliance of international obligations also have been noticed to have adverse implications for the import of ships for recycling at Gadani yard. The European Union (EU) regulations, Hong Kong Conventions (HKC), and Basel regulations unfavorably affect the import of ship for recycling purposes at the Gadani yard as these regulations encompass numerous requirements to be fulfilled for the import of EU flag carrier to the Gadani Yard. Stakeholders demand for the ratification of HKC and compliance with national legal instruments.

8.1.7 Governance of Ship Recycling in Pakistan

The presence of more than hundred ship-breaking plots / facilities at Gadani Yard is an informal and neglected segment contributing significantly through its value chain to industrial economy of Pakistan for the last fifty years. The business-as-usual scenario depicts that this industry is running through ad-hoc mechanism due to lack of specific policy, legal, institutional frameworks and/or regulatory procedures in place. Historically, the important checks were limited to custom clearance, while environmental clearance added recently as legal instrument, which has outstanding issues due to cumbersome procedure and bureaucratic hurdles, as reported by the PSBA members.

8.1.7.1 The Baluchistan Ship Breaking Industry Rules, 1979

Considering location of Gadani Yard within the provincial jurisdiction of Balochistan province, an early attempt was made to formalize this industrial segment through "*the Baluchistan Ship Breaking Industry Rules, 1979*" made under section 30 of the "*Balochistan Development Authority Act, 1974*" of the Government of Balochistan. However, these rules were meant to empower the BDA and are very much limited to handle the leasing of government owned plots for ship breaking purpose at Gadani coast. There is a need to completely revise these rules by incorporating all aspects related to green ship recycling industry, and to bring these in line with international conventions and best practices.

8.1.7.2 Occupational Safety and Health in Ship Recycling

The fundamental rights provided by the *Constitution of Pakistan, 1973* to its citizens cover the workers in ship breaking sector activity in a number of ways. First and the foremost important element is the constitutional guarantee for fundamental rights, which are applicable to the shipbreaking sector, but needs

to be made more specific. While several laws dealing with occupational safety and health of labour exist in Pakistan, their applicability in ship recycling industry is wanting. There are several legal provisions related to the issues of 'occupational health and safety' (OHS), but there is a lack of single legal arrangement so as to deal the matter in a comprehensive manner.

It is quite interesting that the OHS related legislation in Pakistan has its roots to the colonial times, for example the 'Factories Act of 1934', the 'Labourers Act of 1934' and the 'Workmen Compensation Act of 1923'. After independence of Pakistan, legal provisions to operationalize the 'Workmen Compensation Act' were promulgated in 1961, the 'West Pakistan Hazardous Occupations Rules' in 1963, the 'Provincial Employees Social Security (Occupational Diseases) Regulations' in 1967, and the 'Labour Laws (Amendment) Ordinance' in 1972. In order to deal the issue through a single and comprehensive law, the Ministry of Labour and Manpower prepared a draft Act i.e. 'Pakistan Occupational Health and Safety Act' in 2018, but the draft has not yet been debated to have consensus at the level of relevant stakeholders.

8.1.7.3 Hazardous Waste and Environmental Protection

There are concerns regarding availability and the implementation of rules and regulations to deal with the hazardous waste, environmental protection and the aspects of occupational health & safety (OHS) associated with the end-of-life ships. Government of Pakistan promulgated the 'Hazardous Substances Rules 2003' under the umbrella of 'Pakistan Environmental Protection Act (PEPA) 1997'. Later, the Government of Balochistan Province promulgated 'Balochistan Environmental Protection Act (BEPA) 2012'. These federal and provincial legislations are applicable to the ship-breaking sector.

Ministry of Climate Change (MoCC) is the national focal point for the Basel Convention. The Ministry had conducted a detailed study on the generation of hazardous waste by the shipbreaking industry in 2016. During the study, it was estimated that the inventory of toxic landfill waste from shipbreaking yard and industrial area were 4320 and 500 metric tons per year and 5813 thousand metric tons per year respectively. The adoption of National Hazardous Waste Management Policy was approved by the federal government on 28th June 2022 to address the issues of hazardous waste management in Pakistan.

During the course of this study, it was assessed that the environment and occupational health and safety related legislation has weak enforcement and its compliance monitoring system is also not adequate. The temporary and contractual job arrangement in prevailing system of recruitment by the 'contractors' particularly at Gadani Shipbreaking Yard also undermines the

fundamental rights of the labour. Most of the responsibilities related to environmental and labour issues were devolved to the provincial governments, while some important responsibilities are still under the federal government, following the decentralization process in Pakistan, which began in the year 2011 and being practiced as an outcome of the 18th Amendment in the national Constitution of Pakistan.

8.1.7.4 Institutional Procedures and SOPs in Vogue

Following important steps are observed for end-of-life ships coming to Gadani Yard:

l. Purchase and import of end-of-life ship.
m. Entry in Pakistani waters by furnishing information to JMICC.
n. Temporary Stay at Gadani Anchorage.
o. Beaching at Gadani Yard facility area.
p. Custom clearance.
q. Bow (Nall/Nose) cutting upon permission from Balochistan Environment Protection Agency (BEPA) – for ship stability.
r. Submission of Initial Environmental Examination (IEE) report to BEPA, under Balochistan Environmental Protection Act 2012 and its subsequent approval.
s. Removal of hazardous material, wood and agree items – after cold work permission from BEPA.
t. **Inspection of Tankers by Explosive Department:** Degasification, proper ventilation and clearing of tanks are pre-requisite prior to get hot work approval from BEPA against submitted IEE report. Department of Explosives, Circle Office Karachi, Ministry of Industries inspects the ship and issue an NOC which is subsequently submitted to BEPA for issuance of hot work approval.
u. Cutting operations after observing necessary approval from BEPA including hot work permission after clearance from Department of Explosives, Circle Office Karachi, Ministry of Industries in case of a Tanker.
v. **Waste Management:** There is no proper waste management practice in most of the ship recycling facilities at Gadani Yard.

8.1.7.5 Responsible Institutions

Balochistan Environmental Protection Agency (BEPA) and Balochistan Development Authority (BDA) have shared responsibilities regarding shipbreaking, in addition to various ministries on Federal level including the Ministry of Labour and Manpower, the Ministry of Maritime Affairs (MoMA), Ministry of Climate Change (MoCC) and the Social Welfare Department.

Based on the standard procedure in vogue, it is found that various legal provisions are fulfilled for environmental and safety related aspects pertaining to arrival, beaching and cutting of ships on the shores of Gadani. However, a

lot more is needed to bring it at par with international obligations particularly HKC and EU Regulations for Ship Recycling.

8.1.8 International Obligations

8.1.8.1 Basel convention

The Basel Convention, adopted on 22 March 1989, deals with movement and disposal of hazardous waste. This is of particular concern to Ship Recycling as end-of-life ships comprise of an array of hazardous materials – such as asbestos, PCB and waste oils – which can have serious implications for the environment and human health if not managed properly. The Convention provides recommendations on procedures, processes and practices that must be implemented to ensure safe and environmentally sound practices. The Guidelines also advise on monitoring and verification of environmental performance.

Recognising that Basel controls may often be circumvented for ships going for recycling, IMO developed Hong Kong Convention (HKC) for exclusive guidance regarding green ship recycling. HKC's guidelines are comprehensive and supersedes the Basel Convention.

8.1.8.2 Hong Kong Convention (HKC)

HKC was adopted in Hong Kong, China, on 15 May 2009. The Convention elaborates in its articles and regulations a control system for ship recycling, which includes obligations for flag States, ship owners, recycling States and recycling facilities. Under the Convention, Parties are required to take effective measures to ensure that ship recycling facilities under their jurisdiction comply with the HKC. Ship recycling yards are required to provide a Ship Recycling Plan, to specify the manner in which each individual ship will be recycled, depending on its particulars and its inventory. Ships will be required to have an initial survey to verify the inventory of hazardous materials, renewal surveys during the life of the ship, and a final survey prior to recycling.

The Convention will only enter into force 24 months after the ratification by 15 States, representing 40 per cent of world merchant shipping by gross tonnage, with a combined maximum annual ship recycling volume not less than 3 per cent of their combined tonnage. HKC is not expected to enter into force before many years due to its strict criteria. So far, seventeen countries (i.e. Belgium, Denmark, Croatia, Spain, Estonia, France, Germany, India, Japan, Malta, Netherlands, Norway, Panama, Republic of the Congo, Republic of Serbia, Turkiye, Ghana) have ratified HKC, - the combined merchant fleets of which constitute approximately 29.77% of the gross tonnage of world's merchant fleet, and combined recycling volume of the Contracting States during the preceding 10 years is approx. 13.9 million tons i.e. 0.56%.

8.1.8.3 ILO Guidelines

Earlier to HKC requirements, the International Labour Organisation (ILO), a UN agency, had called shipbreaking one of “the most dangerous occupations” in the world. In March 2004, the ILO unanimously endorsed at its 289th session a set of criteria to govern the disposal of ships, for occupational safety and health in shipbreaking operations. Besides, on 31 May 2006, ILO adopted a Convention on Promotional Framework for Occupational Safety and Health Convention (No. C187) which is also relevant. India, Pakistan and Bangladesh have not ratified ILO’s C187 yet. GoP should implement clauses of ILO’s C187 (2006) and ratify it.

