

Comprehensive Analysis of Existing Infrastructure Conditions Correlating Ship-Breaking Activities and its Implications on Workers and Community a Case Study of Gaddani Town and Ship-Breaking Industry, Baluchistan, Pakistan

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Abstract

Ship-breaking activities are facing numerous challenges while at the same time providing considerable opportunities and employment creation in a holistic manner. This research paper is an attempt to discover existing conditions whether satisfactory or beyond it and their implications on the community living in the vicinities of Ship-Breaking industry including the workers that work and live in the yards. The study is paced to collect sufficient evidences to support the assumptions, therefore, Firsthand knowledge and ancillary data sources are taken in account. Analysis has unveiled that the populace living in the study area is bereaved even from the basic necessities of life, vulnerable to health risks and diseases, and facing physical hazards due to working in risky environment. Furthermore, it is also discovered that the populace in Gaddani is uncommonly migrant front different parts of Pakistan namely Khyber-Pakhtunkhwa (KPK), Interior Baluchistan region, Sindh, and Interior Punjab where employment opportunities are very limited specifically for lower and lower-middle class. Considering the positive role of Ship-breaking in national economy, basic facilities should be improved and provided to minimize the negative implications to promote one of the biggest South-Asian Ship-Breaking Industry.

Keywords: Ship-Breaking; Infrastructure; Implications; Community; Gaddani; Baluchistan; Pakistan .

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1. Introduction

In the wake of having cruised the world for 20 to 30 years, ships achieve the end of their operational life. They are strong and disassembled to recuperate the steel that makes up more than 90% of their structure. Be that as it may, not all materials on the boat can be reused. Ships likewise contain a lot of dangerous materials, for example, asbestos, waste oils, overwhelming metals and PCBs which should be uprooted by security models and discarded or pulverized appropriately. [1]. As these materials consists hazardous properties, if not handled properly are exposed to the workers and communities posing serious health risks.

Ship breaking is a challenging process because of the auxiliary multifaceted nature of boats with numerous environmental safety and wellbeing issues included [2]. The Ship Dismantling practices are being drilled up the seaside region of Gaddani and have picked up significance in the large scale and miniaturized scale economy of Pakistan. Ship breaking activity exemplify both challenges and opportunities, increasing demand of raw material for re-rolling mills and other purposes reflects negative impacts on coastal as well as physical environment while generating a great amount of employment opportunities. To assess the various impacts Ship Breaking Industry and existing infrastructure conditions on environment and health of community and workers, this research is an attempt to identify possible implications and present suitable solutions.

1.1 *Brief of Beginning of Pakistan ship breaking industry*

The Pakistani ship breaking industry can look back on a long history. Before the independence of Pakistan in 1947, the process of ship breaking was practiced by certain local tradesmen, in addition to the main business. These informal activities were confined to small types of vessels, like tugs, barges and fishing boats, which were situated near the Port of Karachi. At the beginning of the 1950s a small group of companies undertook serious efforts to establish a regular ship breaking industry in Pakistan [3]. At that time the necessary infrastructure, like road network and technical equipment, did not exist. Today's ship breaking area was – typical for the Balochistan province – a relatively uninhabited nomadic backcountry [4]. During the late 1960s, the Gaddani Beach served as the location for ship breaking and step-by-step the area grew [5]. In 1971 the secession of East Pakistan and the establishment of Bangladesh, as a consequence of the Bangladesh wars, caused a lapse of steel and iron deliveries from the region around Chittagong. The collapse of the trade relations to India, after the wars in 1965 and 1971, was added to that. The Pakistani currency depreciated with the result that imports of iron and steel goods were more expensive. The ship breaking industry was the perfect niche to supply the national demand for the resources of steel and iron. Besides the recyclable steel scrap is cheaper than imported or domestically-produced steel [3]. In 1978 the Pakistani government recognized the importance of the ship breaking yards for the national economy, and adopted a set of measures in order to give the branch a push. This practical implementation included the classification of Gaddani Beach as a harbor, a reduction of import duties, the establishment of a management for infrastructure and logistic and the extension of the term of lease from one up to five years [5][6]. Not least the Pakistani ship breaking industry profited from the pre-existing geographical benefits, including the high tide way for the beaching method, being able to operate at any time of the year because of the all-season weather conditions and the direct location at the east-west trade routes at sea.

