ASSESSING THE IMPACT OF INDUSTRIAL ACTIVITIES ON THE LOCAL FISHING COMMUNITY IN GWADAR

Submitted by:

Abdul Wadood

SUPERVISED BY

DR. MUHAMMAD NASIR

DEPARTMENT OF ENVIRONMENTAL ECONOMICS

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS

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Pakistan Institute of Development Economic

CERTIFICATE

This is to certify that this thesis entitled: **"Assessing the Impact of Industrial Activities on the Local Fishing Community in Gwadar".** submitted by Abdul Wadood is accepted in its present form by the Department of Environmental Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in **Master of Philosophy in Environmental Economics**.

Supervisor:

Dr. Muhammad Nasir
Senior Research Economist
PIDE, Islamabad.

External Examiner:

Dr. Faiz Ur Rehman, Assistant Professor
QAU, Islamabad.

Head,
Department of Environmental Economics

Dr. Rehana Saddiqui,
Head
Department of Environmental Economics
PIDE, Islamabad.

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Abstract

Developmental projects are backbone of the economy. World economies are in dire need to initiate development projects which should comprises of connectivity by roads, highway, railways and different special economic zones to create employment opportunities to increase living standard and improve socioeconomic condition of the people to reduce poverty. According to Bhattacharya (2012), regional infrastructure increase the standard of living and reduce poverty by connecting different places and people with major economic hubs and markets, narrowing gap of development among regions. Infrastructure development is the first step towards attainment of sustainable economic growth and development. Obviously economic corridors lead to economic growth and development but it has inverse relationship with environment. According to Laurance (2001), 95% of forest degradation and fire burn occur around 50 km near road side. Corridors also polluted environment through chemical and nutrient pollution. Infrastructure development may also effect environment positively. The positive impact of economic corridors on environment may include the use of uncultivated land due to passage of corridors through that area, providing access to different areas of land where human access was not possible to utilize that piece of land. This could generate job opportunities for those who are relying on activities that are harmful for environment such as hunting and deforestation for livelihood or use it as a source of energy. CPEC projects will also have positive and negative impacts on environment. Aggregate positive and negative impacts are discussed in the above paragraph. In the current context a very important positive impact could be the preserving of fish stock at Gwadar through shift the fishing labor to industrial sector. More than 90% of the population in Gwadar relies on fish hunting which has resulted in the depletion of fish stock and is a threat to the livelihood of the poor fishermen (Gwadar profile, 2016).

Contents

Chapter 1

INTODUCTION

1.1 BACKGROUND

Developmental projects are backbone of the economy. World economies are in dire need to initiate development projects which should comprise of connectivity by roads, highway, railways and different special economic zones to create employment opportunities to increase living standard and improve socioeconomic condition of the people to reduce poverty. The concept of economic corridor has been introduced at the GMS (Greater Mekong Sub region) Eighth Ministerial Meeting in 1998 (Ishida 2009). According to Bhattacharya (2012), regional infrastructure increase the standard of living and reduce poverty by connecting different places and people with major economic hubs and markets, narrowing gap of development among regions. Infrastructure development is the first step towards attainment of sustainable economic growth and development. The basic idea of corridors is to connect the regions and countries through roads to accelerate aggregate economic activity, (Ishida 2009). The aim of infrastructure development is to get access to different markets which will lead to the expansion of industrial sector. Supply of industrial goods will increase due to increase in demand of the people of different regions and countries, which in turn leads to export led growth. Due to change in the consumption pattern and export of industrial products more revenues and profit will be generated, new industries will be developed which will create new job opportunities and overall economic activity will move towards boom due to multiplier effect.

Connectivity via roads increases the efficiency and production of different sectors of economy like agriculture and industry. Agriculture sector is the leading supplier of

raw Material to the industry. Corridors also provide access to the new technology used in agriculture sector to enhance productivity. The accessibility of modern agriculture technology depends upon rural connectivity and farm to market roads which leads to enhancement of agriculture production (ESCAP 2000). Binswanger et al, (1987) found a positive and significant correlation between development of roads and aggregate agriculture production while collected data from 58 countries.