8.1.8.4 EU Waste Shipment Regulation

Came in 2006. It bans all exports of hazardous waste to non-OECD (Organisation for Economic Co-operation and Development) countries and all exports of waste for disposal outside the EU/EFTA (The European Free Trade Association).

8.1.8.5 EU Ship Recycling Regulation (EU SRR)

European ship owners own 35% of the world fleet. Given the reason that a large percentage of these is being dismantled under conditions which are often harmful to workers’ health and the environment, European Union promulgated EU Ship Recycling Regulation which was entered into force on 30 December 2013. All new and existing ships of 500 Gross Tonnage and above, either flying an EU Member State flag, or calling at an EU port, must comply with EU SRR. It closely follows HKC text and is designed to facilitate early adoption of HKC. It sets requirements for ship recycling activities, and includes environmental protection and occupational health and safety standards that go beyond the Hong Kong Convention.

From December 2018, large vessels flying the flag of an EU Member State may be recycled only in safe and sound ship recycling facilities included in the European List of ship recycling facilities (‘the European List’).

The European List was first established on 19 December 2016, and last updated on 11 November 2020 under Commission’s decision EU 2016/2323. The European Commission has added several new yards to the List. With the new update, the European List of ship recycling facilities currently contains 46 yards, including 37 facilities in EU Member States, 8 facilities in Turkiye and 1 facility in the USA. It also contains 36 more applications under certification process; 19 Indian companies, 4 from China, 2 from USA and 11 from Turkiye. None of Pakistani or Bangladeshi company has applied so far.

The EU Regulation would likely influence operations at Gadani Yard to a considerable degree, considering the past trends of EU ships' arrival at Gadani. Generally, flags are changed for end-of-life-ships through flag of convenience such as Panama, Palau, Samoa, Marshal Island etc. However, with growing pressure from EU states against such practices of flag change, the impact would likely be more at Gadani Yard considering the global share of EU state's fleet i.e. 35%.

Inclusion in EU List

EU SRR Article 15(4) introduces a two-step inspection and verification regime. There is a requirement of compliance by ship recycling facilities as set out in Article 13 and certification through *a s*ite inspection by an **independent verifier** with appropriate qualifications. Companies owning or operating a ship recycling facility need to ensure that it is independent and has the necessary qualifications. Following is the list of classification societies which are recognized / accredited by the European Union:

m. American Bureau of Shipping (ABS)
n. Bureau Veritas SA
o. China Classification Society (CCS)
p. Croatian Register of Shipping (CRS)
q. DNV GL AS
r. KR (Korean Register)
s. Indian Register of Shipping (IRCLASS)
t. Lloyd's Register Group LTD (LR)
u. Nippon Kaiji Kyokai General Incorporated Foundation (ClassNK)
v. Polish Register of Shipping (PRS)
w. RINA Services S.p.A.
x. Russian Maritime Register of Shipping (RS)

While individual Gadani Ship-Recycling Facilities should bear the expenses, Government should facilitate their inclusion in European List by patronizing the process through engagement of an approved classification society. Bahria Classification Society may strive for its inclusion in European List of classification societies.

8.1.8.6 Preparedness for International Obligations and Green Ship Recycling Operations at Gadani Yard

Economic Operators are trying to comply with national legislation and international obligations including the provisions of the Hong Kong Convention (HKC), EU Regulations and other multilateral environmental agreements by achieving certifications of ISO-14001, ISO 9001, ISO 18001 and ISO 30000.

During consultative sessions of NIMA Officials with relevant stakeholders held in January 2021 at Karachi and a subsequent session at Gadani Yard during

July 2021, PSBA members showed their resolve towards ratification of Hong Kong Convention and supported the efforts by Government of Pakistan to ensure early compliance strategy for green ship recycling. This is a welcome development for ship recycling sector of Pakistan.

The PSBA members reiterated their stance in the recently held seminar / webinar by NIMA on 27 October 2022. During the webinar, Mr. Asif Ali Khan, Vice Chairman Pakistan Ship Breaking Association (PBSA) told that most of the requirements as per the HKC are already being complied at Gadani. The number of casualties at Gadani are almost negligible. He appreciated the efforts made by the Ministry of Climate Change (MoCC) with regards to Treatment Storage and Disposal Facilities (TSDF). He said that Pakistan is going on the right path for the early implementation of ratification of Hong Kong convention.

8.1.8.7 Ratification by Pakistan

While Pakistan has signed and ratified Basel Convention, it is neither signatory nor has ratified the HKC. Prime reasons for non-ratification of HKC attributes to absence of any road map by the concerned government quarters and businesses authority in this regard. The lack of interest to invest by the economic operators, inadequate capacity of the actors and issues pertaining to land rights for the public as well as privately owned plots at Gadani Yard; have further slowed the process. In a recently held seminar / webinar by NIMA on 27 October 2022, Secretary Ministry of Maritime Affairs (MoMA) assured the participants that the MoMA has been successful in creating more clarity on the subject matter particularly in the context of Hong Kong convention for safe and environmentally sound recycling of ships.

8.2 The Way Forward to Green Ship Recycling – Recommendations

8.2.1 Compliance with International Obligations

e. Pakistan needs to ratify Hong Kong Convention, which sets the global standards for safe and environmentally sound ship recycling. In this regard, Government of Pakistan (Ministry of Maritime Affairs) is to make a comprehensive action plan to ensure that all legal frameworks, environmental and occupational safety requirements and best industrial practices required under the ambit of HKC are timely and properly implemented before the Convention is enforced.

f. GoP needs to implement clauses of ILO's C187 (2006) and ratify it. There is no harm to ratify it along-with HKC as both will be complementing each-other.

g. There is also a need to get certified ship recycling facilities under EU Regulation.

h. Bahria Classification Society may strive for its inclusion in EU accredited classification societies.

8.2.2 Policy, Legal and Strategic Measures

l. The Federal Government needs to declare this informal sector as an "Industry" with an incentive based National Ship Recycling Policy including required Regulations and a "Green Ship Recycling Strategy", to allow for the needed transition towards clean and safe ship recycling.

m. It may be placed under the Ministry of Industries with a strong connectivity with Ministry of Maritime Affairs.

n. There is a dire need for sector-specific regulations that deal with decent work practices and conditions, along-with clean, green and safer ship recycling activities, which should be in accordance with the national legislation as well as international obligations. These new instruments must take into consideration the occupational safety and health of workers, labour inspections and job security to the yard workers to ensure the overall safety and progress of the industry.

o. Balochistan Environmental Protection Agency (BEPA) needs to ensure environmental compliance against the mandatory requirements as part of approval for Initial Environmental Examination (IEE).

p. As part of Balochistan Environmental Protection Act, there is a need to develop and implement a sector specific regulation and detailed guidance, alike IEE/EIA Regulation 2000 and its guidelines, for the operational aspects of ship-recycling process at a facility area.

q. The federal government needs to decrease the taxation and apply fixed tax method on the ship recycling industry in Pakistan, by simplifying the tax structure and providing ease of doing business.

r. Pakistani beaches and conditions, especially at Gadani, are suitable for recycling the ships through beaching method. However, there is a need to adopt the modern techniques and well defined SOPs and trained manpower to bring it at par with global standards. This would not only improve the work efficiency but will also preclude the dangers to environment and occupational safety. Therefore, the Federal Government is to set the policy guidelines for ship recycling through beaching method at Gadani by incorporating the aforementioned measures.

s. So far, the industry is running through ad-hoc mechanism due to absence of specific policy, legal, institutional framework and / or procedures in vogue. Therefore, there is a need to have comprehensive instructions to deal with all aspects of Ship Recycling. This may include federal and provincial rules as well as international obligations, and requirements of various national institutions.

t. Pre-determined SOPs for monitoring and responding to various contingencies need to be put in place. This should cover all scenarios from entering of a ship into Pakistani waters to beaching at Gadani Yard etc. Continuous monitoring should be adopted by all relevant institutions in order to avoid any other similar issue in future.

u. Since JMICC related SOP for the entry of ship into Pakistani waters is not documented, a procedure for the functional aspect of JMICC should be laid down properly.

v. In the context of CPEC, an export-oriented ship recycling facility may be developed at Gwadar which would be having more prospects considering the Free-Zone status of the Gwadar.

8.2.3 Provision of Infrastructure and other Allied Facilities

f. Provision of required infrastructure and basic amenities at Gadani Ship Recycling Yard by the federal and provincial governments.

g. Provision of adequate healthcare facilities to the workers and an ambulance service by the federal and provincial governments.

h. Government needs to conduct a meaningful consultation with relevant stakeholders for viable solution of necessary infrastructure related to Ship Recycling process-based operations.

i. The PSBA members are very much willing to enter into public-private partnership. For the purpose, government needs to provide green incentive scheme, which may be materialized through tax waiver by adopting a green ship recycling policy and maintaining the competitive edge of ship steel over the import of re-rollable steel.

j. The federal government needs to settle the land-rights for Gadani Ship Recycling Yard with provincial government as well as private plot owners.

