

Pre-Feasibility Study

SHIP BREAKING



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1 PURPOSE OF THE DOCUMENT

The objective of the pre-feasibility study is primarily to facilitate potential entrepreneurs in project identification for investment in ship breaking. This project pre-feasibility may form the basis of an important investment decision and in order to serve this objective, this document / study covers various aspects of project concept development, start-up, operations and business management of ship breaking and scrap business. The document also provides sectoral information, brief on government policies and international scenario, which have some bearing on the ship breaking industry as a whole and the project itself.

This particular pre-feasibility is regarding “Ship Breaking & Scrapping” sector. The report provides an overview of the driving mechanisms of the ship breaking and scrapping industry. The overview is focused on the economics of the ship scrapping industry and aims at describing the interaction with the other shipping markets and providing insight into the forces that determine when and where ships are scrapped. Key drivers behind the ship owners' supply of vessels for scrap and the ship scrapping yards' demand for the same are addressed separately. Finally, the dynamics and equilibrium of supply and demand are discussed. The information in this section serves as a reference for the analysis of the historical developments in the ship scrapping industry and the projections of the future volumes of ship scrapping under different scenarios.

Before studying the whole document one must consider following critical aspects, which forms the basis of any investment decision.

2 CRUCIAL FACTORS & STEPS IN DECISION MAKING FOR INVESTMENT

The ship breaking industry (which has not yet been declared as an industry in Pakistan) has been a well reputed sector and a major source of steel supply to the local re-rolling mills especially during eighties. However, the scenario has been totally changed; ship suppliers have directed their attention toward Bangladesh, India and China due to high price offers which is around \$300 to \$450 per ton. In addition the import duty on scrap ships in Pakistan is 25% whereas in the neighboring countries it is just 11%. The two reasons have badly hindered the progress of ship breaking industry in Pakistan.

The following critical key factors need to be considered before entering the ship breaking and scrapping market to minimize associated risks:

- ***Demand for steel and other reusable items:*** When the demand for steel and other reusable items increases, the ship scrappers' earning potential increases. Hence, the ship scrappers willingness to pay for a vessel for decommissioning increases (and vice versa with the weakening in the demand for steel and other reusable items)
- ***Running costs*** which to a large extent is determined by local conditions play a crucial role for the demand of vessels for decommissioning. An increase in either of the cost

items listed below will shift the demand curve downwards, i.e. lower the ship scrappers' willingness to pay:

- **Labor costs** play, and have played a crucial role for the ship breaking industry. Given the current practice used, ship breaking is a very labor- intensive industry.
- **Waste disposal costs:** Decommissioning involves large waste quantities for disposal.
- **Costs implied by regulation (health, safety & environment):** Regulation also influences demand as higher requirements regarding health, safety and environmental issues increase the costs of ship scrapping. Though in Pakistan and neighboring countries the environment and health safety regulations are not so strict or they may not be followed by the ship breakers.
- **Import duties, levies and taxes:** Ship scrappers which are subject to high duties, levies and taxes are less competitive compared to countries with no or low taxes.
- **Capital costs** play an insignificant role in present markets due to the basic nature of the industry. There is a potential of increasing productivity by using better technologies in the industry, but this will require large investments, which do not seem to be competitive to the current practice used.
- **Infrastructure:** The better the infrastructure (roads, distance to users [buyers] of steel, access for the labor force etc.), the lower the running costs. This infrastructure is available at Gaddani-the prime ship breaking site in Pakistan.
- **Exchange rates:** Exchange rates naturally affect the competitiveness of the ship scrapping yards , as the costs of the ship scrapping yard are paid in local currency (except for the vessels for decommissioning).

3 PROJECT PROFILE

3.1 Opportunity Rationale

Like every business, Ship breaking also depends on demand and supply function. Pakistan needs more than 40 million tonnes of steel in the next fiscal year¹ while it has installed capacity of steel production at Pakistan Steel Mills of around 1 million tones. In addition, further expansion in production capacity in Pak Steel would increase it to 1.5 million. The installation of a new mini steel mill at Port Qasim by Saudi Arabia's Al-Tawarki Group would enable the steel production industry to reach 2 to 2.5 million tonnes. Still there would be gap in demand and supply of steel which could be bridged by traditional ship breaking industry.

¹ <http://www.jang.com.pk/thenews/may2005-daily/21-05-2005/business/b8.htm>

Ship breaking industry depends on availability of scrap ships. Every year around 600-700 larger sea vessels are taken out of service and brought to Asia for scrap. In the 1990s they had an aggregate tonnage of around 15 million dwt (dead weight tonnage) a year. However, the scrap market increases and will increase substantially the following years. In 2001 the total number of vessels (608) sold for scrap already totaled a figure of 28 million dwt. This marks a year on year growth of nearly 25% for Asian Countries like Pakistan, China, India and Bangladesh where more than 90% of world ship breaking occurs.

Given that some ships must be scrapped after 20-25 years for safety reasons, the supply side for these vessels is easy to calculate since the age of the existing fleet is known. In 1998 - a bumper year - a total of 673 ships or 27,254,525 dwt were scrapped, and in 1999 it remained about the same. The average age of the 88,000-strong fleet has reached 19 years at the end of 2000. To maintain this average would require the annual scrapping of almost 1,900 vessels a year with an average age of 25 years, which would be three times 1998 ship scrapping rate.

The above statistics are evident of good investment potential in the ship breaking business. However, reduction in the current duty structure (which is 24%) and tax relaxation would be necessary to compete in the international market since the scrap ship prices are increasing (around \$300-\$450 per tonne).

3.2 Project Brief

Ship breaking is the process of dismantling an obsolete vessel's structure for scrapping or disposal. Conducted at a pier, dry dock or dismantling slip, it includes a wide range of activities, from removing all gear and equipment to cutting down and recycling the ship's infrastructure. Ship breaking is a challenging process, due to the structural complexity of the ships and the many environmental, safety, and health issues involved.

The scraping work needs huge labor and capital; scrapping operations involve high risks and problems. So, the owners of the vessels prefer to sell out the unserviceable vessels to the countries where there is demand for scrapped steel and other items of old ships, where labor cost is relatively low and where there is less concern about hazards, toxicity and environmental pollution. Thus, ship owners who want to get rid of their unserviceable vessels contact the concerned business community who look for cheaper steel and other items of the ships. These two parties transact a good business of selling and buying of unserviceable vessels at a point.

3.3 Proposed Business Legal Status

The government policies in Pakistan have been inconsistent for ship breaking industry during the past years. Most of the businessmen in this industry prefer to take it as side

business² (though still they remain in steel business), since the business highly depends on the availability of scrap ship which can not be ensured without good industry contacts (scrap ship suppliers and brokers), and competitive and consistent internal economic policies. In addition the business involves huge investment and finance when a buying deal is being made. This need of finance would be done in a setup where more than one investment party is involved. Therefore, a partnership setup for ship breaking business would be proposed.

3.4 Project Capacity and Rationale

It is important to clarify a few points regarding supply and demand in relation to the term *capacity*.

Quantity is sometimes mistaken for *capacity*. However, the quantity observed in the market is merely the *volume* provided at that specific point in time to match supply. It says nothing about the *maximum quantity* or *capacity* that the ship scrapping yards can handle. In this report, the term *capacity* is used only in relation to discussions about constraints to the number of ships the ship breaking site can hold and scrapping yards can process. In Pakistan most of the breaking activities are generally done in open sky; therefore, no specific infrastructure is required for storage and processing. Generally the transportation of scrap material and production process is synchronized. After the reasonable stock is available to transport, parties from re-rolling mills are ready to take the delivery.

Regarding the capacity of decommission of ships, there is no evidence that there have been any *capacity constraints* in the industry historically, which have seriously affected prices or volumes of scrap. If the current practice continues in the future, no capacity constraints are foreseen, as decommissioning with the currently applied practice only requires a suitable beach, plenty of labor and a hinterland force requiring steel - all of which seems to be readily available in Pakistan. Rather than *capacity constraints*, it seems that the key drivers behind supply and demand for ships for decommissioning have determined the historical level of scrapping and scrap price.

Based on the historical scenario in the Pakistani ship scrapping market, ship breaking industry has been providing around 1 million tonnes of steel to the local re-rolling mills which was totally based on the availability of scrap ships rather than the installed processing capacity. Therefore, for the purpose of this pre-feasibility it is assumed that at least one light ship would be purchased in a year with the weight of 1000-1500 Tonnes.

3.5 Project Investment

The total cost of the project would be around Rs. 94,296,250/-. Working capital requirement would be around Rs. 79,370,250/- and the rest would be the fixed capital.

² Based on discussions with the existing Ship breakers

3.6 Output Products/Product Mix

In the businesses like Ship breaking, output products of the business are very structured and defined³. It solely depends on what type of ship has been brought to be shredded. For this pre-feasibility study we have assumed a cargo or passenger ship would be scrapped; therefore, output would be as follows:

S.No.	Component	%age of total
1	Ship plate and profiles of 1/2" Thickness and above	40%
2	Ship plate and profiles of 3/8" Thickness and above	20%
3	Second quality re-rollable scrap of short lengths	15%
4	Small irregular pieces and re-meltable scrap	15%
5	Cast iron, pipes or cast steel	8%
6	Non-ferrous metals	1%
7	Stores or machinery	2%

3.7 Recommended Project Parameters

Capacity	Human Resource	Technology/Machinery	Location	
Installed Capacity 1000-5000 Tonne	No. of employees 9 Permanent and 16 Contractual staff	Local/Foreign Mixed	Suitable Locations Gaddani, Karachi	
Financial Summary				
Project Cost	ROI	NPV	Payback Period	Cost of Capital
Rs. 94,296,250	30%	-	1 Year	-

Investment in Ship breaking is considered to be for a short period and in cycles, i.e. an entrepreneur would purchase a scrap ship, scrap it, sell the scrap in the market, realize the sale proceeds, pay off the creditors and the balance, if any, works out to be his surplus. The cycle is repeated, if the entrepreneur wishes to buy another scrap ship. Hence, the ship breaking business is different from a typical manufacturing or services entity.

3.8 Proposed Location

The choice of location for the establishment of scrapping sites rests upon some priority requirements as follows:

- A long uniform inter-tidal zone/ sufficient tidal difference (allowing vessels of a range of sizes to be “dry-beached)
- Minimum exposure (coastal protection) and stable weather conditions
- Availability of low cost labor
- A certain level of infrastructure

³ Ship-breaking Industry (Special Procedure) Rules, 1997

All above requirements are fulfilled by Gaddani Ship Breaking Site.