Special Economic Zones (SEZs) are other characteristics of development projects. Several reports showed that special economic zones (SEZs) have become a leading promoter for regional economic growth and development in developing countries like ASEAN countries and china (Ishida 2009). The SEZs are the specific geographical region with less economic regulations than a country's usual regulation laws. One of the main stimulating factors for the establishment of special economic zone is economic corridors when a country decides to increase regional connectivity through economic corridors; she also intends to setup SEZs along the route (ADB Report 2014). The idea of economic corridors is to accumulate industrial estates on the borders and coastal areas, and the construction of oil refineries, and natural gas pipelines to enhance economic activities and tourism as well as to achieve access to the regional and international markets. People of a country with better infrastructure have more access to the supply of energy, cable lines, pure water, and seaports (Kudo 2007).

Obviously economic corridors lead to economic growth and development but it has inverse relationship with environment. Increasing economic activities may also have adverse impact on environment. The adverse effects of economic growth and development have received much attention during recent years. All the studies showed that environmental degradation is accelerated during early phase of economic development and reduce in later period when an economy enters in boom. This relationship between development (as income) change and environmental quality is called the Environmental Kuznets Curve (EKC). The

massive development results in greater use of environmental resources and emission of pollutants which enhance pressure on environment. People are poor during the early phase of development and environment is not their concern however, during advance phase of development as income increases, people's concern about environment increases and regulating authorities become more conscious about environment. During the early stage of development, environment degradation rapidly increases because industries give priority to increased production, and people give preferences to employment and income than clean air and fresh water (Dasgupta et al., 2002). Infrastructure development is the main cause of pollution and degradation of environment through emissions, water pollution and noise pollution, massive access to the biodiversity habitat and hunting near roads. Connectivity through roads is the most common characteristics of anthropogenic activity and has adverse impacts on biodiversity sanctuaries and environment globally (Trombulak and Frissel 2000; Forman et al. 2002). According to Laurance (2001), 95% of forest degradation and fire burn occur around 50 km near road side. Corridors also polluted environment through chemical and nutrient pollution. Effects of chemical pollutants and nutrient overflow are very serious issues to the stream and wetlands near corridors which ultimately enter to marine ecosystem (Pratt and Lottermoser, 2007). The long routes of economic corridors divided the areas of biodiversity where they can easily move from habitats to pasture and other grazing areas. One of the common example is of tropical forests which bears the high proportion of species, including various insects, flies, ants, bees, butterflies, amphibians, reptiles, birds, bats and small and large mammals, that tend to avoid even narrow clearings or forest edges (Laurance et al 2002 ; Goosen 2001).

Infrastructure development may also effect environment positively. The positive impact of economic corridors on environment may include the use of uncultivated land due to passage of corridors through that area, providing access to different areas of land where human access

was not possible to utilize that piece of land. This could generate job opportunities for those who are relying on activities that are harmful for environment such as hunting and deforestation for livelihood or use it as a source of energy. People will find alternate sources of employment due to corridors passage through that area and it will provide access to work in the neighboring cities and towns. Corridors could also have positive impacts on marine ecology where continued and excessive fishing endangered the marine ecosystem.

The China-Pakistan Economic Corridor (CPEC) interlinks the Gwadar coast of Pakistan with the Xinjiang (Kashghar) province of western China through road of 2700 kilometer. Perhaps no policy initiative is receiving more attention in Pakistan than the CPEC since its announcement in July 2013. Pakistan has geo strategic and economic importance due to its geographical location. Gwadar coastline is the gateway of Central Asia and Middle East. China's vision is to broaden its export of industrial goods and imports of oil, gas and raw material through this shortest route of trade to fulfill its increasing energy demands. China is going to invest more than $50 billion in CPEC projects, which will be expected to reduce its transportation cost. The distance between shanghai sea port (China) and Kashghar (china) is about 5153 km and the distance from Kashghar to Gwadar seaport (Pakistan) is about 2,800 Km which is approximately half of the currently used route. The transportation cost will be decreased many times and shipment time will also be reduced at least by ten days when CPEC route will be used by China. The current route from China to Europe and Middle Eastern countries is insecure, costly and long (Aqeel 2016). Pakistan is a developing country and has appealing opportunities for foreign investors to invest in Pakistan in different sector like agriculture, hi-tech industries and manufacturing industries due to its cheap labor and underutilized natural resources. CIA World Fact Book, (2016) reveals that Pakistan has huge and unutilized reserves of natural resources like oil, coal, gas, and copper. China Pakistan Economic Corridor (CPEC) is expected to play vital role to connect both countries through