8.2.4 Clean and Safe Operations at Gadani

e. Establishment of enhanced coordination mechanism between the federal and provincial government of Balochistan in order to ensure clean and safe operations at Gadani Ship Recycling Yard.

f. Technical training, capacity building and creating awareness amongst the workforce to ensure safe and clean operations.

g. Shipbreaking yard owners should be educated regarding the requirement of HKC to ensure their smooth compliance prior ratification of HKC for meeting international standards of ship recycling processes.

h. PSBA members are required to prepare their facility areas on HKC requirements.

8.3 Action Plan Matrix (Road-map)

Table 8. 1: Action Plan Matrix (Road-map) for Green Ship Recycling

S.No.	Suggested Action / Measure	Timeline			Responsibility / Role		
		Immediate (0-1 year)	Short to medium terms (1-7 years)	Long-term (7+ years)	Federal Government	Provincial Government	Economic Operators
1.	**Policy, Legal and Strategic Measures**						
1.1	The Federal Government needs to declare this informal sector as an "Industry" with an incentive based National Ship Recycling Policy, a Regulation and a "Green Ship Recycling Strategy", to allow for the needed transition towards clean and safe ship recycling. It may be placed under the Ministry of Industries with a strong connectivity with Ministry of Maritime Affairs.	√			√		
1.2	There is a dire need for sector-specific regulation that deal with decent work practices and conditions, along-with clean, green and safer ship recycling activities, which should be in accordance with the national legislation as well as international obligations.		√	√	√		
1.3	Balochistan Environmental Protection Agency (BEPA) needs to ensure environmental compliance against the mandatory requirements as part of approval for Initial Environmental Examination (IEE).	√	√	√		√	
1.4	As part of Balochistan Environmental Protection Act, there is a need to develop and implement a sector specific regulation and detailed guidance, alike IEE/EIA Regulation 2000 and its guidelines, for the operational aspects of ship-recycling process at a facility area.	√				√	
1.4	The federal government needs to decrease the taxation and apply fixed tax method on the ship recycling industry in Pakistan, by simplifying the tax structure and providing ease of doing business.	√			√		

S.No.	Suggested Action / Measure	Timeline			Responsibility / Role		
		Immediate (0-1 year)	Short to medium terms (1-7 years)	Long-term (7+ years)	Federal Government	Provincial Government	Economic Operators
1.5	There is a need of long-term policy decision by the Federal Government for ship recycling through beaching method at Gadani	√			√		
1.6	So far, the industry is running through ad-hoc mechanism due to absence of specific policy, legal, institutional framework and / or procedures in vogue. Therefore, there is a need to have comprehensive instructions to deal with all aspects of Ship Recycling. This may include federal and provincial rules as well as international obligations, and requirements of various national institutions.	√	√		√	√	
1.7	Pre-determined SOPs for monitoring and responding to various contingencies need to be put in place. This should cover all scenarios from entering of a ship into Pakistani waters to beaching at Gadani Yard etc. Continuous monitoring should be adopted by all relevant institutions in order to avoid any other similar issue in future.	√			√		
1.8	Since JMICC related SOP for the entry of ship into Pakistani waters is not documented, a procedure for the functional aspect of JMICC should be laid down properly.	√			√		
1.9	In the context of CPEC, an export oriented facility may be developed at Gwadar which would be having more prospects considering the Free-Zone status of the Gwadar.			√	√		
2.	**Compliance with International Obligations**						
2.1	Pakistan needs to ratify Hong Kong Convention, which sets the global standards for safe and environmentally sound ship recycling.	√			√		
2.2	GoP needs to implement clauses of ILO's C187 (2006) and ratify it. There is no harm to ratify it along-with HKC as both will be complementing each-other.	√			√		

S.No.	Suggested Action / Measure	Timeline			Responsibility / Role		
		Immediate (0-1 year)	Short to medium terms (1-7 years)	Long-term (7+ years)	Federal Government	Provincial Government	Economic Operators
2.3	Certification of Ship Recycling Facilities under EU Regulation for Ship Recycling.	√	√		√	√	√
2.4	Bahria Classification Society may strive for its inclusion in EU accredited classification societies.	√	√				√
3.	**Provision of Infrastructure and Other Allied Facilities**						
3.1	Provision of required infrastructure and basic amenities at Gadani Ship Recycling Yard by the federal and provincial governments.	√	√		√	√	
3.2	Provision of adequate healthcare facilities to the workers and an ambulance service by the federal and provincial governments	√	√		√	√	√
3.3	Government needs to conduct a meaningful consultation with relevant stakeholders for viable solution of necessary infrastructure related to Ship Recycling process-based operations.	√	√		√	√	√
3.4	The PSBA members are very much willing to enter into public-private partnership. For the purpose, government needs to provide green incentive scheme, which may be materialized through tax waiver by adopting a green ship recycling policy and maintaining the competitive edge of ship steel over the import of re-rollable steel.	√	√		√	√	
3.5	The federal government needs to settle the land-rights for Gadani Ship Recycling Yard with provincial government as well as private plot owners.	√	√		√	√	
4.	**Clean and safe operations at Gadani**						
4.1	Establishment of enhanced coordination mechanism between the federal and provincial government of Balochistan in order to ensure clean and safe operations at Gadani Ship Recycling Yard.	√		√	√	√	

S.No.	Suggested Action / Measure	Timeline			Responsibility / Role		
		Immediate (0-1 year)	Short to medium terms (1-7 years)	Long-term (7+ years)	Federal Government	Provincial Government	Economic Operators
4.2	Technical training, capacity building and creating awareness amongst the workforce to ensure safe and clean operations.	√	√	√			√
4.3	Shipbreaking yard owners should be educated regarding the requirement of HKC to ensure their smooth compliance prior ratification of HKC for meeting international standards of ship recycling processes	√	√		√	√	√
4.4	PSBA members are required to prepare their facility areas on HKC requirements.	√	√	√	√	√	√

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Annex-A: Questionnaire for Ship Breaking Workers

NIMA SURVEY OF GADANI SHIP-BREAKING YARD

QUESTIONNAIRE FOR SHIP-BREAKING WORKERS

Questionnaire #: NIMA-_____

PART A:	**PARTICULARS OF THE DAY**		
1. Date of Interview	Day	Month	Year 2021
2. Name of the Ship-breaking Plot:			
PART B:	**BASIC INFORMATION ABOUT RESPONDENT**		
1. Age: **1)** 18 - 30 **2)** 30 – 40 **3)** 40 – 50 **4)** 50 or above			
2. Gender: **1)** Male **2)** Female			
3. Education of the respondent: **1)** Illiterate **2)** Primary / Middle **3)** Matric **4)** Graduate			
4. Job title:			
5. Duration of Work: **1)** 1 – 5 Years **2)** 5 – 10 Years **3)** 10 Years or above			
6. No of ship-break: **1)** 1 – 10 **2)** 10 – 20 **3)** 20 – 30 **4)** 30 or above			

PART C:	**STAKEHOLDER CONCERNS**
1. What is the source of your drinking water?	**a) Source of drinking water** 1) Water tanker 2) Water supply from Hub dam 3) Bottled water **b) If source of water is from HUB then is there Water Filter installed?** **1) Yes 2) NO**
2. Free medical facility or first aid for workers in case of accident?	**1) Yes 2) NO**
3. In case of emergency, on site ambulance available?	**1) Yes 2) NO**
4. Do you have any mechanism to report problem injuries and diseases, ill health, and incidents	**1) Yes 2) N0**
5. Overall, are you satisfied with the provision of medical facilities?	1) Totally Satisfied 2) Satisfied 3) Dissatisfied
6. Are you satisfied with your Job / working conditions including salary?	1) Totally Satisfied 2) Satisfied 3) Dissatisfied
7. How your working conditions can be improved?	1) Work load 2) Salary increase 3) Bonus and other monetary benefits 4) Health insurance 5) Other ……
8. Have you taken any training on emergency response and rescue?	**1) Yes 2) NO**
9. Do you use Personal Protective Equipment (PPE) during your work?	**1) Yes 2) NO**
10. What steps do you think can be taken to improve your working conditions?	What the owner should do? _____ What the Government should do? _____ Others _____

PART D:	**Operation and Control**	
1.	Are you involved in the mechanized or manual operation in the ship breaking?	**1 Mechanised** **2 Manual**
2.	Are you in the favor of mechanized or manual work?	**1 Mechanised** **2 Manual**
PART E:	**Environmental Issues**	
1.	How do you dispose off waste water from the ship? Drain into the sanitary lines?	**1) Yes 2) NO**
2.	Any mitigation measures being taken to reduce the air emissions from the machinery used?	**1) Yes 2) NO**
3.	Metal cutting produce gasses like NOx, Sox and CO_2 adequate mitigation measures been taken to reduce the exposure to the workers?	**1) Yes 2) NO**
4.	Proper Waste management of asbestos, heavy metals, oil residues, PCBs?	**1) Yes 2) NO**
5.	workers houses are in safe places away from waste sites and pollution?	**1) Yes 2) NO**

PART F: STAKEHOLDER CONCERNS

Q1. Characteristics of Gadani Beach having attraction for the location of existing yard? [Beach morphology, Tides favorable or not etc.] + [Observations + Feedback of Stakeholders]

Q2. What are merits and demerits of beaches at Gwadar and Port Qasim viz-a-viz alternate location options for Green Ship Recycling in Pakistan? [If they favour good beaching method and cost-effective ship recycling process]

Q3. Is it equally feasible and good to shift ship recycling facility to any other location preferably at Gwadar considering the CPEC prospects?