3.9 Key Success Factors/Practical Tips for Success

In the Ship Breaking business, an entrepreneur who has got the lead information on availability of breakable ship and has cemented the buying deal in least possible time, is likely to be successful in this business. The minimum the difference between the timing of information regarding availability of scrap ship and deal finalization, the higher will be the success chances for the business. Ship buying deal, negotiation and close interaction with the international scrap ship (demolition) market are considered to be the rule of game in Ship Breaking business. The availability of latest information on ships ageing and phase out plan of various shipping companies and geographical location around the globe is regarded as a critical success factor.

4 SECTOR & INDUSTRY ANALYSIS

4.1 The Business Cycle of the Shipping Market

Business cycles occur in most industries. Also in shipping, the business cycle is an integrated part of the business. The business cycle plays a crucial role in fostering an efficient working industry by forcing the weakest and most poorly managed companies out of business during the downturns, leaving only the most efficient companies in business.

Basically the shipping industry consists of four markets:

- **The *new building market* trades new vessels**
- **The *freight market* trades sea transport services**
- **The *sale and purchase market* trades second-hand vessels**
- **The *demolition market* trades old and obsolete vessels.**

The dynamics of the business cycles in shipping is a very complex matter, as a wide range of factors influence the fluctuations and because the four markets are closely interconnected. The shipping market in general is operating under business cycles with up and downswings with a cyclical behavior. By managing risk and return on market investments, the business cycles play a central role in balancing the economics of the entire shipping industry.

4.2 Demand & Supply

The demand and supply in each market are, as mentioned, closely interconnected. If, for example, only few new ships are built and the demand for sea transport services increases

(for example due to an upswing in the global economy) the price for sea transport services will increase. This will affect both the second-hand market and the demolition market. The price for second-hand ships will increase reflecting the higher earning potential and fewer ships will be sold for scrapping, also affecting the price in the demolition market. This will lead to an increased activity in the new building market and, eventually, to a downward pressure on the price for sea transport services due to the increased supply of sea transport service.

The demolition market plays an important role as a buffer balancing demand and supply in the freight market. During a recession, the global demand for sea transport services stagnates or declines, which creates an overcapacity in the freight market leading to increased scrapping, thereby balancing out demand and supply. During an upturn in the business cycle the reverse occurs, as described above.

Predicting the development in the four shipping markets or in the business cycle is essentially what shipping is all about. However, predicting the cycles are very complex as many factors influence the four markets and thus the business cycles. Historical evidence shows that the [business] cycles are not regular.

4.2.1 *Supply of Vessels for Scrapping*

The main cash inflow for ship owners is freight revenue. However, the ship owners also receive positive cash inflow from the demolition market when selling ships for demolition. If the ship owner's decision on when to scrap a given vessel is not subject to any constraints, the ship owner simply evaluates the expected future earning potential and the expected cost of keeping the vessel in operation against the price obtainable when the vessel is sold for scrap.

When the revenue from selling the vessel for scrap outweighs the difference between the future earning potential and running cost, the ship owner will find it optimal to sell for scrap. Given that the earning potential declines and the cost of keeping the vessel in operation increases as the vessel ages, the price a ship owner requires for selling the vessel for scrap declines, the older the vessel is. An important factor in this consideration is the cost of taking the ship through international contacts in the four markets, which widens in scope when the vessel ages.

Regulatory requirements naturally interfere with this. If, for example, the ship owner's decision is subject to age limitations, the ship owner can be forced to supply the vessels to the ship scrapping yards earlier than he would otherwise find optimal. Ignoring the cost of transporting the vessels to the ship scrapping yard (and possible regulation or company policies), the ship owner is presumably indifferent about *where* to scrap. The ship owner will simply choose to scrap the ship at the ship breaking yard offering the highest price.

Five key factors for the supply of vessels for scrap can be identified.

- ***The future earning potential:*** If the general market conditions in the freight markets improve, the supply curve shift upwards, as high earnings encourage the ship owners to keep trading. Accordingly, ship owners require a higher price to sell a vessel to the ship scrappers when the freight markets are strong (and vice versa for a decline in the future earning potential).
- ***The cost of keeping the ship in operation:*** If the cost of keeping the ships in operation increases (for example due to higher bunker/fuel cost, higher cost of survey etc.), the supply curve shifts downwards, as ship owners would then require a lower price to sell a vessel to the ship scrappers (and vice versa for declining cost of keeping the vessels in operation).
- ***Age profile of existing fleet:*** The supply curve shifts downwards the larger the share of old vessels is. The reason is that the earning potential declines and running cost increases the older the vessel is. Accordingly, ship owners will, on average, require a lower price to sell to the ship scrappers if the share of old vessels is high (and vice versa for a smaller share of old vessels).
- ***The size of the current fleet:*** Keeping other things equal, the constant increase in the world-fleet leads to an increased supply of vessels for the demolition market.
- ***Regulation:*** Regulatory issues, like phase out regulation, port state controls, statutory surveys, vetting systems etc., affect the demolition supply curve. These are factors that did not exist in the past, but are gaining importance at the moment for the key decision: whether to invest in the maintenance and follow operation or to sell the vessel for scrap. Accordingly, one key consideration is that increased maritime safety will likely lead, as a side effect, to increased scrapping activity.

4.2.2 Demand of Vessels for Scrapping

The decision of a (potential) ship scrapper to enter the market by buying a vessel for scrap is heavily influenced by the possibilities of selling the steel and other reusable items from the ship and the ship scrappers cost structure. If for some reason revenue declines (if for example the price of steel or other reusable items declines) and/or the running cost of the ship scrapper increases, the ship scrapper will require getting the vessel for scrap at a lower price. Otherwise the ship scrapper will step out of the market.

Running costs, i.e. labor costs, taxes, capital costs, infrastructure, environmental requirements etc., are heavily influenced, and thus determined, by local conditions. The same goes for the revenue side. In developing countries like Pakistan, the demand for steel and other reusable items is high, i.e. revenue possibilities are likely to be better due to the accelerated economic growth. Accordingly, ship scrappers in some countries/regions will be able to offer a higher price for a given vessel, if their costs are lower and/or revenue possibilities are better.

As the ship owners are assumed to be indifferent to the location of ship scraping yard, the above mentioned factors influencing the demand side, determines this. The activities of the individual ship scrappers are aggregated to give the total demand at any given price.

The critical factors (mentioned in Section 2) influencing the demand of ships for decommissioning are the key to understanding the pattern of decommissioning world-wide today and in the past. With no restriction of ship owner's decision on where to scrap, this is determined by which ship scrapper offers the best price. Ship scrappers with "high costs" due to, for example, high costs of labor and/or high disposal costs, have no chance of being in the market as long as ship scrappers with "low costs" have the capacity of processing the ships supplied to the industry.

4.2.3 Government Policy Direction

A ship breaker who is not already registered as ship breaker shall apply for registration to the Collector of Sales Tax having jurisdiction over the area where the ship-breaking is to be carried out.

The application for registration shall be processed in the Collectorate and a certificate of registration shall be issued to the applicant in accordance with Registration, Voluntary Registration and De-registration Rules, 1996.

The CBR has accordingly issued two notifications whereby value of 'ships for scrap' has been fixed at \$300 per LDT for the purposes of calculation of sales tax at the import stage in terms of Clause (46) of Section 2 of the Sales Tax Act, 1990. As per the SRO 76(I)/2005, an amendment has been made in Chapter XIII of the Sales Tax Special Procedures Rules 2004 to reduce the mandatory value-addition from 14 percent to 5 percent for the purposes of payment of sales tax on local supply of the scrap obtained from ship-breaking.

It is expected that the measures would reduce the landed cost of ship-scrap by around Rs. 1,300 per metric tonne and thereby enable the ship-breakers to bid for higher purchase price in the world market.

This relief will, however, be available to those imports only where the declared value of 'ships for scrap' is more than \$300 per LDT and would continue for a period of three months only after which it will be reviewed in consultation with the Pakistan Ship-Breakers Association.

The announced relief package is expected to result in the revival of the ship-breaking industry, and is anticipated to provide jobs to thousands of persons and cheap scrap for use by the re-rolling mills while making the used refrigerators and air-conditioners available for use in offices and houses. This would help stabilize the market price of steel and iron bars, and ease the pressure on the construction sector.

The government has also reduced with-holding tax from 3% to 1% and has lifted duty (5%) which will also give a relief to the industry whereas the break up of the duty and taxes (around 24%)⁴ to be paid is as follows:

40% at the time of issuance of Ship beaching permission
30% with in one month of the commencement of operations
30% after one month

Generally a ship inspection is carried out by the officials of PNSC and “Ports & Shipping Division” of the government of Pakistan.

5 MARKET INFORMATION

5.1 Market Dynamics

The balance between supply and demand in the ship scrapping industry is ever changing. The effect of changes in the key drivers of the industry is described below (not the price, as this is endogenously determined by demand and supply). The description of changes in the key drivers primarily focuses on the consequences in the demolition market.

- **Freight rates**

Freight rates heavily influence the price of ships for demolition. Peaks in the freight rates are transmitted to the demolition market with a small delay, reducing the supply of ships for demolition, as higher freight rates make it more attractive for the ship owners to keep their vessels in operation. Technically, higher freight rates will shift the supply curve upwards, eventually, leading to increased prices and fewer ships sold for demolition. The new equilibrium is found where the "new" supply curve intersects the demand curve.

- **Phase out schemes**

Regulation that put certain restrictions on the use of ships will affect the market equilibrium. A regulation calling for phase out of ships before the ship owners would otherwise find it optimal to scrap will increase the supply of ships for demolition. Technically, this will shift the supply curve to the right, eventually, leading to lower prices and more ships sold for demolition.

A phase out scheme increases the volume of ships that are decommissioned, which means that more demand will be satisfied. Thus, more ship scrappers will be in the market, or more of the less efficient capacity of existing ship scrappers will be utilized. If it is assumed that "low cost" ship scrappers are not able to process more ships, demand from "high cost" ship scrappers (for example European shipyards) may

⁴ Based on our discussions with the existing ship breakers

be satisfied. As mentioned, this could imply that the equilibrium price declines below zero.

A phase out scheme might affect both the freight markets and the new building market. When more ships are scrapped, the supply of sea transport services declines leading to increased freight rates, which will ultimately lead to increased demand for new vessels (and, eventually, a higher supply of sea transport services).

- **Fluctuations in steel prices**

Prices of recycled steel influence the price that ship scrappers can pay for a ship for demolition. If prices of recycled steel increases, the ship scrappers will be willing to pay more for the vessels, increasing the demand for ships for demolition. Technically, this will shift the demand curve to the right, eventually, leading to higher prices and more ships sold for demolition.