CPEC connectivity. Pakistan wants to counter social problems and energy short falls to attain economic development while china needs CPEC projects to spread its influence and trading ties to the western countries and covering energy supply route (Small, 2015).

Gwadar will become the channel and starting point for new investment. Pakistan will be huge hub for regional trade, transport and overall economic activity. Some 2282 Acres (923 Hectare) of land has been developed by the Gwadar Port Authority (GPA) under a land lease agreement. Different projects under phase 1 from 2015 to 2020 have been launched. Pakistan's government has planned the creation of 29 industrial parks and 21 mineral zones, 27 of them to be given the status of Special Economic Zones (SEZ) (Mario Esteban 2016). The most advanced of these projects will be the Gwadar SEZ, expected to be practical by the end of 2017, which will consists of industrial units for mines and minerals, food processing, agriculture, livestock and energy. These steps are expected to attract Chinese investment and technical know-how (Mario Esteban 2016). The basic aim of the project is to develop a commercial logistics center, exhibition hall and some industries with local resources, for example, fisheries and livestock. Under phase, 2, from 2020 to 2025, which is termed the period of growth and development, new manufacturing industries will be developed. Massive Industrial parks will also be established steadily. Phase, 3, from 2025 to 2030, will be the matured period. The Free Zone will be the main part of the CPEC development projects and will serve the local economic growth and development in Balochistan. Exhibition, sales and logistics processing will be a leading feature of these projects. Northern manufacturing area project will be included in development of industries of domestic appliances, textiles and garment processing machinery. This project is proposed to shape and enhance the skills of the working population at Gwadar. The skill required for running the textiles and manufacturing industry is tool making, technicians, supervisors, polymer technicians, engineers. Oil refinery

industry will provide job opportunities like engineers and journeyman jobs e.g. control panel operator, shift supervisor, pump system operator boilermaker, pipefitter, welders and cutters.

CPEC projects will also have positive and negative impacts on environment. Aggregate positive and negative impacts are discussed in the above paragraph. In the current context a very important positive impact could be the preserving of fish stock at Gwadar. More than 90% of the population in Gwadar relies on fish hunting which has resulted in the depletion of fish stock and is a threat to the livelihood of the poor fishermen (Gwadar profile, 2016). This is due to lack of other employment opportunities. The provision of new jobs to fishermen at Gwadar is very essential, not only for securing their livelihood but also for environmental perspective to attain marine ecology balance. Gwadar is an under developed city of Pakistan compare with Karachi having port. Total projected population of Gwadar is 263,514 and total working population of Gwadar 15 to 60 years is 55% of the total population (census, 2017). Almost the entire population of Gwadar is involved in fishing because no other sector like industry and agriculture is well developed. Men are involved in fishing and women are involved in fishing related activities (Gwadar profile 2016).