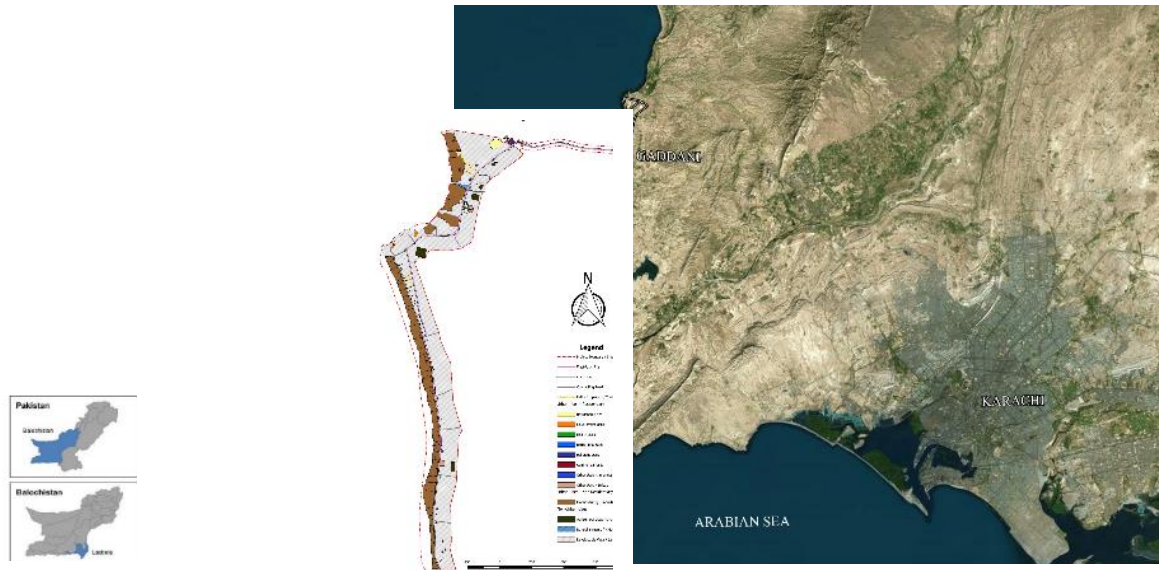


Figure 1: Location of Study Area

1.2 Study Limitations

The research paper aims to provide a detailed insights and is limited to Physical, social, and Economic frames in which ship breaking industry is localized. It focuses on the present practices of Ship breaking industry as well as the demonstration of the historical development and the detailed description of Gaddani Ship breaking industrial area, including a clearer picture of the Existing Infrastructure, Labor & community conditions and evaluating these according to health, safety, and living conditions.

2. Materials and Methods

In this research, Methodology is designed according to the nature of study area, and objectives. Primary and secondary sources both are taken into consideration; four techniques have been harvested to achieve the objective which are enlisted below.

- Interviews
- Observations
- Questionnaires
- Documentary Analysis

2.1 Selection of Study area

The ship breaking yards are mainly located along 12 KM long coastline of Gaddani. Most of the ship breaking yards are operated under private ownership and under the pledge of Balochistan Development Authority (BDA). At present about 40 plots are operational in Gaddani Shipbreaking yards which are operated by 38 operators [7]. The conditions in Gaddani show near preferences through a generally abnormal state of automation and a dry

workplace contrasted with Bangladesh, where shorelines are sloppy. [7]. Figure 1 shows the study area of Gaddani.

2.2 Objectives of the Study

The main objective of the research is to explore the livelihood conditions and health related risks of community and workers in Gaddani ship breaking industrial area. The specific objectives are as follows:

- To find out the Socio-economic condition of community and workers in the ship breaking industrial area.
- To assess the major health related risks and hazards with vulnerability of community and workers due to ship breaking activities in the study area.
- To find the relationship between health related risks and existing infrastructure conditions in ship breaking industrial area.
- To draw comprehensive suggestions and recommendations.

2.3 Data collection and Analysis Procedure

The present research is carried out based on the combination of primary and secondary sources of data. Primary data is collected using various tools namely; Field observations, Questionnaires, Focus group discussion, and expert opinion survey. The group members were chosen from workers, local residents, and ship breaking owners. To acquire more precision in data about 450 questionnaires were conducted from various stakeholders to find out the vulnerability and present conditions of workers and community. All of the questionnaire were conducted door to door, and face to face. Secondary data is taken and incorporated from different books, journals, daily news, papers, magazines, District profile, BDA, Local govt. offices, and district profile. The collected data from the field and secondary sources is analyzed in Statistical Package for Social Science (SPSS). Later this information is presented in tables, charts, graphs, diagrams, and figures.