Q4. How a ship is beached for its recycling at Gadani Yard? [develop transcription for the beaching method being followed]

Q5. Please enlist the inventory taken out from tankers and carriers.

Q6. Is there any **ship recycling plan** properly followed and documented? [Take a copy if documented procedure in place OR develop transcription feature for the traditional knowledge being practiced.]

Q7. Is there any **waste management plan** properly followed and documented? [Take a copy if documented procedure in place OR develop transcription feature for the traditional knowledge being practiced.]

General Yard Observations:

Work instructions for HSE displayed at plot no…….. observed during the visit.

ISO and other Certifications available for plot no…….. as follow:

1. ISO 14001
2. ISO 9001
3.
4.
6.
7.
8.
9.

Annex-B: Questionnaire for Green Ship Recycling in Pakistan

This questionnaire form is the part of a visit to Karachi by NIMA staff on Ship recycling study. In this study we intend to explore the possible Impacts of ship recycling activates on socio-economic, health, and environmental dimensions. All your answers will be kept confidential with the research team and no one will be identified when we shall report our findings. *Thank you* in advance for being a part of this study.

For Office Use only

Name of the enumerator: Imtiaz Hussain **Date:** _____

Area: _____ **Questionnaire ID:** ***Green Ship Recycling***

Questionnaire No:_____ **Site name**_____

1. What is socio-economic contribution of ship Recycling in Pakistan?

_____

_____

2. Why Gadani Yard beach is important for Ship recycling in Pakistan?

_____

_____

3. What are concerns of stakeholders regrading clean and safe operations at Gadani Yard?

_____

_____

4. Are the existing practices at Gadani Ship Recycling Yard not clean and safe?

_____

_____

5. There are international obligations without which this sector can't survive. What are issue towards ratification of Hong Kong Convention HKC?

_____

_____

_____

_____

6. Is there no serious intention of Pakistan Ship breaking Association PSBA members or the GoP to fulfil the requirements of HKC?

_____

_____

7. How can be ratification to EU listing or HKC be achieved?

_____

_____

8. What personal protective equipment PPE defined by ILO and IMO are using during ship recycling at Gadani yard?

_____

_____

9. What measure are taking into account for safe and environmental sound Ship recycling?

_____

_____

10. **How the impact of dollar exchange rate can be managed to provide more buying edge to our economic operators over the Indian and Bangladeshi operators?**

_____

_____

_____

_____

Thank you very Much

Annex C: Activity wise Process Flow Matrix of in Vogue for Ship Recycling at Gadani

Process Flow	Activity	Responsible Person	Related Records/ Procedure	Records Number	Quality Parameter	Acceptance Criteria	Legal Applicable Requirement
⬇	Ship Beaching	Contracted Captain	Correspondence by Email/Phone Call	-	Availability of space in yard	Beach as per the cutting requirement	As per the list of Legal and Regulatory requirement
⬇	Ship Inspection	Yard Manager QHSE Manager and Environmental Consultants	Initial Environmental Examination Report	-	As per the requirement of Baluchistan Environmental Protection Act, 2012	As per the requirement of Baluchistan Environmental Protection Agency	
⬇	Degasification and Ventilation of tanks, Void & Closed Spaces	Head Supervisor (Jamadar), Ship Sarang and Ship Foreman	Ship Recycling/Dismantling Plan	SI-P-27	As per the qualification of confined space tests	Qualify of the test results	
⬇	Cleaning of Tanks	Contractor and QHSE Manager	Ship Recycling/Dismantling Plan Confined Space Entry Program, Spill Prevention Control, Safe Entry Checklist, Confined Space Entry Permit, Spill Report	SI-P-27 SI-P-23 SI-P-25 SI-FM-23-02-00 SI-FM-23-01-00 SI-FM-25-01-00	As per the material specification	Visual Inspection	
⬇	Inspection by Explosive Department of Pakistan (For Oil Tankers and LPG Carriers only	Team of Explosive Department of Pakistan	Safe for Hot Work Certificate by Explosive Department of Pakistan	-	Report of explosive department of Pakistan	Qualify of the report	

⬇	Removal of Hazardous Material	QHSE Manager and Ship Sarang	Waste Management, Ship Recycling/Dismantling Plan, Waste Generation Record, Waste Disposal Record	SI-P-22 SI-P-27 SI-FM-22-01-00 SI-FM-22-02-00			
⬇	Removal of Wood	Contractor	Ship Recycling/Dismantling Plan	SI-P-27			
⬇	Discharge of Compressed Gases	Ship Sarang	Ship Recycling/Dismantling Plan	SI-P-27			
⬇	Decommissioning of Electrical Appliances	Contractor	Ship Recycling/Dismantling Plan	SI-P-27			
⬇	Primary Cutting	Head Supervisor (Jamadar), Ship Foreman, Ship Sarang and QHSE Manager	Hazard Identification, Environment Aspects, Confined Space Entry Program, Hot Wok Permit, Spill Prevention Control, Ship Recycling/ Dismantling Plan, Risk Assessment and Control Sheet,	SI-P-14 SI-P-18 SI-P-23 SI-P-24 SI-P-25 SI-P-27 SI-FM-14-01-00 SI-FM-18-01-00 SI-FM-18-02-00 SI-FM-18-03-00 SI-FM-23-01-00 SI-FM-23-02-00 SI-FM-24-01-00 SI-FM-24-02-00	Balancing of Ship	Visual Inspection	

			Environment Aspect and Impact Log Sheet, Rating Scale, Impact Control Plan, Confined Space Entry Permit, Safe Entry Checklist, Hot Work Checklist, Hot Work Permit, Spill Report				
⬇	Secondary Cutting	Kinara Sarang, Kinara Foreman and QHSE Manager	Hazard Identification, Environment Aspects, Hot Work Permit, Spill Prevention Control, Recycling/Dismantling Plan, Risk Assessment and Control Sheet, Environment Aspect and Impact Log Sheet, Raking Scale, Impact Control Plan, Hot Work Checklist, Hot Work Permit, Spill Report	SI-P-14 SI-P-18 SI-P-24 SI-P-25 SI-P-27 SI-FM-14-01-00 SI-FM-18-01-00 SI-FM-18-02-00 SI-FM-18-03-00 SI-FM-24-01-00 SI-FM-24-02-00 SI-FM-25-01-00	Visual inspection for size of blocks	Size of block according to the requirement	
⬇	Tertiary Cutting	Ground Foreman and QHSE Manager	Hazard Identification, Environment Aspects, Hot Work Permit,	SI-P-14 SI-P-18 SI-P-24 SI-P-25 SI-P-27	Size and shape of the sheet	A per the requirement of client	
			Spill Prevention Control, Ship Recycling/Dismantling Plan, Risk Assessment and Control Sheet, Environment Aspect and Impact Long Sheet,	SI-FM-14-01-00 SI-FM-18-01-00 SI-FM-18-02-00 SI-FM-18-03-00 SI-FM-24-01-00 SI-FM-24-02-00 SI-FM-25-01-00			

			Rating Scale, Impact Control Plan, Hot Wok Checklist, Hot Work Permit, Spill Report				
⬇	Storage	Drumi	-	-	-	-	
	Dispatch	Loading Supervisor, Yard Manager	Purchase, Storage and Dispatch, Gate Pass, Soda Book, Daily Sheet	SI-P-11 SI-FM-11-08-00 SI-FM-11-09-00 SI-FM-11-10-00	As per the requirement of client	Visual inspection by client representative and loading supervisor	

Annex D: Legal and Other Requirement Matrix

LEGAL & OTHER REQUIREMENT MATRIX
Integrated management system (9001, 14001, 45001 & 30000)

S No	Environmental Discipline	Applicable Law	Legal Requirement	Application	Frequency	Concern	Responsibility
1.	Hazardous Waste	Balochistan Environmental Protection Act 2012 Pakistan Factories Act 1934	Balochistan Environmental Protection Act 2012, Section 1 Handling of Hazardous Substances – no person shall import, generate, collect, consign, transport, treat, dispose of, store, handle or otherwise use or deal with any hazardous substance except- (a) under a license issued by the Agency and in such manner as may be prescribed; Effective arrangements shall be made in every factory for the disposal of wastes and effluents due to the manufacturing process carried on therein	All Hazardous waste shall be disposed off thought EPA Approved Contractor. Proper Certificate will be obtained after the disposal of waste	As & when required	Hazardous waste	QHSE Manger
2.	Emission of Noise	Balochistan Environmental Protection Act 2012 National Environmental Quality Standards (NEQS)	Prohibition of certain discharges or emissions. (1) Subject to the provisions of this Act and the rules and regulations no person shall discharge or emit or allow the discharge Or emission of any effluent or waste or air pollutant or noise in an amount concentration Or level which is in excess of the National Environmental Quality Standards or, where Applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6	Noise Level Testing	Annually	Within production Area or yards Generators Area	QHSE Manger
3.	Emission of Gases			Air Emission Test			