1.2 Problem Statement

The massive dependence on fishery creates marine ecosystem inbalances and it is also a threat to poor fishing labors livelihood. Fish production is decreasing in the World Ocean and seas. The rapid decline in marine fisheries is a global phenomenon (Pauly and Chuenpagdee 2007). According to the World Bank and the United Nations' Food and Agriculture Organization (2009), excessive fish catch may cost 50 billion dollar in net economic losses during a year. Over fishing is well defined by Grainger and Garcia (1996); Pauly et al (1998); Froese and Reyes (2002), as the fish production is more than its productive capacity. According to Garcia and Newton (1997), during 1970 to 1989, worldwide fishing effort raised by 332%, while a global abundance index decreased by 62%. Fish worker and fishing vessels increase over year and fish

production decreases. According to Salayo et al (2008), Fish stock is declined between 5 to 30% due to over fishing in Southeast Asia. The data from fishery department Balochistan also shows that as fishermen and the number of advanced large fishing boats increased, fish production is decreased and per capita income of the fishermen also decreased. In Gwadar over fishing is the main reason for the fish stock depletion (Directorate of Fisheries balochistan, 2014). They continued their fishing efforts even during breading months which are hazardous not only for marine ecology but also for their livelihood in long run. Fishermen of Gwadar have no other employment opportunities; neither agriculture sector nor industrial sector is developed to provide jobs. Now the new capital inflow through CPEC projects is expected to provide different jobs opportunities to the fishers. It may reduce the excessive fish catch and the marine ecosystem inbalances may be addressed, as the provision of jobs and employment may reduce pressure on marine ecosystem. Economic zone under CPEC projects are expected to employ approximately 40000 people (CPEC MOU). It is expected that the shifting of fishermen to industry could reduce fish catch which has increased due to overfishing and increase in number of vessels. The important question, however is examine that will they like to leave this profession and switch to this new sector. If yes, at what expected return the fishermen would be willing to switch to the industrial sector, which wage will they demand and what kind of skill will be required for them to adjust in the industrial sector. Even if they are willing to switch, are there any constraints that may prevent this switching? These constraints may include different skill requirement, uncertainty of job (contract or daily wages) and distance to the place of job. If there is training required for the jobs provided to the fishermen, who will bear the cost of the training? Even if the cost is borne by the Government/ industry, will the fishermen be willing to participate in the training?

1.3 Research Question

The research questions of the study are:

1. What are the fishermen's actual preferences regarding job opportunities provided by CPEC?
2. What are the potential hurdles in the smooth transition from fishery to industrial sector?

1.4 Objectives of the Study

1. To estimate the actual amount of income at which the fishermen will be willing to switch to the industrial sector.
2. To identify the potential hurdles in the smooth transition from fishery to industrial sector.

1.5 Significance of the Study

Coastal ecosystem of Gwadar is vulnerable due to excessive fish catch which also affect the fishermen's livelihood. Almost the entire community engages in fishing sector. This is due to lack of other employment opportunities. The provision of jobs and employment may reduce pressure on marine ecosystem. Now the new projects under CPEC will create new job opportunities to the natives of Gwadar. This study provided the data and information of fishermen willingness to switch from fishery to industry and the hurdles they face during the transition. Switching of fishing class to industry is very difficult and complicated task because it is not the shifting of labor from one sector to another sector of the same skill. It is shifting of fishing labor to industrial sector which needs totally different skills compared to fishery. It was, therefore, important to estimate the fishermen willingness to switch in monetary terms. The findings of the study will help policy makers. These findings identified the hurdles which will arise during switching from fishery to industrial sector. These hurdles are included the skill difference between the two sectors, lack of education, lack of access to vocational education and training opportunities, distance from the site of the job, and uncertainty (Contract and daily wages) in the job. Knowing about all these hurdles in advance, policy

makers and concern authorities should take different measures to resolve these issues and hurdles to ensure a smooth transition.

Chapter 2

Fisheries in Pakistan

Pakistan coastal areas are rich in marine resources and also have potential for industrialized fisheries as well. Some 400 marine fish and shrimp were identified in the coastal areas of Pakistan. Very few researches have been done in Pakistan on fish species, fish stock and marine biology. There are many fish vessels and boats engaged in fishing near coastal areas of Pakistan which number are increasing every year. Despite the increase in vessel there was a decline in fish production between 2003 and 2014 while fishermen also increased. On April 2010 the director general of marine fisher tells that fish catches had diminished by 29 percent over the last decade. Some rare fish species have been completely vanished, like gallo and Kalaki fish in Baluchistan, Zardum, Paplet, and Kalgun in other coastal areas of Baluchistan and Palla in Sindh (Sharukh Rafi, 2011).