3. Socio-economic conditions

To assess the socio economic condition of the community and workers, five parameters are considered; Gender, age, education, occupation, and monthly income. Table 1 displays the socio-economic parameters.

It is observed from the table that male respondents are in high ratio. It also indicates that around 40.8% are illiterate followed by Primary (27.5%), SSC (21.8%), HSC (9.4%), and the degree holders constituted about (0.5%) in the study area. In this context, 46.2% are labors, while 56.9% are students and other comprises as Shop keeper (12%), house wife (11.6%). On the other hand, the table also reveals that around 54% earn Rs.4000-5000, and 27.6% people earn Rs.6000-8000 monthly.

3.1 Housing Pattern

It is observed from the survey that most of the houses (47%) of Ship breaking workers and community are tin-

fence (Dismantled materials from ship used to construct houses) and followed by 27% houses are semi-pacca (made from brick & tin shade), while 16% of the houses are Kacha kacha (made from mud, and bamboo). It is also found that about 10% of the houses are made from concrete and with permanent roof. Figure 2 displays the current statistics, However, it is also concluded that workers and community behind the yards is living in poor housing structures and unhealthy environment. Figure 3 shows the housing conditions.

Table 1: Socio-economic characteristics

Gender			Age			Education			Occupation			Monthly (PKR)		Income	
Sex	F	%	Interv al	F	%	Level	F	%	Categor y	F	%	Rang e	F	%	
Male	398	88.4	21-30	56	12.4	Illiterate	184	40.8	Shop keeper	54	12	4000- 5000	243	54	
Female	52	11.6	31-40	139	30.8	Primary	124	27.5	Student	121	26.9	6000- 8000	124	27.6	
			41-50	182	40.4	SSC	98	21.8	Labor	208	46.2	9000- 12000	56	12.4	
			51-60	41	9.2	HSC	42	9.4	House wife	52	11.6	13000 -	21	4.7	
			60+	32	7.2	Degree	2	0.5	unemplo yed	15	3.3	15000 +	6	1.3	
Total	450	100		450	100		450	100					450	100	

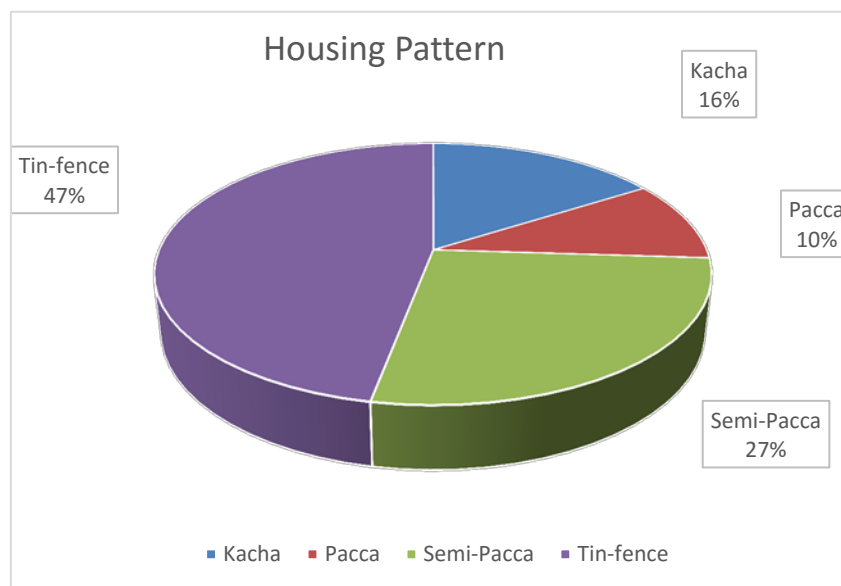


Figure 2: Housing Pattern



Figure 3: Shanties behind the yards

3.2 Sanitation System

It is observed from the field investigations that sewerage system in the study area doesn't exist. However, toilets are present but are used with septic tanks. The survey reveals that about 37% of latrines structure is tin-fence, semi-pacca latrines comprises 27%, and pacca latrines are about 4%. Consequently, the remaining percentage which is 32% doesn't have access to latrines and uses open spaces. Figure 4 shows the relative statistics.