4.	Vehicle Emission	Balochistan Environmental Protection Act 2012 National Environmental Quality Standards (NEQS)	Regulation of motor vehicles – (i) Subject ot the provisions of this Act, and the rules And regulations, no person shall operate a motor vehicle from which air pollutants or Noise are being emitted in an amount, concentration or level which in excess of the National Environmental Quality Standards, or where applicable the standards established Under clause (g) of sub-section (i) of section 6	Testing of emissions from vehicle	Annually	Lifters, cranes, winches and generators	QHSE Mange
5.	Air Quality	Balochistan Environmental PROTECTION Cold work NOC requirements	All precaution measure should be strictly adhered to minimize any negative impact on soil, ground water, ambient air quality and wildlife in the area	Testing of Air Quality	Annually	Within production Area	QHSE Manger
		Pakistan Factories Act Rules, 1934 National Environmental Quality Standards (NEQS)	In every factory in which, by reason of the manufacturing process carried on, there is given off any dust or fume or other impurity of such a nature and to such an extent as is likely to be injurious or offensive to the workers employed therein, effective measures shall be taken to prevent its accumulation in any work – room and its inhalation by workers and if any exhaust appliance is necessary for this purpose, it shall be applied as near as possible to the point of origin of the dust, fume or other impurity and such point shall be enclosed so far as possible.				
6.	Drinking water quality	Pakistan Factories Act Rules, 1934 National Standards for Drinking Water Quality (NSDWQ)	In ever factory effective arrangements shall be made to provide and maintain at suitable points conveniently situated for all workers employed therein a sufficient supply of whole-some drinking water	Testing of Drinking Water quality	Annually	Drinking Water Facility in yard	QHSE Manger

			In every factory there shall be provided free of charge for the use of the employees of the factory a supply of water fit for drinking at the rate of one gallon per day for every person employed in the factory				
7.	Storage of Hazardous items	Balochistan Environmental protection cold work requirements	The proponent will ensure safe storage and disposal of chemicals and lubricants and oils from the ship storage to protect the marine life, the yard shall have waste storage facilities and separate storage facilitates for hazardous waste materials as per environmental and safety regulations	Proper storage, handling & disposal of Hazardous items Material safety data sheet	As & when required	Hazardous material area	QHSE Manger
		HAZARDOUS SUBSTANCES RULES, 2014 Pakistan Factories Act 1934	A container of a hazardous substance shall be of such size, material and design as to ensure that- a. It can be stored, transported and used without leakage and safely; b. The hazardous substance therein does not deteriorate in a manner as to render it move likely to cause, directly or in combination with other substances, an adverse environmental effect				
		Balochistan environmental hot work noc requirements	The yard shall have waste reception and storage facilities and separate storage facilities for hazardous material as per environmental regulation				
		Balochistan Environmental department (no Env/2018/65-82) requirement	A warning statement comprising- i. the word “DANGERI” in red on a contrasting background; ii. a picture of a skull and cross-ones; iii. pertinent instructions for use, storage and handling and safety precautions relating thereto iv. instructions regarding return or disposal of the empty container Basic				

			instructions mentioning immediate steps to be taken in case of any accident or emergency, preferably in local language				
8.	Segregation and collection of Hazardous Waste	Balochistan Environmental protection Cold Work NOC requirements	Any kind of waste generated/produced during cold work should be appropriate disposed of.	Proper collection of Hazardous waste with in hazardous room as properly identified for collection of hazardous waste and avoid mixing with non hazardous waste	As & when required	Within production area	QHSE Manager
		HAZARDOUS SUBSTANCES RULES, 2014 Pakistan Environmental Protection Act 1997	Under clause (b) of sub-rule (2) of rule 5, shall- a. provide for the generation, collection, transport and disposal of the hazardous waste in a manner which will protect against an adverse environmental effect; b. ensure that the hazardous waste is not mixed with non-hazardous waste, unless the applicant can prove that such mixing will better protect against an adverse environmental effect				
9.	Storage & Handling of Gas cylinders	Industrial Gases Safety Rule 2010 Pakistan Factories Act 1934	Cylinders shall be stored in a cool, dry, well ventilated place under cover, away from boilers, open flames, steam pipes or any potential sources of heat and such place as storage shall be easily accessible. Keeping to be fenced with chains to avoid falling If thin-wall cylinders (liquefied petroleum or dissolved gas), not to be stacked in horizontal position Cylinders with flammable and toxic gases to be kept separately Not to be stored near any combustible material Empty ones to be segregated from filled ones	Proper keeping of Gas Cylinders with chained fence Segregation of cylinders with respect to hazard	As & when required	Hazardous Material Area	QHSE Manager
10.	Cleanliness	Factories Act, 1934	Section 13: Cleanliness	House keeping	Periodical	Overall	QHSE Manger

			Every factory shall be kept clean and free from effluvia arising from any drain privy or other nuisance, and in particular a. Accumulation of dirt and refuse shall be removed daily by sweeping or by any other effective method from the floors and benches of work-room anf from staircases and disposed of in a suitable manner. b. the floor of every work-room shall be cleaned at least once in every week by washing, using disinfectant where necessary or by some other effective method: c. where the floor is liable to become wet in the course of any manufacturing process to such extent as is capable of being drained, effective means of drainage shall be provided and maintained				
11.	Ventilation & Temperature	Pakistan Factories Act, 1934	15. Ventilation and temperature (1) Effective and suitable provisions shall be made in every factory for securing and maintaining in every work-room- a. adequate ventilation by the circulation of fresh air and (b) Such temperature as will secure to workers Therein reasonable conditions of comfort and prevent injury to health, and in particular (i) The walls and roofs shall be of such material & so designed that such temperature shall not exceeded but kept as low as practicable	Proper ventilation	As & when	Worker room	Yard Manger
12.	Dust & Fume	Pakistan Factories Act, 1934	Section 16. Dust and fume- (1) in every factory in which by reason of the manufacturing process carried on, there is given off any dust or fume	PPE & Air Quality testing	Periodical	Overall Yard	Yard Manger

			or other impurity of such a nature and to such an extent as is likely to be injurious or offensive to the workers employed therein, effective measures shall be taken to prevent its accumulation in any work-room and its inhalation by workers and if any exhaust appliance is necessary for this purpose, it shall be applied as near as possible to the point of origin of the dust, fume or other impurity and such point shall be enclosed so for as possible				
13.	Fencing	Pakistan Factories Act, 1934	20. Fencing or machinery In every factory the following shall be securely fenced by the safeguards of substantial construction which shall be kept in position while the parts	Proper fencing or barricading to be installed	As & When	Overall yard	QHSE Manger
14.	Crane & Lifting Machine	Pakistan Factories Act, 1934	Section 33: Cranes and other lifting machinery A register shall be maintained by the Manager for every examination of a lifting machine containing the following particulars	Inspection	Periodical	Equipment	QHSE Manger
15.	Contagious Disease	Pakistan Factories Act, 1934	Section 23, Precautions against contagious or infections disease- (1) Each worker in a factory shall be provided with a “Hygiene Card” in which during the month of January and July every year entries shall be recorded after examination by appointed factory doctor to the effect that the worker is not suffering from any contagious or infectious disease. The fee of such an examination shall be fixed by the provincial Government and will be borne by the occupier or manager of the factory	Health Tests & Fitness Certificate	Annually	Overall Yard	QHSE Manger
16.	Fire Control	Balochistan environmental hot			Periodical	Overall Yard	QHSE Manger

		work NOC requirements	The proponent will ensure that yard is equipped with firefighting equipment and proper training for the worker	Fire Fighting Equipment, Training Drills & Signage			
		Balochistan environmental cold work NOC requirements					
		Pakistan Factories Act, 1934	Section 25, Precautions in case of fire- Every factory shall be provided with such means of escape in case of fire as may be prescribed If it appears to the inspector that any factory is not provided with the means of escape prescribed under sub-section He may serve on the manager of the factory an order in writing specifying the measures which should be adopted before a date specified in the order				
17.	Moving Machines	Pakistan Factories Act, 1934	27. Work on or near machinery in motion- Where in any factory it becomes necessary to examine any part of machinery referred to in section 26 while the machinery is in motion, or as a result of such examination to carry out any mounting or shipping of belts, lubrication or other adjusting operation while the machinery is in motion such examination or operation shall be made or carried out only by a specially trained adult male worker wearing tight fitting clothing whose name has been recorded in the register prescribed in this behalf and while he is so engaged, such worker shall not handle a belt at a moving pulley unless the belt is less than six inches in width and unless the belt joint is either laced or flush with the belt	Guarding/Fencing & Training & Under Supervision activity	As & When	Overall Yard	QHSE Manger
			29. Striking gear and devices for catting off power In ever factory –				