A higher level of decommissioning will result in more recycled steel on the market, which could, eventually, affect the price of recycled steel. However: "*recycled steel from ships forms an insignificant share of total steel production, as well as of the global supply of recycled steel*". Hence, the price for steel can be considered as exogenous in this context, i.e. the steel price is not significantly affected by the developments in the ship demolition market.

- **Health, safety and environmental regulation**

When new regulation regarding health, safety and environmental aspects is introduced in the ship scrapping sector, the demand curve is affected. General stricter regulation will increase the costs of scrapping a ship, reducing the demand of ships for demolition. Technically, this will shift the demand curve to the left, eventually, leading to lower prices and fewer ships sold for demolition.

Health, safety and environmental issues are often implemented locally, whereas the market for demolition of ships is global. Hence, it is likely that new regulations will only affect part of the ship scrappers that form the total demand curve.

Technically, a regulation that only affects some of the ship scrappers will simply lower these ship scrappers' willingness to pay. A new aggregated demand curve will be formed with a shape that has been pushed downwards compared to the starting point. The new equilibrium will have a lower price and fewer ships sold for demolition, if ship scrappers that were originally "above the equilibrium point" are affected by the regulation. Moreover, local regulation may push some of the ship scrappers out of the market, because they are no longer competitive, i.e. the price that they are willing / able to pay for a ship for decommissioning is lower than the equilibrium price.

- **Market interactions**

It is fair to assume that ship owners will sell ships for demolition to the ship scrapper paying the highest price, as long as there are no specific reasons to act differently. Accordingly, without further market interactions, it will primarily be the "low cost" ship scrappers that are in the market.

However, regulation can be used as a means to provide a sufficient incentive for the ship owners to sell their ships to ship scrappers complying with specific safety, health and environmental criteria, such as the IMO, ILO and Basel Convention guidelines for ship scrapping. One way could be to simply subsidize "high cost" ship recyclers (for example European ship recyclers) so that they can offer prices for ships for decommissioning that are competitive to the prices offered by ship scrappers from "low cost" countries. Technically, a properly applied subsidy-scheme to European ship recyclers will increase the price that they are willing to pay for ships for decommissioning. A new aggregate demand curve will be formed where European ship recyclers will be in the market. Another way would be to simply use "command and control" regulation forcing ship owners to scrap in certain countries/under certain conditions. However, without world wide support, command and control regulation will probably only have little effect.

5.2 Global Ship Breaking / Scrapping Market

The tables show that in the past 10 years decommissioning of ships have been heavily concentrated to countries in the Indian Sub Continent and Asia.

<i>Total historical ship scrapping volumes (all types) by region and year (Million LDT, Million DWT and number of vessels)⁵</i>													
Scrap Location	Unit	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Other	Total
Bangladesh	mLDT	0.5	0.6	0.9	0.7	1.1	1.2	0.8	1.7	1.4	0.7	0.0	9.6
	mDWT	3.1	3.9	4.6	3.2	5.8	7.2	4.2	9.5	8.7	4.1	0.0	54.2
	No.	25	31	61	63	66	65	61	123	69	39	0	603
India	mLDT	1.3	1.4	2.2	2.1	2.8	2.8	2.1	2.2	2.9	1.9	0.0	21.7
	mDWT	65	6.1	8.8	7.7	10.0	10.6	8.1	8.1	11.1	7.6	0.1	84.7
	No.	107	148	262	293	360	340	274	298	326	229	1	2,638
Pakistan	mLDT	0.6	0.5	0.3	0.2	0.6	0.7	0.2	0.6	0.3	0.2	0.0	4.0
	mDWT	3.7	3.1	2.0	0.9	3.4	4.3	1.2	3.7	1.7	1.0	0.0	24.9
	No.	19	20	16	14	40	34	16	26	13	14	1	213
Indian Subcontinent	mLDT	0.1	0.1	0.1	0.3	0.3	0.1	0.1	0.1	0.0	0.0	0.0	1.2
	mDWT	0.9	0.4	0.6	1.4	1.1	0.8	0.6	0.5	0.1	0.2	0.0	6.6
	No.	6	2	9	18	24	9	7	5	1	2	0	83
China	mLDT	0.5	0.2	0.1	0.0	0.5	1.0	1.1	1.1	1.3	1.5	0.1	7.4
	mDWT	2.8	0.9	0.3	0.1	2.1	5.4	5.7	5.7	5.9	8.2	0.1	37.1
	No.	34	19	13	6	48	72	77	76	90	79	9	523
Vietnam	mLDT	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.4
	mDWT	0.3	0.4	0.2	0.5	0.4	0.3	0.1	0.0	0.0	0.0	0.0	2.3
	No.	3	2	6	3	5	5	4	1	1	0	0	30

⁵ A study on the implications of the accelerated phase out scheme of single hull tankers proposed by the EU for the world ship scrapping and recycling industry- June 2004

<i>Total historical ship scrapping volumes (all types) by region and year (Million LDT, Million DWT and number of vessels)⁵</i>													
Scrap Location	Unit	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Other	Total
Other Asia	mLDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00.0	0.0	0.0	0.1
	mDWT	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.0	1	0.0	0.0	0.6
	No.	0	2	1	1	1	4	0	1	1	1	0	12
EU	mLDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	mDWT	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3
	No.	2	1	1	3	7	3	3	2	4	1	0	27
Turkey	mLDT	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.7
	mDWT	0.0	0.1	0.2	0.2	0.3	0.6	0.2	0.3	0.3	0.1	0.0	2.3
	No.	2	5	10	12	15	18	14	16	21	12	0	125
North America	mLDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	mDWT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
	No.	0	0	0	0	0	0	0	1	4	1	0	6
South America	mLDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	mDWT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	No.	1	1	0	0	2	1	1	2	1	0	0	9
Mexico	mLDT	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
	mDWT	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.3
	No.	0	1	0	2	6	8	1	0	1	0	0	19
Other	mLDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	mDWT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	No.	0	0	0	0	2	0	0	0	0	0	1	3
Unknown	mLDT	0.1	0.0	0.2	0.3	0.2	0.3	0.4	0.1	0.2	0.2	1.1	3.1
	mDWT	0.8	0.1	1.0	1.1	0.6	1.5	1.7	0.2	0.6	0.7	4.0	12.3
	No.	14	8	22	32	23	41	34	14	24	15	140	367
Total	mLDT	3.2	3.0	4.0	3.8	5.6	6.4	4.8	5.9	6.2	4.5	1.2	48.7
	mDWT	18.2	15.5	17.6	15.3	23.9	30.8	21.8	28.2	28.5	21.9	4.2	226.0
	No.	213	240	401	447	599	600	492	565	556	394	151	4,658

Note: "Indian Subcontinent" means that it can be in any of the three countries; India, Bangladesh or Pakistan

Note: 2003 only includes January – September

Note: Rounding will display digits <0.05 as 0.0

DWT: deadweight tonnage is carrying capacity of ship in ton (an oil tanker of 200 DWT can carry 200 ton oil)

GT: gross tonnage is content of ship in cubic meters

LDT: light displacement tonnage, almost similar to the net weight of a ship, it is a general used measurement to calculate the scrap value of a ship. One LDT is equivalent to 1.016 MT.

The above table indicates that the ship breaking in India, Bangladesh, Pakistan, and China has accounted for more than 90% of the total volume of ships scrapped (LDT). Only a small amount of ship scrapping has been carried out in Western Europe and other OECD countries.

Less than 2% of the ship scrapping seen from 1994-2003 has taken place in Europe of which Turkey alone accounts for more than 85%. The reason for this is simply that the economics of ship scrapping are not in favor of EU countries. It is not only due to the higher labor costs and the cost of protecting human health and the environment, but also due to the fact that the demand for recycled steel and other reusable items from ships is lower in the EU compared to, for example, the Indian Sub Continent or China. The prices obtained in third world countries are consequently better on per tones of steel basis (EU, 2000).

The global volume of scrapping is related to the overall size of the world fleet. The constant increase over the years in the size of the world fleet has led to a general increase in the supply of ships to the ship scrapping industry, as implied by the table on previous page. The trend in volumes of ship scrapping has followed the increasing trend in the size of the fleet. However, it is also evident that there have been large variations over the years. These variations are determined by the developments in the key drivers of supply and demand. It is important to bear in mind that the age profile of the world fleet plays a prominent role.

The following table presents an overview of total number of companies involved in ship scrapping in different countries according to Lloyds register (Lloyds, 2004). Countries with more than ten companies are shown in bold.

- | | | |
|--------------------------|-----------------------|---------------------|
| • Bangladesh (50) | • Belgium (3) | • Brazil (3) |
| • Canada (1) | • China (14) | • Denmark (5) |
| • Egypt (8) | • Estonia (1) | • France (3) |
| • Germany (2) | • Greece (2) | • Iceland (1) |
| • India (249) | • Italy (5) | • Japan (3) |
| • South Korea (1) | • Lithuania (1) | • Mexico (1) |
| • Namibia (2) | • Netherlands (2) | • Norway (1) |
| • Pakistan (27) | • Peru (2) | • Philippines (1) |
| • Portugal (3) | • Singapore (3) | • South Africa (1) |
| • Spain (14) | • Taiwan (7) | • Thailand (1) |
| • Turkey (20) | • United Kingdom (9) | • United States (3) |
| • Uruguay (1) | • Vietnam (13) | |

5.3 Ship Breaking In Pakistan: History & Market Trend

Pakistan's ship-breaking industry once provided jobs to over 35,000 persons directly and occupied the second top position amongst the international ship-breaking industry. During its golden period, this industry had at its docks at Gadani 40 to 50 obsolete ships at a time for breaking against few ships at present. **High taxes, machinations of the vested interests, high duty structure and increasing scrap ship prices have contributed to the present state. These are the reasons most of the ship breakers are not doing ship breaking as a permanent business or source of income rather as a side business as and when a successful deal is possible. Level of operation is limited to one light ship in a year or more than one or in certain cases, there is no ship breaking activity at all.**

India, Sri Lanka and Dubai have benefited the most from the decline in Pakistan's ship-breaking industry and have consequently emerged as a regional hub of ship-breaking.

Some measures adopted by the present government two years ago - in particular cut in duties on import of ships for dismantling, had kindled hopes for the revival of this industry, as it had started to attract entrepreneurs. The duties on ships doubled from five to 10 per cent and sales tax increased from 15 per cent to 20 per cent, rendering the business non-viable once again. The present relief package announced by the government has, once again, rekindled hopes about the revival of this industry.

Pakistan's ship-breaking industry is spread along the Gadani beach, which is about 50-km north-west of Karachi. Ship-breaking had started there much before Pakistan's independence in August, 1947. However, the ship-breaking industry registered a spectacular growth after Pakistan's independence, enabling it to rapidly establish itself into the club of top ship-breakers of the world by the mid-sixties.