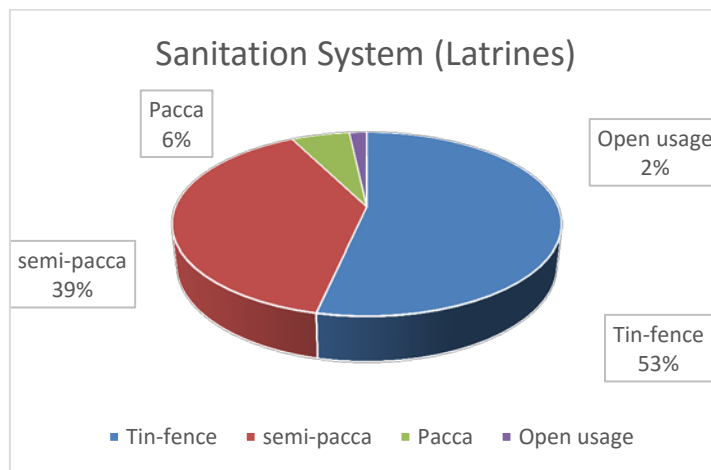


Figure 4: Sanitation System

3.3 Satisfaction Level

In accordance with the satisfaction level, three parameters are taken into consideration to explore the satisfactory level; Existing Basic Infrastructure Condition (Municipal services), Education, and Medical Facilities. Table 2 displays the satisfaction level in percentages. Furthermore, Figure 05 shows availability and unavailability %age.

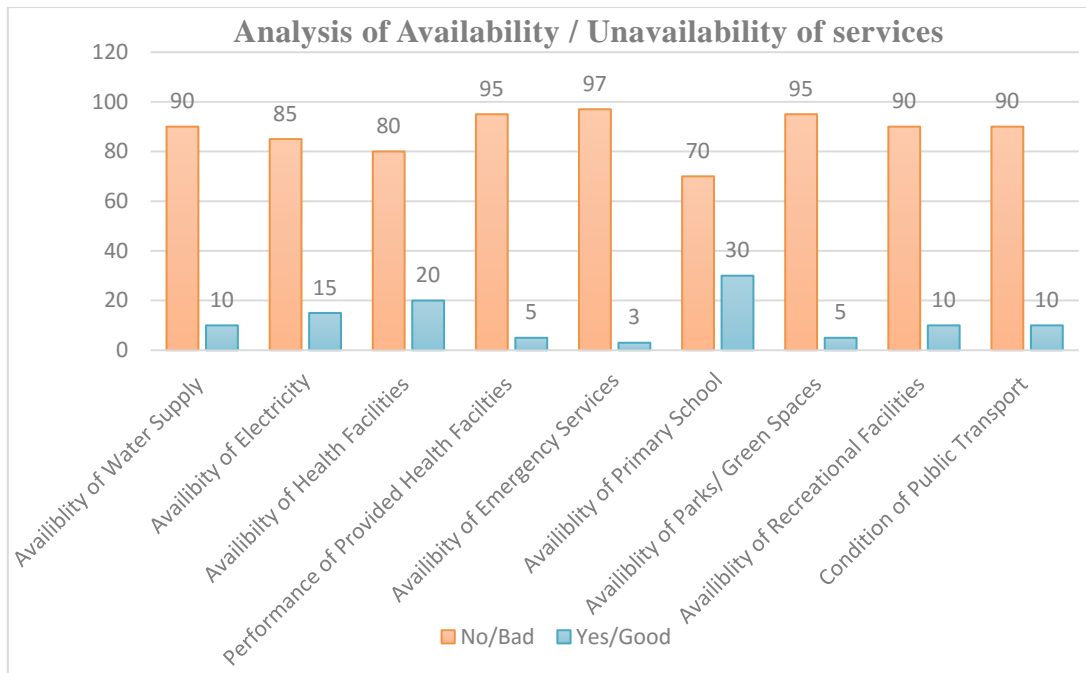


Figure 5: Availability / Unavailability of Services

Table 2: Satisfaction Level of Community & workers

Items	Satisfactory (%)	Un-Satisfactory (%)	Acceptable (%)	Poor / Unacceptable(%)
Basic Infrastructure	13	32	8	47
Education	39	20	21	20
Medical	6	42	30	22

It can be concluded from Table 2, the satisfactory level of people living in Gaddani ship breaking industry area is quite low (13%) in the context of basic infrastructure which is utmost mandatory to improve the living conditions. The lowest figure is for Medical facilities (6%), since there are various health related risks in Gaddani ship breaking industrial area; the lack of medical facilities would only worsen the situation. Education level seems to be a bit satisfactory which is (39%), the sole reasons for this considerable percentage is the number of schools present in the area. In terms of Figure 5, which depicts the availability and unavailability of services; most of the answers received are in favor of “Un-availability” above 80%. Consequently, this statistical data presents the overall living conditions in Gaddani ship breaking industrial area which doesn’t seem to be very promising.