			(a) suitable striking gear or other efficient mechanical appliances shall be provided and maintained and used to move driving belts to and from fast and loose pulleys which form part of the transmission machinery and such gear or appliances shall be so constructed, placed and maintained as to prevent the belt from creeping back on the fast pulleys; (b) Driving belts when not in use shall not be allowed to rest or ride upon shifting in motion.				
18.	Underage Employment	Pakistan Factories Act, 1934	28. Employment of young persons on dangerous machines- No child or adolescent shall work at any machine unless he has been fully instructed as to the dangers arising in connection with the machine and the precautions to be observed and – a. has received sufficient training in work at the machine, or b. is under adequate supervision by a person who has thorough knowledge and experience of the machine	No allowance policy of Underage employment	-	-	Yard Manger
19.	Guarding	Pakistan Factories Act, 1934	31. casing of new machinery- In all machinery driven by power and installed in any factory after the commencement of the Labor Laws (Amendment) Ordinance, 1972- (a) every set screw, belt or key on any revolving shaft, spindle, wheel or pinion shall be so sunk, encased or otherwise effectively guarded as to prevent danger 33. Cranes and other lifting machinery- (i) The following provision shall apply in respect of cranes and all other lifting machinery, other than hoists and lifts in any factory	Guarding/ Fencing & training & under supervision activity	As & When	Over all Yard	QHSE

20.	Means of Access	Pakistan Factories Act, 1934	33-D. Floors, stairs and means of access – In every factory – a. all floors, stairs, passages and gangways shall be of sound construction and property maintained and where it is necessary to ensure safety, steps, stairs, ladders, passages and gangways shall be provided with substantial handrails: b. there shall, so far as is reasonably practicable, be provided and maintained safe means of access to every place at which any person is at any time required to work; c. all places of work from which a worker may be liable to fall a distance exceeding three feet and six inches shall be provided with fencing or other suitable safeguards; and d. adequate provision shall be made for the drainage of floors in wet processes and for the use of slatted stands and platforms	Periodical Inspection	Periodical	Within production Office and Yards	QHSE Manger
21.	Heavy Objects	Pakistan Factories Act, 1934	33-F. Excessive weights- (i) No person shall be employed in any factory to lift, carry or move any load so heavy as to be likely to cause him injury.	Signage, Training	Periodical	Plant & Machinery	QHSE Manger & Yard Manger
22.	Eye Protection	Pakistan Factories Act, 1934	33-G. Protection of eyes: - The provincial Government may; in respect of any manufacturing process carried on in any factory by rule require that effective screens or suitable goggles shall be provided for the protection of persons employed on or in the immediate vicinity of a process which involves- a. risk of injury to the eyes from particles or fragments thrown off in the course of the process, or b. risk to the eyes by reason of exposure to excessive light or heat	Signage, Training EIS	Periodical	Health & Safety	QHSE Manager

23.	Maintenance	Pakistan Factories Act, 1934	33-H. Powers to require specifications of defective parts or tests of stability- If it appears to the Inspector that any building or any part of the ways, machinery or plant in a factory is in such a condition that it may be dangerous to human life or safety, he may serve on the Manager of the factory an order in writing, requiring him before a specified date- a. to furnish such drawings, specifications and other particulars as may be necessary to determine whether such building, ways, machinery or plant can be used with safety, or b. to carry out such tests as may be necessary to determine the strength or quality of any specified parts and to inform the inspector fo the results thereof.	Periodic load test of lifters, Cranes and Winches	Periodical	Yard & Machinery	Yard Manger
24.	Accidents	Baluchistan Development Authority NOC requirements	The buyer of the vessel shall be responsible for injury suffered damage sustained or loss caused to any person or property during process of dismantling	Monitoring & Measurement	Periodical	Overall Yard	QHSE Manager
		Balochistan Environmental protection Cold work NOC requirements	In case of any accidents/future damage/disaster the proponent would be held responsible				
		Pakistan Factories Act, 1934	33-N. Notice of certain accidents – Where in any factory an accident occurs which causes death, or which causes any bodily injury whereby any person injured is prevented from resuming his work in the factory during the forty-eight hours after the accident occurred or which is of any nature which may be prescribed in this behalf, the manager of the factory				

			shall send notice thereof to such authorities, and in such form and within such time as may be prescribed				
25.	Urinals/ Latrines	Pakistan Factories Act, 1934	Section 21: Latrines and Urinals i) In every factory- (a) Sufficient latrines and urinals of prescribed types shall be provided conveniently situated and accessible to workers at all times while they are in the factory. (b) Enclosed latrines and urinals shall be provided separately for male and female workers (c) Such latrines and urinals shall be adequately lighted and ventilated and no latrine and urinal shall unless specially exempted in writing by the chief inspector communicate with any work room except through an intervening open space or ventilated passage	Periodical Inspection	Periodical	Within Yard	Yard Manager
26.	Storage of flammable material	Balochistan Environmental Protection department hot work NOC requirement s	The proponent will ensure that flammable material or liquid may not be stored within 50 feet of hot work operation	LPG storage	As & When	Over all Yard	Yard Manger
		Balochistan Environmental Protection department hot work NOC requirement s	The proponent will ensure that flammable material or liquid may not be stored within 25 feet of hot work operation	Diesel Storage			
27.	Import of Ship	Pakistan Customs Rule 2001	1) An importer, after making payment of duties payable under rule 323, shall be allowed to bring the ships in the approved breaking yard at Gadani Beach, District Lesbella, Baluchistan. (2) For the assessment of the amount payable under rule 3, the importer shall file the stability booklet, builder's	(during ship import) NOC of Customs before beaching Ships, custom inspection, clearing agent licenses	As & When	-	Yard Manger

			plan or builder's certificate confirming light displacement tonnage (L.D.T) along with other documents, as may be required with the bill of entry to the assessing officer appointed in this behalf. (3) In the case of non-production of builder's plan under sub-rule (2), the ship shall be surveyed by an approved surveyor to ascertain the light displacement tonnage (L.D.T) prior to beaching as laid down in the public Notice No. 1/1990, date the 3rd February 1990, and No. 2/1990, dated the 30th December, 1990, issued by the Collector of Customs, Custom House, Gadani. (4) The importer shall, after paying the first installment under rule 4, submit an application for grant of permission for breaking of ship along with an undertaking on forty rupees judicial stamp paper testifying that- (a) He shall start breaking the ship immediately after receiving the requisite permission and will not remove from the yard any goods except unnecessary tackle, with the permission of the Assistant Collector concerned; and (b) He shall stop breaking in case the dues are not paid within the stipulated time or there is any dispute in respect of finalization of assessment of the ship concerned. (5) Final assessment of the ship shall be made within one month from the date				

			of initial payment and the importer shall be required to deposit the deferred amount within such time as may be specified at the time of such final assessment. (6) In the case of unavoidable delay in finalization of assessment of the ship, the grace period may be allowed for one month only by the Collector, Gaddani, keeping in view the exigencies of the case. (7) In case of failure by the importer to make payment in accordance with the schedule specified in rule 323, he shall be stopped braking the ship forthwith and shall not be allowed to avail facility of deferment of duties payable in respect of the ship for which such deferment was permissible and no such deferment of duties shall be allowed to him in future. (8)				
28.	Gas free certificate	Balochistan Environmental department (no Secy-Env2018/65-82) requirement	Ship involving oil tanker/ Chemical tanker/ LPG carrier/Gas carrier vessel (hereinafter called the ship coming to Pakistan for dismantling must be certified “certificate of gas free for hot work)	(During ship import) Gas Free certificate of oil tanker	As & When	Health & Safety	Yard Manger
29.	Initial Environmental Examination and Environmental Impact Assessment	PAKISTAN ENVIRONMENTAL PROTECTION ACT 1997, BALOCHISTAN ENVIRONMENTAL PROTECTION ACT 2012, IEE/EIA REGULATION 2000,	No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Government Agency approval	IEE of Ship	As & When	Environment	Yard Manger
30.	Joint inspection	Balochistan Environmental	After beaching of above said ships, Balochistan Environmental protection	Joint inspection of ship	As & When	Environmental, health and safety	Yard Manger

		department (no Secy-Env/2018/65-82) requirement	Agency along with Pakistan Custom Balochistan Development Authority and labour department to inspect the ship jointly				
31.	Explosive inspection	Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	After authentication of the gas free certificates, the explosive department will be approached by the proponent who will inspect the tanks of the oil tankers with the help of sophisticated electronic equipment to re-verify the status of the gas free certificate for hot works	Explosive department inspection	As & When	Environmental, health and safety	Yard Manger
32.	Compensation	Balochistan Environmental Protection department Hot Work NOC requirements Balochistan Environmental Protection department cold Work NOC requirements Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	In case of verifiable damage to community the compensation will invariably be paid by the proponent	Compensation will be paid in case of variable damage to the community	As & When	-	Yard Manger/ Owner
33.	Emergency Response Plan	Environmental Approval hot work Requirements Environmental Approval cold work Requirements Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	The proponent will ensure that the yard shall have an emergency have an emergency plan o procedure in order to deal with oil spill, personal accidents with hazardous material. The proponent will ensure that the yard shall have an emergency have an emergency plan o procedure in order to deal with oil spill, personal accidents with hazardous material.	ERP for Company	-	Environment, Health and Safety	QHSE Manager
34.	Frist Aid	Hot work Environmental		First aid facility	Over all Yard	Health and safety	QHSE Manager