Gadani is the third largest ship breaking yard and employs about 10,000 workers and meets one-third of the scrap requirements of the re-rolling mills. A Gadani-based ship-breaking firm scrapped the world's second-largest vessel The Sea Giant, a tanker of 555,051 dwt, in September 2003. It also scrapped the world's third-largest vessel, the Kapetan Michalis in 2002.

In the eighties, the ship-breaking industry provided employment to over 35,000 workers directly, while over 500,000 persons earned their living indirectly, through trade and such industries that used ship scrap as raw material. In 1985-86, the ship-breaking industry helped the country in making an annual saving of Rs. 1,500 million, which would otherwise have been spent on import of iron and steel. It also earned another Rs500 million in foreign exchange through the export of surplus ship-scrap, second hand machinery, generators, air-conditioners and other equipment. It also contributed to the national exchequer, during that financial year, an amount of over Rs. 1,035 million in customs duty, sales tax and income-tax. The ship-breaking industry paid Rs2.69 billion in customs duty alone during the period July 1982 to June 1986.

The provincial government of Balochistan earned an annual income of Rs. 22 million through license fees and lease money during those times; while Gadani Town Committee earned over Rs30 million every year, through octroi duty, making it Pakistan's richest local body, in terms of population-revenue ratio.

Prior to the independence, some casual businessmen used to occasionally break a few obsolete ships at Gadani. However, it was after Pakistan's independence that a group of entrepreneurs made serious efforts to develop this casual trade into a regular industry. At that time, Gadani beach lacked the necessary infrastructure facilities like carpeted roads and utilities like electricity, potable water, telephone and even arrangements for providing first aid or medical help to the workers.

The place was uninhabited and consequently there was an acute shortage of labor as well. The majority of workers were uneducated, unskilled and migratory. Even the businessmen, who entered the trade, possessed little know-how of the industry, but they were infused with self-confidence and imagination and had realized that with the introduction of modern bulk carriers and the looming crisis in the international shipping industry, most of the outdated/obsolete vessels would soon become redundant. Besides, as a result of initiation by many countries of a process of replacement of their unserviceable WWII vintage war ships with modern and sophisticated vessels, there appeared an international market for the sale of obsolete ships.

A number of other factors also contributed to the rapid growth of the ship-breaking industry in Pakistan. Among others, these included a growing demand for iron and steel for the country's rapidly developing re-rolling mills, engineering and other ancillary industries, which consumed iron, steel as well as other non-ferrous metals.

The disruption of normal trade relations with India following 1965 and 1971 wars, discontinuity in supply of steel and iron products from Pakistan's only steel mill at Chittagong after the emergence of Bangladesh and massive devaluation of rupee in 1972 made import of iron and steel products much costlier. This provided a chance to the ship-breaking industry to meet the national demand for raw material from the much cheaper ship-scrap.

Although the policy of nationalization, adopted by the government in 1972, discouraged investment in fixed assets and capital goods, it gave a boost to the ship-breaking industry which, being labor-intensive, needed neither fixed assets nor capital goods.

In 1978, realizing the importance of ship-breaking industry for the national economy, Pakistan government announced a number of measures to give a boost to this industry. These included: recognition of ship-breaking as an industry, declaring Gadani as a port, reduction in customs duty on ships imported for breaking, provision of telephone connections, increasing the lease period from one year to five years; and appointment of an 8-member committee to solve other problems of the ship-breaking industry.

The years between 1969 and 1983 are considered to be the golden period of the ship-breaking industry in Pakistan. It was during this period that the ship-breaking activities witnessed a boom and this industry left many of its international rivals far behind as far as the total number of ships demolished and the tonnage of ship-scrap handled was concerned.

6 SHIP BREAKING PROCESS

The scrapping process follows a sequential pattern that can be described in a series of four steps:

- **Offshore:** Prior to beaching, tanks are discharged and valuables (mostly electronic equipment) are removed

- **Inter-tidal zone:** The vessel is beached by own power and dismantling is initiated (in a certain sequence)
- **On the beach:** Sorting of components and further cutting into manageable pieces for further transport and processing
- **On shore/final destination:** Re-use 'as is' of different components/materials (secondhand market) and re-manufacturing/recycling into new products/components.

6.1 Acquisition / Buyout

Unserviceable vessels are sold on the basis of lightweight Tonnage (LDT) of the vessel. A ship is measured mainly on the basis of its Dead Weight capacity. Dead weight of a ship is defined as 'weight of cargo plus fuel and consumable stores' while light weight of a vessel is the 'weight of the hull including, machinery and equipment'. The length, breadth, depth, and displacement are also very important factors for buying and selling of an unserviceable ship. Present international rate for sale of vessel is US\$ 400 to US\$ 450 per lightweight tonnage (LDT), This is particularly in case of ships with better steel quality, whereas the previously book able price was US\$.150 per LDT.

Generally 95% of a ship's body is made of mild steel (M.S.), 2% of stainless steel and 3% of miscellaneous metals, such as brass, aluminum, copper, gun metal and other alloys which are important factors of ship breaking. Stores and other materials that may be available from a ship purchased for beaching are also considered very important. In fixing the price of a ship, consideration is given to the factor of whether it is a dead ship or a running one. Ships store ranges from foodstuff to clothing, from electrical to electronics, machinery of most type, life saving equipment, drugs, communication equipment etc.

The Pakistan Ship Breakers Association purchase dead/unserviceable vessels or ships in running conditions from different parties at different points and bring those to Pakistani Coast for beaching. The ship breakers purchase the vessels of their choice. Nationality of the owners of the vessels or the country of origin of the ships is not a factor of consideration but they take into account the following points during purchase of the ships:

- Light weight tonnage of the vessels (LDT)
- Cost of the voyage to the beaching site of the ship.
- Probable towing cost in the case of dead vessel.
- General stores that may be available.
- Miscellaneous materials that may be available.
- Position of the re-useable marine stores.

From various sources, such as the Ship Breakers Association, ship breaking enterprises and the Govt. agencies, it is gathered that generally the following **three types** of vessels are demolished in Pakistani Ship Breaking Yards.

- General cargo vessels
- Tankers
- Bulk carriers

Pakistani breakers prefer to demolish the above types of vessels for reasons, such as availability of profitable items, safe and easy breaking operation and safe journey of the vessels to beaching site. The main sources for purchase of unserviceable vessels are the former USSR, Bulgaria, Romania, Greece, Italy, Turkey, Japan, Singapore, South Korea, etc. Towing of a dead ship for scrapping is costly, so the Pakistani ship breakers and their agents generally prefer to buy ships on voyage or ships stranded at a port near to coast, i.e., located at any port of India, Bangladesh, Sri Lanka, Myanmar, Thailand or Singapore.

6.2 Beaching

When a ship is towed from the sea to the beaching ground, it is inspected, checked and made gas free. Then, fitters start opening the important parts and removable items from the vessel. These include furniture, beds, bunks, cabin materials, utensils, crockery, removable electrical items, electronic appliances, sanitary wares, insulators, food items and cosmetics, glass ware, refrigerators and pipes & fittings, as these may be damaged during beaching operation of the vessel.

6.3 Dismantling

No sound technical system is used to recover valuable stores, spares, metals and other items from the ships. On arrival of ships at outer anchor of the Karachi Port, agents of shipping companies book a towing vessel from the Karachi Port Authority for towing the vessel to the shore / Gadani. The Port officials before towing the vessel verify the import documents, document on payment of duties/ taxes and certificates issued by the concerned Government authorities. One Deck Officer and one Certified Engineer, in addition to the Master of the vessel need to be present during beaching operation of a ship. Then Pakistan Navy comes for inspection of the ships and prepares a complete inventory of communication equipment, radios, wireless sets, walkie-talkies, transceivers, engines etc.

As per law of the land, the walkie-talkies and wireless sets are subject to be handed over to the Wireless Board of the Government immediately after completion of beaching of the ships. Meanwhile, the Mercantile Marine Department conducts surveys to check the safety measures taken and also checks the marine stores and a list is prepared. The Mercantile Marine Department surveyors also verify all the documents of the vessels. First of all, valuable metal furniture, fixtures, electrical and electronic items, engines, boilers etc. are removed from the vessel. Then the ships if filled up with water up to deck level and later the water is discharged through the sea corks or through other means to clean the ships and make the vessels ready for scrapping. This cleaning process is not

sufficient to make the vessel free from dangerous gases, fumes, chemicals and contaminants. The water so discharged, contain a mixture of hazardous chemicals and contaminants. Thus, sea-water is contaminated which causes harmful effects to sea lives and also pollutes the environment. Risks of the asbestosis, chemicals, hydrocarbons, toxic items and radiation remain there all the time.

6.3.1 Material Complexity

To enable assessments of waste streams and quantities from the dismantling process, the vessel is usually segmented into spaces:

- Cargo spaces
- Machinery spaces
- Accommodation spaces

The composition of these spaces in terms of complexity/ density of components and material composition vary significantly. This approach allows simple breakdown as function of material composition complexity and allows waste stream quantification to be undertaken.

- The cargo space areas represent large low density volumes of the vessels bounded by ships structure and containing mostly only simple items such as pipe work and outfit steel including ladders and hatch covers. There may also be limited amounts of cabling, instrumentation and selected machinery items.
- The machinery space areas represent steel structure surrounding high-density areas comprising predominantly heavy machinery items including the main engines, generators, auxiliary machinery and pipe work. There will also be significant electrical cabling, electronic equipment, instrumentation, insulation and outfit steel in such areas. Overall, a far greater diversity of original materials will be present than in cargo, tank or void spaces.
- The accommodation space areas however whilst also high-density areas surrounded by (generally lighter scantling) steel structure have a marked difference in the composition comprising hotel outfit (furniture, furnishings, sanitary) within joinery sub-divided areas, together with electrical and electronic equipment and controls in the navigation and domestic areas. These areas require high levels and complex utility provision involving pipe work, electrical cabling, ventilation trunking and comfort insulation.

Different ship types will have different mixes of these three area types and further, the composition within the areas will differ accordingly. The total lightweight of the vessel can be considered to comprise:

$$\text{“Lightship} = \text{A (Steelwork/ Outfit)} + \text{B (Machinery/ Outfit)} + \text{C (Joinery/ Outfit)}\text{”}$$

Different ratios by weight for different vessel types are presented in the following table. This can be used as a basis for calculating an illustrative 'average' composition reflecting the mix of ship types in the fleet.