4. Relationship between Ship Breaking activities and Hazards and its impacts on Community and Workers

4.1 Health risks

It is unveiled from the study that majority of the people living in Gaddani ship breaking and industrial area are exposed to several health related risk and are vulnerable due to unhealthy, noxious, and risky environment round the clock. Possible risks are identified and presented in Table 3. Multiple answers are considered in the table while combining common answers from community side and from labors side.



Figure 6: Existing Condition of Infrastructure at Gaddani Ship Breaking Industrial Area



Figure 7: Existing Condition of roads at Gaddani Ship Breaking Industrial Area

Table 3: Major Health risk affecting the wellbeing of Community and workers

S #	Health Issues / risks	Frequency (F)	Percentage (%)
1	Organ Injury and permanent Loss	320	23.19
2	On site death	104	7.54
3	Eye sight damage and headache	122	8.84
4	Breathing problems, Cold and Cough	240	17.39
5	Skin itching and Rashes / other skin diseases	220	15.94
6	Muscle and Chest Pain	148	10.72
7	Diarrhea and dehydration	66	4.78
8	Gastro Intestinal problems	160	11.59
	Total	1380	100

The above Table 3 reflects that physical damage including breaking of bones and permanently losing one’s body organ scores highest on the table (23.19%), followed by Breathing problems (17.39%), Skin diseases (15.94%), Muscle and chest pain (10.72%), Gastro Intestinal problems (11.59%), Eyes sight damage (8.84%), and Diarrhea and Dehydration (4.78%).

It is evident from the above analysis that various health issues prevail in the Gaddani ship breaking industrial area. Most of the health issues like Diarrhea and Dehydration, Gastro Intestinal problems are caused due to consumption of low quality drinking water and poor sanitation system. Furthermore, it is also revealed that a number of cases regarding skin diseases and breathing problems are registered in near health care center which are caused by the hazardous particles present in the air due to ill extraction and dismantling procedure of ships. Other major problems of high severity also occur in the study area some of them are Loss of life, Permanent loss of body organs, and Eye sight damage and headache. Operational yards produce higher amount of noise that it causes brain damage and torch activities affects the eye sight.

In the light of above discussion, it can be concluded that existing infrastructure is not in a good shape to counter severe health issues. Whether it be road network, health facilities, emergency services, water supply, sewerage & sanitation system, and electricity; All of the services and facilities are either not available or available but not in the form to counter severe risks affecting the wellbeing of community and workers living in Gaddani ship breaking industrial area. (Figure 5 represents the analysis of services and facilities).

4.2 Usable Materials and their effects on health

A ship which has completed its life cycle is none other than a giant of pollution and risks. Around 68 operational plots produces a large amount of recyclable material each year. The major item that is acquired from dismantling procedure is Steel which is sent to re-rolling mills. Not only the hazardous waste or other chemical pollutants are dangerous to human health but more often neglected are the usable materials which are used either by workers or by the community people living behind the yards. These usable materials often pose greater health risks than any other material present in the ship; However, not all usable materials are dangerous but the

ill practices of dismantling makes them so. These kind of materials causes more often skin diseases because of their direct interaction with the user on daily basis.

To conclude it is necessary to present a list of usable materials acquired from ship and used by community and workers. Table 4 provides the names of usable materials extracted from scrapped ships, and Figure 8 shows on site Images of placed usable materials.