		Approval Requirements	The proponent shall ensure that yard have facility to provide first aid during cold & hot works to injured person				
		Cold work Environmental Approval Requirements					
		Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	The proponent shall ensure that yard have facility to provide first aid during hot works to injured person.				
35.	Work Instructions	Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	The proponent will ensure that the yard have clear working procedure to which all employees should adhere	Awareness	Over all Yard	Environme Health and safety	QHSE Manager
36.	Hazardous material Training	Environmental Approval hot work Requirements	The proponent will ensure that the staff must be trained to handle and store hazardous material	Training	As and When	Environmental Health and safety	QHSE Manager
		Environmental Approval cold work Requirements					
		Balochistan Environmental department (no Secy-Env/2018/65-82) requirement					
37.	PPEs	Environmental Approval hot work Requirements	The proponent will ensure that during hot works the workforce on the yard shall wear safety helmets, safety shoes, eye protective glasses and working gloves	PPEs provided to the worker during work	Over all Yard	Health and safety	QHSE Manager
		Environmental Approval cold work Requirements					
		Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	The proponent will ensure that the workforce on the yards wear face masks/ protective clothing when dealing with asbestos, PCBs, Toxic material or material which generate toxic fumes				
38.	Fire Watcher	Environmental Approval hot work noc requirements	The proponent shall ensure that whenever hot work operation are taking place a responsible individual	During Hot Work cutting	Over all Yard	Health and safety	Yard Manger

			shall be appointed as fire watch and shall be in duty continuously during such operations.				
		Balochistan Environmental department (no Secy-Env/2018/65-82) requirement	The proponent shall ensure that such person shall have no other duties other than to watch fire watcher shall be equipped with or have immediate access to emergency fire protection equipment (charged fire extinguisher and/or fire hoses) Fire watches shall remain on duty				
			The proponent shall ensure that person performing hot work may not serve as their own fire watch				
			the proponent shall ensure that fire watches shall be equipped with a mechanism to send a fire alarm or a device to cause an alarm to be sounded				
39.	Business license	Balochistan Local government Act 2010	License is issued in pursuance of part 3 item of 13 Balochistan local government act 2010 to the owner of the business	Business License	Annually	Production	Yard Manger
40.	Dismantling statement	Balochistan Development Authority NOC requirements	The buyer of the vessel shall submit monthly statement to the undersigned showing the tonnage dismantled and particular of scraps & all material removed from the vessel during the month	Monthly dismantling report	Annually	Production	Yard Manger
41.	Removal of oil	Balochistan Development Authority NOC requirements	The buyer of vessel may ensure that oil & oil sludge shall be remove from the tanks of the vessels in suitable means without polluting the harbours water before commencing the ship breaking operations and shall not dumped the said oil anywhere at the beach jurisdiction of the ship braking yard	Handling of hazardous materials	As & when	Environmental, health and safety	Yard Manger
42.	LPG Gas Cylinder	Pakistan Petroleum Act 1934	License for storage. Save as provided in section 7, 8 and 9 of the Act and by rule	Storage License	As & When	Environmental, health and safety	QHSE Manager

			109 no one shall store any petroleum except under a license granted under these rules: Provided that no license shall be necessary for storage in a well-head tank.				
		Minerals and gas safety rule 2010	All vessel shall be hydraulic tested by a competent person marked on the vessel at a interval of not more than 10 years after the date of first date,	Hydrostatic test	As & when	Environmental, health and safety	Yard Manger
43.	Diesel Storage	Pakistan Petroleum Act 1934	License for storage. Save as provided in section 7, 8 and 9 of the Act and by rule 109 no one shall store any petroleum except under a license granted under these rules: Provided that no license shall be necessary for storage in a well-head tank.	Storage License	As & when	Environmental, health and safety	Yard Manger
Doc #: SI-FM-25		**Issue #: 01**		**Issue Date: 01-01-2020**			**Rev.#: 01**

Annex E: List of PSBA Members

MEMBERS OF PAKISTAN SHIP BREAKERS ASSOCIATION

S No	Name of Representative	Company name	Address	Phone No	Fax No
1.	Mr. Dewan Rizwan Farooqui	Dewan & Sons	155, Nepier Road, Karachi	32426901	32434418
2.	Muhammad Rafiq Baghani	Abdul Sattar Noor Mohd & Co.	806, 8th Floor, Al Khalij Tower Shahra-e-Milat Road. Karachi	34145405-08	34145409
3.	Mr. Waqar Mehmood Khan	M/s Ahmed Ship Breaking & Co	12th Floor, Uni Center, I.I Chundrigar Road, Karachi	32417140 32417143	32417969
4.	Mr Kamran Malik	M/s Commercial Metal	410, Progressive Plaza, Near PIDC House, Karachi	35655762 35655763	
5.	Mr. Saleem Dada	D.D. Ship Breakers	A-501, 5th Floor Saima Tower, I.I. Chundrigar Road, Karachi	32625901 32625904	32628587
6.	Chaudhry A.Ghafoor	M/s Ghaffar & Co	F-83, SITE Karachi	32589360-2	
7.	Mr. Suleman Jiwani	M/s Imran Ship Breakers & Co	B-71, A, SITE, Karachi	32589341 32589342-5	32589346
8.	Mr Ahrab Malik	M/s Meezan Ship Breakers	405, Business Finance Center I.I. Chundrigar Road, Karachi	32422226 32422228	32415274
9.	Mr. Iqbal Paraikh	M/s Metco Ship Breakers	502-5th Floor, Fourtune Center Block 6, PECHS. Khi	34311151	34311157
10.	fMr. Feroz Ali Punjwani	M/s Prime Ship Breakers	608-6th Floor Prograssive Plaza 5cl Civil Line Beaumont Road, Karachi	35679018 35654628	35674724
11.	Mr. M. Umar Memon	M/s Sadaf Enterprises	208, Fourtune Center, Shahra-e-Faisal Karachi.	34390925 34390926	34390927
12.	Mr. Fazal Parachi	M/s Al Hamza Trading & Ship Breaking Co	301, 3rd, Floor, Beaumont Plaza Near Prograssive Plaza PIDC, Karachi	35653726 35653727	35654433

13.	Mr. Muhammed Rafiq	M/s Salam International	E41, Opposite Telephone Exchange SITE Karachi	32564694	32564694
14.	Mr. Javed Iqbal	M/s Shoaib Shipping Agencies	108, Commerce Center, Hasrat Mohani Road, Karachi	32636215	32631935
15.	Mr. H. Abdul Ghaffar Dada	M/s Star Cotton Corporation	516, 5th Floor Haji Adam Chamber, New Chali. Karachi	32414753 32419716	32419487
16.	Mr. Mohd Yaseen	M/s S.S. Enterprises	301, 3rd floor, S.S. Chamber Simens Chowrangi SITE. Karachi	32565378	32565378
17.	Mr. Mehoob Ali	M/s S.N. Enterprises	10/2, Sidco Avenue Center 264 R.A. line C Tower Karachi	35681083 35689669	35683067
18.	Mr. Muhammad Ikhlaq Memon	M/s Usman Enterprises	101, Fourtune Center Shahra-e-Faisal Karachi	34549645 34549648	34549669
19.	Dr. Dyaram Esarani	M/s Unique Trading	303, 3rd Floor Prograssive Plaza 5 CL Civil Line Beaumont Road Karachi	35655293 35655295	35210223
20.	Mr. Sharif Parachi	M/s Al Hamza Commodities	Plot No 85/C 11 Commercial Street Phase II Ext DHA, Karachi	35315935 35315936-37	35315938
21.	Mr. Najam Sadiq	M/s Hyder Ship Breaking	F-241, SITE, Karachi	32561519 32561520	32584387
22.	Mr. Hanif Jiwani	M/s A.A. Ship Breakers	107-108, 1st floor, Clifton diamond Center, Block 4, Clifton, Karachi	35878273-6	35878276
23.	Mr. Malik Shahid	M/s Decent Trading	D-260, New Alam Kanta Haroonabad, Shershah Karachi	3459215577	
24.	Mr. Abdul Ghaffar	M/s Usman Ship Breakers	F-117, SITE, Karachi	32563473 32572212	32563474
25.	Mr. Iqbal Hussain Agah	M/s Abbas Ship Breaking Ind.	Plot 48, Sector 28, Korangi Idustrial Area Karachi	35046045 35041376	35046044
26.	Mr. Juma Gul	M/s Jammaludin & Co	Plot D2004, Haroonabad, Shershah Village, Karachi	32572100 32570166	32567504
27.	Mr. Shoaib Sultan	M/s Horizon	D-93, Block 4, Clifton, Karachi	34523437	34304359
28.	Miss Madiha Mehmood B.Molvi	M/s M.M. Commodities	3c, Khayaban-e-Ithad, PH II, Ext DHA, Karachi	35891765	35895328