Ship Type	Lightship Tons	A (%)	B+C (%)
• Cargo ship 400,000 dwt	53,500	85%	15%
• Cargo ship 200,000 dwt	29,400	84%	16%
• Cargo ship 100,000 dwt	18,300	80%	20%
• Cargo ship 70,000 dwt	16,700	77%	23%
• Cargo ship 20,000 dwt	08,300	69%	31%
• Cruise vessel 2,000 pax	23,000	44%	56%
• Pass/RoRo ferry	00,985	59%	41%
• Fishing Vessel	01,416	30%	70%
• Offshore Supply	00,765	51%	49%
• Dredger	02,379	63%	37%
Average Fleet Vessel	100%	75%	25%

An average "ship" can be identified based upon the composition of the world fleet into these different ship types and a weighted average calculation for the relative weight breakdown. The above calculation has defined this average vessel composition by weight as: Lightship = (75% A) + (12.5% B outfit) + (12.5% C outfit)

6.4 Scrapping

During the second phase, cutters and their helpers start cutting the vessel into parts. The breaking operation is undertaken based on the structural design of the vessel. The larger parts are dragged to the dry part of the shore with the help of motorized pulley (Winches). A large number of workers are also engaged in this operation. Though the motor does the main job, workers need to help the pulley driver in dragging the part to the dry area of the shore.

Another group of cutters, helpers and workers start cutting the dragged parts of the ship into truckable (transported by trucks) parts as per order of the purchasers. Heavy equipment like boilers, motors, etc. are carried to stack yards by moving crane.

The unskilled workers carry metal plates, metal bars or pipes on their heads or shoulders, start walking in synchronized steps up to a definite destination and then pile up metal plates in stacks yards or load them on trucks. The supervisors control the group of workers; the on-looker guides them and helps them in piling up the heavy metal plates in stack or loading on truck.

6.5 Product Mix Offered

Subject to the maximum aggregated wastage up to seven per cent, the following are the normal percentage or proportion of scrap and other products obtained from the breaking of oil tankers, bulkers, cargo ships, drilling ships, war ships, passenger ships and cattle carriers, namely:-

Item	Proportion (%)
• Ship plate and profiles of ½” thickness and above	40%
• Ship plate and profiles of 3/8” thickness and above but below ½”	20%
• Second quality re-rollable scrap of short lengths	15%
• Small irregular pieces and re-meltable scrap	15%
• Cast iron, pipes or cast steel	7.5%
• Non-ferrous metals	0.5%
• Stores or machinery	2.0%;

Most of the ship breakers already have vendors / third party agents in contract for buying the various extracted scrap in bulks. Usually agents are appointed by large companies for buying scrap from ship breakers.

Pakistan is not self sufficient in iron; as such, it has to depend on the scrapped iron to feed the rolling mills and steel factories. Other items of the ship such as engines, generators, boilers, electrical items, furniture, plumbing items, refrigerators, air-conditioners, etc. have a good market in Pakistan, especially after being refurbished / serviced. The main users of scrapped irons are the local steel re-rolling mills producing MS rods, MS bars, angles and steel sheets for domestic market. The engines and generators are used by the garment manufacturing factories; boilers are used mainly in rice mills, garments washing plants, knitting plants and other industries. There is a great demand for the wooden planks/bars and furniture which are sold on the markets located throughout the country especially in Karachi.

6.6 Problems in Ship Breaking & Hazards

6.6.1 Non Compliance

In Pakistan, ship breaking is carried out in an open space. As a matter of fact, provisions of the Factories Act and occupational safety measures with regard to doors, windows, stairs etc. of a factory premises are not taken into consideration. No young person or women are engaged in ship breaking yards. Limited amount of electricity is used for ship breaking activities. Testing system of cranes, lifting machinery and motorized pulley is hardly done. The yards re-use ropes and chains recovered from the broken ships without testing and examining their strength. There is no marking system of loading capacity of the chains of cranes and other lifting machineries. Gas cutters and their helpers are cutting the steel plates almost round the clock without protection of eyes, so their eyes are always vulnerable to welding effects. They do not wear any uniform and generally never use hand gloves and boots. The unskilled workers carry truckable pieces of iron sheets on

their shoulders and they do not know the weight of the sheets they carry and the employers are also not aware of the legal limit of weights carried by workers. Usually, these workers carry weights far above the limit prescribed in the Factories Act and Factories Rules.

6.6.2 Lack of Hazard Control

Ships are not properly cleaned before beaching. Generally, an eyewash test is carried out to certify that a ship is free from dangerous chemical and fumes. Workers enter into such areas without taking any precautionary measure or without wearing masks or aprons. Workers are not aware of hazards to which they are likely to be exposed. Consequently, workers suffer from suffocative injury and lung problems, which causes temporary loss of working capacity. The hatches and pockets of vessel may contain explosive or inflammable gases. The cutters, if they understand from their experience, drill small holes in order to release gases or fumes. These types of crude attempts very often cause severe explosions.

Ship breaking is a hazardous occupation and entails life risk due to accident and fatal occupational diseases, as the employers do not provide any proper protective and precautionary gears. It is found that the beaches where ship breaking is undertaken are full of chemicals and toxic substances, small pieces of pointed and sharp iron splinters pasted on the surface of the beach causing injuries; the workers usually work bare footed and without masks. Occupational health and safety is not important to the employers, they hardly maintain a First-aid Box. Most of the workers are illiterate, very poor and are not conscious about their health, safety and the dangerous effects of the poisonous chemicals. Accidents are not reported or recorded. If any worker is affected by occupational diseases, he is no more employed by any of the employers. The employers through adoption of various unfair practices usually conceal information when any worker dies due to occupational accidents. In most cases, families of the victims are not informed, as contractors do not use proper names and addresses of the workers and there is no monitoring or inspection by the Inspection Department and the Labor Department.

Following are some of the problems associated with Ship Breaking Activities that have roused national and international attention (especially IMO, Greenpeace, ILO, UNIDO etc.)

- **Pollution:** Ships contain a lot of toxic substances and other hazardous materials. The vessels are broken on Asian beaches and along rivers. The toxic substances are released into the environment. The soil, the sea and the rivers are heavily polluted.
- **Deadly Industry:** Workers dismantle the ships with their bare hands. Many are injured or killed by suffocation or explosions. Many are expected to contract cancer due to asbestos dust. The ship breaking industry is one of the most deadly in the world.

- **Ballast Water:** Ships for scrap arrive most of the time 'in ballast'. The ballast water is intentionally brought on board in order to adjust the ships' stability. The ballast water from ships-for-scrap pollutes the coastal area with oil, biocides and heavy metals. Discharge of ballast water threatens the ecological balance by introducing marine organisms from other areas of the world.
- **Contamination:** Ship breaking activities pollute the soil, sea and rivers. Local fishing and agriculture as a livelihood are almost impossible. Samples taken from Asian yards show contamination with high levels of mineral oil and toxic substances. According to western standards enough to warrant clean-up actions.
- **Permanent Danger:** Hundreds of people at the ship breaking yards endure hard physical labor. They work in permanent danger. Steel plates and pieces fall off the ships. On board gasses cause fires and explosions. Many workers are injured or even killed by the physical hazards. Main causes of death are fire/explosion, hit by materials falling, falls, suffocation and inhaling Carbon Dioxide (CO₂).
- **Toxic Fumes:** The ship breaking workers are permanently exposed to toxic substances. They breathe toxic fumes and asbestos dust. Not only on the job, but also in the sleeping quarters nearby. One out of four workers is expected to contract cancer due to workplace poisons. This makes the industry amongst the most deadly in the world.

6.7 Guidelines & Prevention

- In November 2002 the ILO decided to revise, review and adopt 'Guidelines on safety and health in ship breaking'. The guidelines are a must for every existing and potential ship breaker to adhere to since due to global awareness many international organizations like IMO tend to discourage selling of ships for scrapping to countries where Health Safety and Environment (HSE) guidelines are not followed.
- The International Maritime Organizations (IMO) is the United Nations body that regulates the shipping industry. Established to improve the safety at sea and prevent marine pollution. In March 2002 it started to debate its role in ship breaking.
- The Basel Convention, under the United Nations Environmental Program (UNEP) regulates the international trade in hazardous waste. It recently accepted guidelines on environmentally sound management of full and partial dismantling of ships.

There are various other guidelines that ship breakers are expected to adhere to prevent any hazard and also not to rouse attention of Human Right Organizations that might cause severe legal and financial implications to the business.

6.8 Machinery & Equipment

The production equipment required for the yard is concentrated in two particular areas; steel cutting and materials handling. These two activities dominate the ship dismantling operation as defined.

For steel cutting, high energy plasma processes are used for all large scale plate cutting activities wherever possible with secondary cutting undertaken by either conventional oxy/fuel torches or via more specialized processes such as oxygen arc or powder cutting. A high degree of process mechanization is considered to be essential. Such mechanization would need to be specially developed to suit ship dismantling activities.

For reducing the steel down to acceptably small pieces for reprocessing, a large proportion of cutting is performed by large, heavy duty, mechanical shear mounted on the booms of tracked excavators. Such shear/excavator combinations are extensively used during the dismantling of large, land based, steel structures such as power stations.

Most of the movements of large panel type structures from the areas adjacent to the dock to subsequent breakdown external areas and in the workshops will be done with self elevating transporters similar to the type common in modern shipyards. A number of these vehicles of varying capacities will be required to meet the large number of load movements required. It is anticipated that these will operate independently of the main facility craneage by deploying stools from which to place and recover loads.

7 LAND & BUILDING REQUIREMENT

7.1 Model Ship Breaking Yard

Gaddani is considered to be the dedicated site for ship breaking in Pakistan. Plots are available at Gaddani in prescribed sizes. A ship breaking plot includes 280 feet sea shore area (Sea Shore (Beaching Facility)) with 4 acre land. These plots are either the property of local land lords or BDA. The interested party generally surveys the site (plot and sea depth at that point). The party then contacts the respective authority or the person and makes a deal. The interested party is required to pay a one time lump sum amount depending on various factors i.e. site geographic location, sea depth etc. However, the amount may vary - starting from 1 million to any upper limit depending on how many plots are required. Generally for one plot it is from 1 million to 2 million rupees. Whereas, an additional amount ranging from Rs. 100,000/- to Rs. 160,000/- is also charged in account of annual rent per plot.