The length and size of fish has also become smaller, According to khan and khan (2011), Indian mackerel from Sindh is smaller in size than mackerel present in Balochistan due to excessive fish catch. The chairman of the Pakistan Fisheries Export Association stated that fish stocks is depleted due to excessive fish catch with the use of illegal nets and fishing during breeding periods. Fishermen are the poor class of the society and they can never avoid their activities even during breading months. It is important that even if fishermen will not reduce fish catch even after job created by CPEC, they can at least give up fishing activities during breading months which is not possible during open access scenario and competition. Following tables shows the increasing fishermen population, number of fishing vessels and decreasing fish production at Gwadar bay.

Table 1: Fisherman population in Gawadar

Year	Full time fishermen	Part time fishermen	Occasional fishermen	Total
2003	26211	9893	4772	40876
2004	27040	9638	5108	41786
2005	27284	9808	5211	42303
2006	27959	10415	4621	42995
2007	28398	10657	4810	43865
2008	28813	10873	5074	44760
2009	30815	12808	6348	49971
2010	30514	12240	6025	48779
2011	33255	13144	6413	52812
2012	35465	14353	7069	56887
2013	35475	15201	7301	57977
2014	38377	13598	6100	58075

Source: - Directorate of Fisheries, Balochistan

Table 1 shows the number of fishermen. The number of all fishermen whether they are full time, half/part time or occasional fishermen increased during 2003, to 2014. The total number of fish workers during 2003 was 40876 which increase to 58075 in 2014.

Table 2: Number of fishing vessels in Gwadar coastal area during 2003 to 2014

Year	Number of launches	NO. OF MECHANIZED BOATS	NO. OF MOTORIZED BOATS	NO. OF SAILBOATS	TOTAL
2003	49	1459	4463	25	5996
2004	70	1471	4487	21	6049
2005	72	1510	4556	13	6151
2006	127	1516	4613	N.A	6256
2007	161	1514	4641	N.A	6316
2008	140	1573	4665	0	6378
2009	1617	4724	8736	0	15077
2010	N.A	1747	4916	189	6852
2011	N.A	1831	5144	211	7186
2012	N.A	1985	5347	291	7623
2013	N.A	2017	5611	310	7938
2014	N.A	1963	6753	253	8969

Source: Directorate of Fisheries, Balochistan

Table: 2 show the increasing number of launches, mechanized boats, sail boats and motorized boats during the year 2003, to 214. The number of all fishing vessels in 2003 was 5996 which are increased to 8969 in 2014 while the number of mechanized boats is increased from 1459 to 1963 and motorized boats are increased from 4463 to 6753 during 2003 to 2014.

Table 3: Month wise fish production at Gwadar bay

MONTHS	2012 Q (Metric tons)	Value	2013 Quantity (Metric tons)	VALUE	2014 Quantity (Metric tons)	Value
JANUARY	12318.42	1204022	9463.25	927398	12996.23	1180847
FEBRUARY	16438.16	1037015	21380.23	1389715	10081.26	1698365
MARCH	18633.19	1841817	20232.19	1982754	16856.46	1701792
APRIL	17123.94	1234220	19538.33	1406759	16630.16	1154082
MAY	4436.39	351860	6130.29	398468	4293.42	331889
JUNE	3380.23	169013	3664.19	183209	3621.52	186580
JULY	4253.13	219013	3452.20	176061	5877.13	321033
AUGUST	6884.14	1231273	5836.88	1038965	8930.59	1338849
SEPTEMBER	13821.18	1293330	13603.23	1292306	14633.10	1400963
OCTOBER	14280.17	1441523	15383.11	1538311	15790.89	1485969
NOVEMBER	17344.17	1601324	19254.15	1790636	15574.38	1807202
DECEMBER	17771.54	1734429	17217.02	1677471	18691.24	1916515
Total	146684.66	13358839	155155.07	13802053	143976.38	14524086

Source: Directorate of Fisheries, Balochistan.