Table 4: Usable Materials and Equipment's

S # Name of usable Materials	
01	Iron and Steel
02	Electrical Equipment's
03	Furniture
04	Cold Storage items
05	Boiler
06	Cables
07	Kitchen Materials
08	Refrigerators
09	Insulation Materials
10	Batteries
11	Metals (Used in Construction)
12	Pipes & Tanks
13	Wood (Used in Construction)
14	Ropes
15	Plastic
16	Toiletries



Figure 8: Usable materials

5. Recommendations

Considering the positive contribution of Ship dismantling and recycling in national economy, ship breaking couldn't in any way, shape or form be confined. It is proclaimed as an industry, in this manner, a supportable methodology ought to be taken to minimize the pessimistic outcomes and effects of ship breaking practices on the wellbeing of individuals and environment. The accompanying steps are proposed to make Gaddani ship breaking industrial area better and a protected spot.

- Balochistan Development Authority should take serious actions in providing basic infrastructure facilities such as health, Education, Transportation, water supply, Sanitation system, and electricity.

- Formulation of policies in the context of Occupational health & safety and ensure its implementation.
- A gas free certificate must be obtained before dismantling the ship.
- A precise and periodic assessment of the entire yard ought to be carried out for a certificate of compliance is issued by the Balochistan Environmental Protection office (BEPA) for controlling the contamination.
- Waste acquisition and disposal with safe administration for dangerous materials ought to be established.
- It should be ensured that usable materials are safe to reuse.
- International Conventions and Ship breaking laws should be followed to bring sustainability in ship dismantling procedures.
- The concept of Green yards should be initiated so that the dismantling of ship is ensured in environmentally sound manner and free of health risks.
- The "Green Yard" approach ought to give a guide to interests in the specialized framework of the ship breaking yards including: structures to ensure the full control of contamination's; impermeable floors and seepage framework; heavy lifting tools; power and water supply.
- There is an immediate need for training, awareness raising and capacity building for workers to ensure safe operations. The government should provide a training center.
- Both the Federal and Provincial Government need to promote unbiased research on the working conditions and the environmental impact of ship breaking. They need to allow for transparency and enhance civil society involvement. Moreover, they should embrace the active participation of trade unions and promote their independent and democratic structures.

6. Conclusions

Unlike other countries where ship breaking industry is capital-intensive, In Pakistan Gaddani Ship breaking industry is labor intensive. Thousands of labor forces form the base of Gaddani ship breaking industry and make an elementary contribution to the smooth operation of activity. For that reason, it was more important to enquire to which socio-economic structure, laborers as well as communities are exposed to at Gaddani.

The research paper made an attempt to present the difficulties and to generate detailed perception about the ship breaking industrial area and about the close environment and conditions of labors and communities located therein. This paper formulizes that there is an urgent need for action at Gaddani, to this day basic infrastructures are testifying to the former golden age of the facility. Road are not made for the situation of a permanent frequentation by a huge number of trucks, loaded with steel plates and the recyclable materials and also poses life threatening delays in emergency situations. In addition to that many stretches of the roads are unpaved and too narrow for traffic in both directions. Facility for waste management for numerous hazardous substances is not present and toxic materials are not stored separately but rather dumped in close vicinity, which is at the expense of Environment and Labors & Community health.

Consequently, unpaved roads, barely dwellings, missing electricity and potable water supplies as well as the complete lack of waste management facilities are contributing towards more and more health risks day by day.

Moreover, the demolition of vessels takes without any order and Preventive measures against oil contaminants and other hazardous substances; Namely, the victims are 12,000-15,000 Labors and 25,000 Population Community living under Dangerous conditions near the Ship breaking Industry area.

Although marginal upgrades are locatable at yards, for instance an increased service of automatic equipment, including cranes and wheel loaders, the location of Gaddani Ship breaking industrial area does not comply with international environmental and social standards. Still occupational accidents are ever present, mostly inadequate safety conditions account for life threatening injuries and fatalities, while dealing with hazardous substances and exposure causes a continuing health risk with possible secondary diseases. The actors, on the part of the federal and provincial government do not feel responsible for any kind of investments and improvements in the ship breaking industry and its vicinity.

The results of the research paper have accomplished the objective of presenting a detailed view of Socio-economic, and Physical infrastructure conditions of Gaddani ship breaking industry. In addition, the paper also present, on the basis of results and conclusions, several research gaps, which can serve as starting point for further research. It may offer further fields of work, such as; Environment, Analysis of power and influence of international regulations on Ship breaking activities, Labors, and working environment, Legislative Changes and Infrastructure planning reforms to improve the living conditions.

In conclusion, the paper is scientifically comprehensive for further research in inter-disciplinary fields i-e Sociology, Planning, Infrastructure, Environment, and Economics emphasizing the Ship Breaking Industry.

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