For the purpose of this pre-feasibility report, one plot has been proposed at Gaddani. The total area of the plot would be of four acre with around 280 feet wet birth. A typical dismantling yard comprises the following key functionality:

- Sea Shore (Beaching Facility), used to moor vessels alongside upon arrival at the yard prior to the start of the dismantling activities allowing general preparations to be undertaken;
 - Clearing of all residual materials at a cleaning/ waste reception station (incl. clearance of e.g. any cargo in tanks or holds, bunker and fuel tank, contents, all bilge and oily water, sewage tank contents, ballast water and sediments, etc.)
 - Vessel is made gas free and certified
 - Ensure that ship is presented for dismantling in a clean and safe condition
- The primary dismantling facility, or facilities, which take the ship out of the water, isolate it from the marine environment and allows the initial vessel breakdown into large blocks or sections.
- Large capacity cranes allowing these large sections to be removed from the primary dismantling facility
- Workstations for secondary dismantling activities and sequential breakdown into component elements. Special enclosed workstations would be required to provide containment during the removal of hazardous and toxic materials.
- External storage areas which hold benign steelwork and materials between different stages of dismantling.
- Secure, and open, storage that holds fully processed equipment and materials ready for output from the facility for recycling re-use or disposal.

7.2 Area Requirement

The type of primary facility (ship lift or dock) to be provided will be dependent upon a number of factors:

- The size range of ships to be accommodated
- The product mix of ships to be processed
- The prevailing site topography and ground conditions
- The annual throughput of ships to be deconstructed

Eventual layout adopted for any individual yard will also be largely dictated by these same factors. The size assumed for this pre-feasibility would be in the range of 1000-5000 LDT; and one aforementioned plot would be sufficient to handle such a ship. This assumption is based on our discussions with the existing ship breakers, however, if a ship breaker is willing to enhance the capacity of ship handling, he can add the another plot.

It is also suggested to undertake all necessary measures for pollution traps to ensure that any solid or liquid contaminants which may be spilt cannot find their way into local waterways or permeate into the water table.

7.3 Description of Model Facility

The facility described in outline here is configured for the routine dismantling of small and medium sized, steel intensive vessels which collectively display a high degree of conformity in their structural design configuration.

It is considered that the facility needs a minimum site area of 20 hectares offering an absolute minimum of 280 feet of water frontage adjacent to deep water access. A 400 meter long and 15 meter wide finger jetty is provided to accept incoming vessels and where initial dismantling activities commence with the removal of as much outfit items and materials as possible prior to entering the dry dock. The jetty operates a 40 tonne capacity traveling jib crane to furnish the large number of smaller lifts envisaged at this stage of the dismantling operation. On the jetty initial Cleaning/ Waste reception facilities for relevant cleaning operations (gas free, etc.) and waste categories (domestic waste, consumables, operational waste, cargo remains, etc) are suggested to install.

The dock head area is used mainly for complex shaped steel work such as bow and stern sections as well as accommodation quarters. These areas are also provided with bunds to contain spills and prevent contamination of the adjacent ground.

A further large external hard-standing area is provided where the relatively large panels, output from the areas adjacent to the dock, are reduced down to the sizes which command the maximum scrap or re-use values. Materials handling activities in this area are predominantly undertaken with a mobile crane and lifters (as the size of ship assumed is small).

Since the electricity is not available at Gaddani, the breaking activity on ship would specifically be performed in day light, where, steel plate cutting on open external area could be undertaken in late hours. However, ship breaking activity at Gaddani is noted to be of 8 to 12 hours job. A covered area is also proposed to be used as workshop on site in which the small dismantling of steelwork, piping and equipment which is environmentally hostile or is valuable or easily damaged is undertaken.

Generally, at Gaddani the produced scrap is stacked in the open area and later on transported to the re-rolling mills. Scrap loading activity is undertaken using fork lift trucks.

8 FINANCIAL ANALYSIS AND ASSUMPTIONS

Ship Breaking in Pakistan is no longer remained an attractive business for most of the existing players. This is due to the following reasons:

- Phenomenal increase in scrap ship prices (increased from \$150 to \$450 per LDT although light ships are available in lower prices).
- Un-competitive government levies on the industry compared with those in the neighboring countries.
- Low duty structure on Steel Billets.

Keeping in mind the above three factors, it would be difficult for a new entrepreneur to survive in the market, however, as the scrap ship prices become normal in the international markets, ship breaking business could become an attractive opportunity for the businessmen. With this underlying scenario, the following assumptions have been made to develop the financial model for the proposed pre-feasibility.

- Due to the high market prices of the scrap ships and the above mentioned reasons, a light ship has been assumed to be scrapped on quarterly basis (four ships to be scrapped in a year).
- After the discussions with the existing ship breakers, it was observed that it takes two to three months (depending on the number of deployed staff) to completely dismantle a ship of 3000-8000 LDT (light dead weight tonnage) and sell its scrap; therefore, a long term financing (for the period of 5 or more years) would be incompatible with the typical business cycle of ship breaking business.
- Due to the above reason, Ship breaking business is considered to be a short term financing business; therefore financial statements for one year has been prepared. In consistent with the earlier assumption of scraping one ship in a quarter and four ships in a year, financial statements presents the projected accounts on a quarterly basis.
- For each quarter one small ship of 3000 LDT has been assumed, which will be scrapped and sold off in three months and for the next quarter a new ship of the same size (on average) has been taken.

The detailed project cost estimates for the proposed “Ship breaking and Scrapping Business” have been formulated under the above assumption. The projections cover the cost of land, machinery and equipment including office equipment, fixtures etc. Assumptions regarding machinery have been provided. The specific assumptions relating to individual cost components are given as under:

8.1 Overall Ship Breaking Site & Office Renovation - Construction Cost

Gaddani Ship Breaking site is the prime location for the ship breaking business and ship beaching plots (Sea Shore, Beaching Facility) are identified (by the government) & available in the sizes of around four acre land providing 280 feet beaching facility. One such plot can handle a ship with the weight of 1000 LDT to 5000 LDT. A new entrepreneur may acquire a developed or undeveloped facility. However, for the purpose of this pre-feasibility we have taken the following assumptions:

Requirement for Proposed Project - Ship Dismantling and Finished Scrap Storage

LAND PROCUREMENT COST

Plots Available in Size	4	Acre
Ship Beaching Facility (Sea Shore)	280	Feet
Monthly Rent/plot	12,000	/month
One time cost of Plot Procurement assumed	1,500,000	

LAND & SITE DEVELOPMENT COST

	Size/Capacity (in Feet)	Cost/unit (in Rs.)	Total Cost
Dry dock & dockside areas -Land alignment cost	280	700.00	196,000
Workshop Construction cost	1,000	400	400,000
Open dismantling area - Land alignment	-	-	-
Underground gas pipe lining from gas tank to the dismantling area	20	15000	300,000
Other construction cost i.e. winches base construction etc.	4	50,000	200,000
Low cost residential arrangements for site staff	4-5 10X10 Rooms	25,000	100,000
Provision for Office Renovation			200,000
Total cost of Ship Breaking Facility and other civil works			2,896,000

8.2 Utilities Requirement

The ship breaking (cutting) operations will be undertaken using liquid oxygen and LPG gas; this would draw considerable amount of gas, while, cranes would require fuel for which diesel will be used. The cost of the utilities including diesel/fuel, telephone, and water is estimated to be around Rs. 1,025,000/- per quarter.

8.3 Human Resource Requirement

In Ship breaking business, employers employ two major categories of employees and workers. They are:

- regular employees and workers;
- casual or contractual workers supplied by the Labor Supply Contractors

The second category includes Semi skilled & unskilled workers like:

- Truck helpers
- Semi skilled gas cutters
- Semi skilled Fitters
- Lifters
- Loaders
- Wire pullers
- Cutter, loading & wire pulling helpers.

The second category of workers is mostly engaged through Labor Supply Contractors, and paid on a daily rate basis. Service records of all types of workers under the first category should be maintained by the employers, while records of the workers supplied by the Labor Supply Contractors are not maintained by the employers. Casual workers work under the contractors' supervision.

Ship breaking is a regular production process but not in conformity to normal manufacturing processes. The number of workers engaged in the ship breaking yards depends on the availability of work, size of the ship to be scrapped and market value.

The number of skilled workers and security guards remain static while the number of semi- skilled and unskilled workers varies as per need. It is estimated that in twenty ship breaking yards at Gadani approximately 2000 regular workers (skilled-clerical-commercial and security personnel) are working on monthly wage basis; about 25,000 workers of semi and unskilled categories, work in the above-mentioned ship breaking yards round the year, on a daily wage basis.

Workers even migrate from one yard to another when a yard owner changes the labor contractors or the labor contractors change the yards. This normally happens when the demand for workers increases. Yard owners even attract skilled hands from other yards by offering better wages and service conditions. Mainly gas cutters are considered to be the most valuable workers in ship breaking enterprises. The unskilled workers are generally divided into groups of 25.

The following table gives the details of the human resource requirement for the proposed setup:

STAFF SALARIES AND EXPANSES

Technical Staff					
Skilled Workers	No. of Persons	Employment Status	Monthly Salary	Total Monthly Salary	Total Annual Salary
1. Jamadar* (overall all supervision of Breaking Operations)	1	Permanent	10,000	10,000	120,000
2. Foremen/Supervisors	1	Permanent	6,000	6,000	72,000

Technical Staff					
Skilled Workers	No. of Persons	Employment Status	Monthly Salary	Total Monthly Salary	Total Annual Salary
2. Fitters (he is engaged to dismantle important parts, pipes, hardware, metal etc. of the vessel).	1	Permanent	5,000	5,000	60,000
4. Gas cutters/Welders (highly skilled)	2	Permanent	5,000	10,000	120,000
5. Crane operators	1	Permanent	6,000	6,000	72,000
6. Drivers	1		4,000	4,000	48,000
7. Rhythmic callers/singers. (He goes on singing to synchronize steps of the group of casual workers while carrying heavy steel plates and pipes etc. from one place to another; their role is highly important).	1	Permanent	3,000	3,000	36,000
Total salary - Technical staff	7			44,000	528,000
<u>Semi Skilled Worker</u>					
1. Truck helpers	2	Contractual	3,000	6,000	72,000
2. Semi skilled gas cutters	3	Contractual	3,000	9,000	108,000
3. Semi skilled Fitters	3	Contractual	3,000	9,000	108,000
4. Lifters	2	Contractual	3,000	6,000	72,000
5. Loaders	3	Contractual	3,000	9,000	108,000
6. Wire pullers	1	Contractual	3,000	3,000	36,000
7. Cutter, loading & wire pulling helpers.	2	Contractual	3,000	6,000	72,000
Total salary - Technical staff	16			48,000	288,000
<u>General & Administrative Staff</u>					
Admin. & Accounts Officer	1	Permanent	5,000	4,000	48,000
Secutiry Staff	1	Permanent	4,000	4,000	48,000
Total salary - Non technical staff	2			8,000	96,000
Overall Salary Expenses per annum	25			52,000	912,000

*local term used for the Incharge of overall ship breaking operations who carries also skilled workers

The Jamadar will also perform additional duty of staff security and environmental safety.