29.	Mr. Sajjad Bakar Gokal	M/s Translog Commodities	34-A/5 Beach Hotel Road Karachi	35611001 35611005	32610760
30.	Mr. Saleem Akhtar Qureshi	M/s S.Q. Coporation	Banglow No 14, Army generals Housing Scheme Near Zamzama Park DHA 5 Karachi	35364006 35364007-8	35364010
31.	Mr. Malik Bashir Ahmed	M/s Abbas Steel Group	123-old Clifton Karachi	35870171-2	35870708
32.	Mohd Khalid	M/s Fourwaves Enterprises	Office No 201, 2nd Floor Anum Trade Center Near Ghani Chow Estate Avenue SITE. Karachi	32589532 32589531	32589531
33.	Mr. Sheikh Mohd Saleem	M/s Hajvairy Steel Industry pvt ltd	322, Clifton Center 3rd Floor Shoon Chowrangi Clifton Khi	35293222 35293223	35293224
34.	Mr. Abdul Razzak Noor	M/s Balochistan Ship Breakers	Room No 1, 1st Floor Jubilee Center New Memon Masjid Karachi	32423122 32440552	32431557
35.	Mr. Mehmood Haji	M/s Al Abbas Ship Breaking	B-51 SITE, Estate Avenue Karachi	111-221-111 32561253	32561253
36.	Mr. Gulu Ghanchi	M/s Sikender Industries	F-720, Metrowil SITE Karachi	021-36754848-49	
37.	Mr. Abdul Rehman	M/s Abdul Azizi Nawab Khan & Co	1st Floor Zamindar Building Cambel Street New Cahli, Karachi	32625886 32631830	3008382633
38.	Mr. Mohd Kahliq	M/s Sadiq R Rolling Mills	B-13, B Site Karachi	32578697	32579822
39.	Saleem Akhtar Qureshi	M/s Sea Green	Askari Villa 14 Kahyaban-e-Tauheed Street 16 DHA-V, Khi	35364006-7	35364010
40.	Mr. Younus Jiwani	M/s Right Ways International	Plot No E-31-B Room No 308, 3rd Floor, Anum Trade Center, Estate SITE Karachi	32570630	32570633
41.	Mr. Mohd Shafi	M/s Mateen International	E41, SITE Karachi	32572189- 32571093	
42.	Mr. Habib ur Rehman	M/s Habib Trading	Office No 114, Plot B/1 B9 S.P Chamber, SITE Area Karachi	32551491-3	32551492

43.	Mr. Sadrudin Gilani	M/s Karimi Contracting	207-208-209, 2nd Floor, Uni Plaza, Karachi	3241531-32	
44.	Mr. Alam Khan	M/s New Choice Enterprises	F/187 Central Avenue Near Koila Kanta SITE Karachi	32570708	
45.	Mr. Altaf Ghanchi	M/s Ayan Ship Breakers			
46.	Mr. Malik Waqas	M/s Adam Ship Breakers	16-C 1st Floor Tohid Commercial phase 5 DHA Karachi		
47.	Mr. Arif Rashid Dar	M/s Venture Green Recyclers	8A, 8th Floor, Lackson Square No.1.265R.A. Line Karachi	35687418-35687591	35687581
48.	Mr. Amir Malik	M/s Sharry Ship Breakers	16-C 2nd Floor Tohid Commercial phase 5 DHA Karachi		
49.	Mr. Suleman Farooqui	M/s S.A. Traders	6/8, Rk Square Ext New Chali Karachi	32420836	
50.	Mr. Rizwan Daden	M/s Daden Steel	Room no 305, 3rd Floor S.S. Chamber SITE Karachi	32565378	32565378
51.	Mr. Muhammed Rafiq	M/s Fatima Enterprises	Room No 218, 2nd Floor Gul Center Saddar Karachi.	32584998-32584999	

Annex F: List of Re-rolling Mills in Pakistan

LIST OF STEEL RE-ROLLING MILLS BUSINESSES IN PAKISTAN

Complete directory of Steel Re-Rolling Mills business in Pakistan, find web directory of Pakistani Steel Re-Rolling Mills in any city of Pakistan, B2B information including contact details, address, phone number, email address, photos and owner details. Search from thousands of Steel Re-Rolling Mills in Pakistan, located in Karachi, Lahore, Peshawar, Faisalabad, Multan, Sialkot, Gujranwala, Rawalpindi, Islamabad or any other city of Pakistan. List your business for free.

Karachi & Hub	
Nawab Brothers Steel Mills (p-Karachi	Sunny Steel Industry – Karachi
A.b. Steels – Karachi	A.s. Steel Rolling Mills – Karachi
Al-hamd Rolling Mills – Karachi	Al-meezan Steel – Karachi
Al-safa Steel – Karachi	Associated Rolling Mills – Karachi
Bolan Enterprises – Karachi	Coastal Steel Mill – Karachi
Dada Steels Mills(pvt) Ltd. – Karachi	Diamond Steel Industry – Karachi
Faizan Steel – Karachi	H.f. Steel – Karachi
Hafiz Steel Rerolling Mills – Karachi	Haris Steel Traders Karachi
Ittehad Steel Industries – Karachi	Jaffrani Brothers Re-rolling M – Karachi
Khyber Steel – Karachi	Madina Rolling Mills – Karachi
Majeed Re-rolling Mills – Karachi	Mehboob Re-rolling Mills – Karachi
Mehran Rolling Mills – Karachi	Metropolitan Steel Corporation – Karachi
Mumtaz Steel Corporation (pvt) – Karachi	Quetta Steel R-rolling Mills – Karachi
R.s. Steel Industries – Karachi	Sadiq Re-rolling Mills – Karachi
Salams Steel Mills – Karachi	Sarhad Steel Re-rolling Mills – Karachi
Superior Steel Corporation – Karachi	Tuwairqi Steel Mills Limited – Karachi
Mughal Steel Mill – Karachi	
Lahore	
Anwar Moulding Works – Lahore	Black Gold Steel Industry – Lahore
Jamal Steel Re-rolling Mills – Lahore	Lion Industries & Re-rolling – Lahore
Masood Steel Industry – Lahore	Punjab Concast Steel Furnace – Lahore
A.s. Group of Steel Industries – Lahore	Afco Steel Industries – Lahore
Akhtar Ali & Brothers Steel Re – Lahore	Al-bashir Steel Industries (pv – Lahore
Al-karam Steel Re-rolling Mill – Lahore	Al-rehman Engineers – Lahore
Amir Asim Steel Re-rolling Mil – Lahore	Asia Steel Furnace & Re-rollin – Lahore
Aziz Sons Engineering Works – Lahore	Baba Farid Steel Furnace – Lahore
Barkat Steel Mills – Lahore	Binyameen Naeem Steel Re-rolli – Lahore
Capital Steel Mills (pvt) Ltd. – Lahore	Ch. Abdul Hafeez & Brothers St – Lahore
Chaudhry Steel Re-rolling Mill – Lahore	F.a. Punja Steel Re-rolling Mi – Lahore
Fahad Rafiq Steel Mill – Lahore	Faridia Steel – Lahore
Fbm Engineering – Lahore	Fiaz Steel Re-rolling Mills – Lahore

Habib Steel Re-rolling Mills – Lahore	Hafiz Enterprises – Lahore
Jahangir Steel Re-rolling Mill – Lahore	Jamal Group of Steel Industrie – Lahore
Kamal Steel Re-rolling Mills – Lahore	Madina Steel Industries – Lahore
Magna Steel (pvt) Ltd. – Lahore	Malik Steel Re-rolling Mills – Lahore
Model Steel Enterprises (pvt) – Lahore	Naimat Ullah Steel Works – Lahore
Naveed Faheem – Lahore	Prime Steel Corporation – Lahore
Progressive Steel Industries (- Lahore	Psc Prime Steel Corporation – Lahore
Ramzan Steel – Lahore	Rehman Steel Furnace (pvt) Ltd. – Lahore
Shalimar Steel Re-rolling Mill – Lahore	Siddique Iron Industries (pvt) – Lahore
Steel & Spares Supply Corporat – Lahore	Steel Master (pvt) Ltd. – Lahore
Za. Associates – Lahore	
Gujranwala	
Gujranwala Steel Re-rolling Mi-Gujranwala	Hks Steel And Re Rolling Mills – Gujranwala
Ittehad Steels (pvt) Ltd. – Gujranwala	
Sheikhupura	
Aziz Industries – Sheikhupura	
Islamabad	
Gandaf Steel Industries (pvt) – Islamabad	J.r. Steel Re-rolling Mills – Islamabad
Classic Steel Re-rolling Mills – Islamabad	Muhammad Hussain & Sons (pvt) – Islamabad
Modern Engineering Industries – Islamabad	Siddiqui Steel Re Rolling Mill – Islamabad
Peshawar	
Ff Steel – Peshawar	Frontier Foundry (pvt) Ltd. – Peshawar
Sialkot	
01 S-bordo Surgical – Sialkot	

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