8.4 Ship Breaking Site / Office Furniture & Equipment

A lump sum provision of Rs. 80,000 for procurement of office/ship breaking site furniture is assumed. This would include table, desk, chairs, office stationery and equipment. The breakup of Factory Office Furniture & Fixtures is as follows:

Item	Number	Total Cost
Table & Chair for Owner	1	5,000
Tables & Chairs for Admin. Staff	2	4,000
Waiting Chairs	3	3,000
Curtains & Interior Decoration for office	-	4,000
Chairs for Workers/Labor	5	4000
Electrical Fittings & Lights	-	20,000
Fax machine	1	10,000
Personal Computer	1	30,000
Total		80,000

8.5 Depreciation Treatment

The treatment of depreciation is assumed to be on a diminishing balance method at the rate of 15% per annum on the following. The method is also expected to provide accurate tax treatment.

1. Plant & machinery
2. Construction and Renovation
3. Vehicles
4. Furniture and Fixtures etc.

8.6 Utilities and Other Expenses

Assumptions for the utilities and other expenses have been estimated after the discussion with the industry experts and stake holders. Per month approximate cost of utilities would be as follows:

Utilities - Monthly expenses	150,000
Electricity	-
Diesel/Fuel	22,500
Other Consumables	7,500
Gas (used for oxygen arc)	289,500
Water	750
Telephone	1,500
Other expenses of the permanent staff deployed at breaking site	20,000
Total	341,750
Transport and communication cost	15,000
Other Misc. Expenses	20,000

8.7 Working Capital Requirements

It is estimated that an additional amount of twenty four million (24 million) rupees will be required as cash in hand to meet the working capital requirements. These provisions have been estimated based on the following assumptions for the proposed business. The detailed working capital assumptions are tabulated below:

Working Capital	
Utilities - Three Months (Office & Ship breaking Yard)	1,025,250
1. Electricity - Not available at Gaddani	-
2. Gas (used for ship breaking)	868,500
3. Water/Month	2,250
4. Telephone/Month	4,500
5. Diesel/Fuel	67,500
6. Other Consumables	22,500
7. Other expenses of the permanent staff deployed at breaking site	60,000
Communication and Transportation Cost	45,000
One Year Advance Rent of Plot at Gaddani (@ Rs. 12,000 / month)	144,000
Salaries - Three Months (Permanent Staff)	156,000
Cash in hand at the beginning of the period	24,000,000
Raw Material Inventory - One light Ship of 3000 tonne (@ \$300/tonne)	54,000,000
Total Working Capital	79,370,250

8.8 Machinery & Equipment

Machinery and Equipment expenses after the discussions with the existing ship breakers have been assumed as follows:

Heavy Machinery	Capacity	No.(s) Required	Price/unit	Total Cost
Cranes	40 ton	1	2,000,000	2,000,000
Lifter (amended dumpers with fork)	950 ton	2	2,100,000	4,200,000
Winches (For Ship/Material Pulling from Sea)	-	4	700,000	2,800,000
Other Machinery & Installation Expenses	-	-	1,000,000	1,000,000
Total Machinery				10,000,000
Other Equipment				
Cutting Equipment (Gas Cutters)		-	100,000	100,000
Liquid Oxygen Tank (Fon Gas - capacity in cubic feet)	1500	1	500,000	500,000
LPG Tank (capacity in Liter)	1000	1	500,000	500,000

Heavy Machinery	Capacity	No.(s) Required	Price/unit	Total Cost
Wires (in k.g.)		-	200,000	200,000
Cuppi (Large)		-	50,000	50,000
Shackles		-	50,000	50,000
Other Equipment			100,000	100,000
Total Equipment				1,500,000
Total Machinery and Equipment				11,500,000

8.9 9.8 Vehicle for Support and Maintenance Services

A light loading vehicle would be required for providing services for the maintenance, communication of machinery spare parts, labor etc. For this purpose a transportation vehicle has been proposed and an amount of Rs. 400,000 is assumed to be required to purchase the vehicle.

8.10 Preliminary Expenses

A lump sum provision of Rs. 50,000 is assumed to cover all preliminary expenses like registration, documentation charges, etc. which has been amortized over the 4 quarters (one year) period.

8.11 Import Duty on Scrap Ships

Import Duty on Scrap Ship @ 24% of the import value of the scrap ship has been assumed. This was found after the discussions with the industry experts.

8.12 Ship Anchoring and Transportation Charges

It has been assumed that the ship would be purchased on FOB basis however, a provision of \$2000 per ship of 3000LDT has been assumed for this purpose.

8.13 Selling & Distribution Expenses

For the purpose of this pre-feasibility, it has been assumed that the ship breaking operations would render in association with re-rolling mills and will appoint 2 to 3 of them as booking agents. However, an amount equivalent to 1% of the cash sale for each quarter has been assumed.

8.14 Gas (Liquid Oxygen and LPT) Inventory

Gas (Liquid Oxygen and LPT) is the most important item used as fuel for welding and ship breaking operations and a huge quantity is required to continue the operations therefore an inventory sufficient for 3 months operations has been assumed.

8.15 Finished Goods Inventory

The project will perform in association with the re-rolling mills; therefore all produce will be supplied to the scrap processors (re-rolling mills and machinery buyers) on as and when available basis. Therefore, no finished goods inventory has been assumed.

8.16 Revenue Projections

The revenue streams of the operation have been determined through identifying those material output streams for which a resale value is anticipated. The quarterly volumes/values of material have been estimated based on the predicted scrapping workloads. Unit resale values have been assumed based on each such revenue stream. After the discussions with the existing business players, following revenue streams with current market costs have been identified:

S.No.	Component	%age of total	Sales Price in the local market/Tonne
1	Ship plate and profiles of 1/2" Thickness and above	40%	29,000
2	Ship plate and profiles of 3/8" Thickness and above	20%	29,000
3	Second quality re-rollable scrap of short lengths	15%	27,000
4	Small irregular pieces and re-meltable scrap	15%	22,000
5	Cast iron, pipes or cast steel	8%	16,000
6	non-ferrous metals	1%	29,000
7	Stores or machinery	2%	29,000
	Total	100%	
	Weighted average sales price of ship scrape assumed		26,675

The financial model has been developed for one year period (four quarters) therefore no increase in sales price has been carried out.

8.17 Accounts Receivables

Considering the industry norm, particular to the ship breaking and its allied industries (i.e. steel re-rolling mills etc), it has been assumed that 15% of the sales will be on cash basis. Whereas, remaining 85% sales will be on credit. A collection period of 30 days is assumed for the credit sales.

All of the above assumptions are based on our findings during the discussions with the industry experts and stakeholders. A provision for bad debts has been assumed for each quarter which is equivalent to 0.5% of the credit sales.

8.18 Financial Charges

Based on the periodical nature of the ship breaking business operations, it is assumed that short-term financing for one year will be obtained in order to finance the project

investment cost. This leasing facility would be required at a rate of 15% (including 1% insurance premium) per annum. The installments are assumed to be paid at the end of every quarter of the year.

8.19 Taxation

The business is assumed to be run as partnership; therefore, tax rates applicable on the income of partnership tax payer are used for income tax calculation of the business.

8.20 Cost of Capital

The cost of capital is explained in the following table:

Particulars	Rate
Required return on equity	20%
Cost of finance	15%
Weighted Average Cost of Capital	17.5%

The weighted average cost of capital is based on the debt/equity ratio of 50:50.

8.21 Owner's Withdrawal

It is assumed that the partners will draw funds from the business once the desired profitability is reached from the start of operations. The amount would depend on business sustainability and availability of funds for future growth.

9. ANNEXURES

9.1 Projected Income Statement

9.2 Projected Balance Sheet

9.3 Projected Cash Flow Statement

9.4 Summary of Key Assumptions

9.5 Cost and Revenue Sheet

9.6 Typical Information demanded by the prospective ship breaker while going for a scrap ship buying deal

Sources of Information (documents, references)

Business information sources on Internet for prospective entrepreneurs:

<http://www.shipbreaking.net/>

<http://www.steelchange.com/>

SHIP BREAKING PROJECTED INCOME STATEMENT

Projected Income Statement (Rs.)	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4
Net (Adjusted Sales)	75,292,662	75,292,662	75,292,662	75,292,662
Cost of Sales	68,212,500	68,212,500	68,212,500	68,212,500
Raw Material - Scrap Ship	54,000,000	54,000,000	54,000,000	54,000,000
Gas - For cutting purposes	868,500	868,500	868,500	868,500
Import Duty and Taxes	12,960,000	12,960,000	12,960,000	12,960,000
Ship Anchorage & Transportation Expenses	120,000	120,000	120,000	120,000
Labor (Production Staff)	204,000	204,000	204,000	204,000
Other Misc. expenses	60,000	60,000	60,000	60,000
Gross Profit	7,080,162	7,080,162	7,080,162	7,080,162
Gross Profit Margin	9%	9%	9%	9%
General Administrative & Selling Expenses				
Salaries	24,000	24,000	24,000	24,000
Rent Expense of Ship breaking site	36,000	36,000	36,000	36,000
Amortization of Preliminary Expenses	12,500	12,500	12,500	12,500
Depreciation Expense	501,600	482,790	464,685	447,260
Maintenance Expense	-	-	-	-
Other Utilities Expenses (Water, Telephone etc.)	96,750	96,750	96,750	96,750
Transport and communication cost	45,000	45,000	45,000	45,000
Steel Scrap Distribution and Transportation Expenses	113,421	113,421	113,421	113,421
Subtotal	829,271	810,461	792,356	774,931
Operating Income	6,250,891	6,269,701	6,287,806	6,305,232
Financial Charges (15% Per Annum)	1,630,001	1,207,139	768,221	312,637
Earnings Before Taxes	4,620,890	5,062,562	5,519,585	5,992,595
Tax	1,489,812	1,644,397	1,804,355	1,969,908
Net Profit	3,131,079	3,418,166	3,715,230	4,022,687
Monthly Profit After Tax	1,043,693	1,139,389	1,238,410	1,340,896

SHIP BREAKING PROJECTED BALANCE SHEET

Projected Balance Sheet (Rs.)	Qtr. 0	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4
Assets					
<i>Current Assets</i>					
Cash & Bank Balance	24,357,750	16,966,399	9,420,463	1,714,569	47,843,122
Gas Inventoriy	868,500	868,500	868,500	868,500	868,500
Raw Material Inventory	54,000,000	54,000,000	54,000,000	54,000,000	0
Advance Rent for One Year	144,000	144,000	144,000	144,000	144,000
Accounts Receivable	-	0	0	0	0
Total Current Assets	79,370,250	71,978,899	64,432,963	56,727,069	48,855,622
<i>Fixed Assets</i>					
Machinery & Equipment	11,500,000	11,068,750	10,653,672	10,254,159	9,869,628
One time Cost of Land at Gaddani Shipbreaking Site	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Site Office Construction and Renovaiton	1,396,000	1,343,650	1,293,263	1,244,766	1,198,087
Furniture & Fixtures	80,000	77,000	74,113	71,333	68,658
Vehicle	400,000	385,000	370,563	356,666	343,291
Total Fixed Assets	14,876,000	14,374,400	13,891,610	13,426,925	12,979,665
<i>Intangible Assets</i>					
Preliminary Expenses	50,000	37,500	25,000	12,500	0
Total Assets	94,296,250	86,390,799	78,349,573	70,166,494	61,835,287
Owner's Equity	47,148,125	50,379,204	53,897,369	57,712,600	61,835,287
Long Term Liability	47,148,125	36,011,595	24,452,204	12,453,894	0
Total Equity & Liabilities	94,296,250	86,390,799	78,349,573	70,166,494	61,835,287

BREAKING PROJECTED STATEMENT OF CASH FLOWS

Projected Statement of Cash Flows (Rs.)	Qtr. 0	Qtr. 1	Qtr. 2	Qtr. 3	Qtr. 4
Cash Flow From Operating Activities					
Net Profit	0	3,131,079	3,418,166	3,715,230	4,022,687
Add: Depreciation Expense	0	501,600	482,790	464,685	447,260
Amortization Expense	0	12,500	12,500	12,500	12,500
(Increase) / decrease in Receivables	-	0	0	0	0
(Increase) / decrease in RM - Scrap Ship	-	0	0	0	54,000,000
(Increase) / decrease in Gas Inventory	-	0	0	0	0
Net Cash Flow From Operations	0	3,645,179	3,913,456	4,192,416	58,482,447
Cash Flow From Financing Activities					
Receipt of Long Term Debt	47,148,125				
Repayment of Long Term Debt		11,136,530-	11,559,392-	11,998,310-	12,453,894-
Owner's Equity	47,148,125	100,000	100,000	100,000	100,000
Net Cash Flow From Financing Activities	94,296,250	11,036,530-	11,459,392-	11,898,310-	12,353,894-
Cash Flow From Investing Activities					
Capital Expenditure	14,876,000				
Machinery & Equipment	11,500,000-				
Vehicle for support services	400,000-				
Plot at Gaddani Site - One time cost	1,500,000-				
Factory/Office Furniture	80,000-				
Ship Breaking Facility and Office Construction & Renovation Cost	1,396,000-				
Advance Rent of Ship Breaking Facility - One Year	144,000-				
Gas Inventory for Ship Breaking	868,500-				
Raw Material Inventory (One ship of 3000 tonne)	54,000,000-				
Preliminary Expenses - Documentation and Registration	50,000-				
Net Cash Flow From Investing Activities	69,938,500-	0	0	0	0
NET CASH FLOW	24,357,750	7,391,351-	7,545,936-	7,705,894-	46,128,552
Cash at the Beginning of the Period	0	24,357,750	16,966,399	9,420,463	1,714,569
Cash at the End of the Period	24,357,750	16,966,399	9,420,463	1,714,569	47,843,122

SHIP BREAKING REVENUE ESTIMATION

Type and category of Ship assumed to be purchased:	Small Size Cargo Vessel	
No. of ships assumed to be purchased for Breaking & Scrapping:	4/year	
Average Weight assumed for one Light Ship	3,000	LDT
Saleable Scrape after dismantling of ship assumed - in %age	93%	
Total Wastage	7%	
Saleable Scrape after dismantling of 4 ships - in tons	11,339	**tonnes
Distribution of saleable components*		
S.No.	Component	Sales Price in the local market
	%age of total	
1	Ship plate and profiles of 1/2" Thickness and above	40% 29,000 /tonne
2	Ship plate and profiles of 3/8" Thickness and above	20% 29,000 /tonne
3	Second quality re-rollable scrap of short lengths	15% 27,000 /tonne
4	Small irregular pieces and re-meltable scrap	15% 22,000 /tonne
5	Cast iron, pipes or cast steel	8% 16,000 /tonne
6	non-ferous metals	1% 29,000 /tonne
7	Stores or machinery	2% 29,000 /tonne
	Total	100%
Weighted average sales price of ship scrap assumed		26,675 /tonne
Total Annual sales REVENUE		302,456,088
Revenue Estimation on Quarter Basis		4
	Qtr. 1	75,614,022
	Qtr. 2	75,614,022
	Qtr. 3	75,614,022
	Qtr. 4	75,614,022

Cost Estimation

Raw Material Cost		1 USD=60	Pk. Rs.
Breakable Ship Value in the international market	\$	300	18,000 Rs. /tonne
Weight assumed for Light Ship (in tonnes):			12,000 Tonne
Value of the ship based on international market (excluding transportation expenses)			216,000,000 Rs.
Total Anchorage & Transportation Expenses (4 ships)	\$	8,000	480,000
Total Raw Material Cost			216,000,000
Raw Material Cost on Quarter Basis			
Qtr. 1			54,000,000
Qtr. 2			54,000,000
Qtr. 3			54,000,000
Qtr. 4			54,000,000
Ship Cutting & Breaking Cost (Gas Consumption)			
	Gas Consumption/ tonne of cutting & breaking	Cost per liter/ cubic feet	Total Cost of Gas Consumed
Liquid Oxygen (in cubic feet)	6.5	33	2,574,000
LPG (in liter)	3	25	900,000
Total Cost of Gas Consumed in producing 12000 tonnes			3,474,000
Gas Consumption Cost on Quarter Basis			
Qtr. 1			868,500
Qtr. 2			868,500
Qtr. 3			868,500
Qtr. 4			868,500
Total Annual COST of Raw Material & Gas used for 4 ships breaking			219,474,000

*1000 LDT=Light Displacement Tonnage=1016 metric tonne

**MT=1.016= 1

SHIP BREAKING SUMMARY OF KEY ASSUMPTIONS CAPITAL EXPENDITURE

<i>PARTICULARS</i>	<i>TOTAL COST/DETAILS</i>
Fixed Capital	
Machinery & Equipment	11,500,000
Cranes	2,000,000
Lifter (amended dumpers with fork)	4,200,000
Winches (For Ship/Material Pulling from Sea)	2,800,000
Other Machinery & Installation Expenses	1,000,000
Cutting Equipment (Gas Cutters)	100,000
Liquid Oxygen Tank (Fon Gas - capacity in cubic feet)	500,000
LPG Tank (capacity in Liter)	500,000
Wires (in k.g.)	200,000
Cuppi (Large)	50,000
Shackles	50,000
Other Equipment	100,000
Vehicle for support and maintenance services - One light vehicle	400,000
Land Cost (280 Feet Sea Shore (Beaching Facility) with 4 acre plot at Gaddani)	1,500,000
LAND & SITE DEVELOPMENT COST	1,196,000
Provision for Office Renovation	200,000
Office Furniture and equipment	80,000
Preliminary Expenses - Documentation and Registration	50,000
Total Fixed Capital	14,926,000
Working Capital	
Utilities - Three Months (Office & Shipbreaking Yard)	1,025,250
1. Electricity - Not available at Gaddani	-
2. Gas (used for ship breaking)	868,500
3. Water/Month	2,250
4. Telephone/Month	4,500
5. Diesel/Fuel	67,500
6. Other Consumables	22,500
7. Other expenses of the permanent staff deployed at breaking site	60,000
Communication and Transportation Cost	45,000
One Year Advance Rent of Plot at Gaddani (@ Rs. 12,000/month)	144,000
Salaries - Three Months (Permanent Staff)	156,000
Cash in hand at the beginning of the period	24,000,000
Raw Material Inventory - One light Ship of 3000 tonne (@ \$300/tonne)	54,000,000
Total Working Capital	79,370,250
TOTAL PROJECT COST	94,296,250
Loan Finance	47,148,125
Equity Financing	47,148,125
Debt:Equity Ratio (50:50)	50%

PROJECT RETURNS AND OTHER FINANCIAL ASSUMPTIONS	
IRR	-
NPV	-
ROI	30%
Payback Period	
Debt Equity Ratio	50:50'
Required return on equity	
Cost of finance	
Weighted Average Cost of capital	

Utilities - monthly expenses	
Electricity	-
Diesel/Fuel	22,500
Other Consumables	7,500
Gas (used for oxygen arc)	289,500
Water	750
Telephone	1,500
Other expenses of the permanent staff deployed at breaking site	20,000
Total Utilities and other expenses - monthly expenses	341,750
Transport and communication cost	15,000
Other Misc. Expenses/month	20,000
Annual increase in Other Misc. Expenses/month	
Anchorage & Transportation Expenses	\$ 2,000
Annual Increase in anchorage & transportation expenses	
Import Duty and Taxes	24%
Operational Days / Month	30
Operational Days / Year	360
Sales on Credit - as %age of total	85%
Sales on Cash - as %age of total	15%
Accounts Receivable period (days) - only for 15% credit sales	1
Provision for bad debts (on credit sales)	0.5%
Inventory days / months(Gas 3 Month)	3
Finished Goods Inventory (Days)	No
Time taken to dismantle a 3000 tonne ship	90
Maintenance expenses	
Steel scrap distribution and transportation expenses	1%

Annexure 9.6**Typical Information generally demanded by the prospective ship breaker while going for a scrap ship buying deal**

Kindly inform us the full detail information as follow:-

1. Vessel Name and Type
2. Light Displacement (LDT) In Metric Ton or Long Ton
3. Place & Year Built
4. Length Overall X Breadth X Depth
5. Draft of The Vessel (FWD/AFT)
6. GRT/NRT
7. Number/Type/Capacity/Description Of:
 - Main Engine
 - Auxiliary Engine
 - Generators and Power of Generators In KW
 - Auxiliary Generators and Power of Generators In KW
8. Material / Weight Spare Propeller / Tailshaft, if any?
9. Description of Propeller (Type/Material) Etc.,
10. Material & Weight of Permanent Ballast (If Any)
11. Material & Weight Of Insulation (If Any)
12. Delivery Mode (OWN POWER or UNDERTOW)
13. Delivery Dates & Price Idea
14. Last Cargoes Carried by the Vessel
15. Removals (If Any)
16. Operating condition of Major Machinery
17. Single Skin or Double Skin
18. Double Bottom Tanks / Wing Tanks
19. Reefer Space, if any
20. Owner of The Vessel
21. Inspection is available or not ?
- 22- Store and Spare Parts Positions.
23. Photographs, if any.