Table 3 reveals month wise production and value of marine fish catch at Gwadar during 2012, 2013 and 2014. Total fish production during 2012 was 146684.66 metric tons and its value is 13358839 rupees. Total fish production during 2013 was 155155.07 metric tons and value of production was 13802053 rupees and total fish production in the year 2014 was declined to 143976.38 metric tons

Chapter 3

Literature Review

3.1 ECONOMIC CORRIDORS AND ECONOMIC DEVELOPMENT

Economics corridors have no clear definition in literature. Economic corridors may be domestic, regional or global. The concept of economic corridor became famous when Asian Development Bank's (ADB) greater Mekong Subregion (GMS) projects were started. Economic corridor is a better infrastructure which accelerates economic activities. Economic corridors are very important in the development of the whole region. For instance, decreasing the transportation cost and provides access to the global market, people's income increases and poverty reduces due to better infrastructure development. Economic corridors play vital role in linking economies across the region and increase their trade ties and investment. Economic corridors are crucial in bridging the economies with regional economic integration in the current globalization period (Kuroda et al. 2007). It is explained in the literature that if the member countries are not linked through advance means of transportation regional integration will decline (ADB 2014). Economic corridors have played vital role in integrating economies across a region (Vickerman 2002). Economic corridors develops infrastructure and generates more production, more investment and reduced trade barriers like tariffs and quotas which increases domestic, regional and international trade. According to Bhattacharya (2012), regional infrastructure increase the standard of living and reduce poverty by connecting different places and people with major economic hubs and markets, narrowing gap of development among regions.

3.2 Economic Corridors and Special Economic Zones

One of the main stimulating factors for the establishment of special economic zones (SEZs) is economic corridors when a country decides to increase regional connectivity

through economic corridors; she also intends to setup SEZs along the route. Several reports showed that special economic zones (SEZs) have become a leading promoter for regional economic growth and development in developing countries like ASEAN countries and china (Ishida 2009). The SEZs are the specific geographical region with less economic regulations than a country's usual regulation laws. SEZs consist of free trade zones or export processing zone (EPZ) and give special inducements such as low tax rates to investors to encourage them to invest. It may be tax evasion or reduction in taxation to investors to invest. SEZs are the defined geoghraphical region near border areas where business rules are more different than the rules prevails inside the country, these rules mostly deals with investment scenario and regulation strategies to liberalized the trade and business (ADB report 2016). The Pakistan's government has planned the creation of 29 industrial parks and 21 mineral zones, 27 of them to be decided the status of Special Economic Zones (SEZ). The most advanced of these projects will be the Gwadar SEZ, expected to be functional by the end of 2017, which will consists of industrial units for mines and minerals, food processing, agriculture, livestock and energy(CPEC MOU).

3.3 ECONOMIC CORRIDORS AND ITS ADVERSE ENVIRONMENTAL IMPACTS.

Economic corridors accelerate pace of economic growth and development. However, development and connectivity through roads, rails, and expressways have adverse impacts on environments. Deforestation is a major cause of environmental degradation and infrastructure development provide access to the people for forest degradation. Infrastructure development, paving roads and extended connectivity enhance the rate of environmental degradation. According to Fearnside, (2007), paving roads affects environment adversely and encourage deforestation. The impact of corridors is not limited to the side or nearby corridors areas. It is expanded to other areas where human access is not possible or has least access to forests or other pasturing areas. Roads and corridors provide opportunity of hunting which raised

mortality and animal escaping 5 to 10 km of roads and it may long for wide ranging species like apes and elephants (Lahm et al 1998, Blake 2008). Pollution emitted by corridors such as air, water or noise pollution has also adverse effects on water, forests and biodiversity. Effects of chemical pollutants and nutrient runoff are likely to be especially serious for streams and wetlands near roads, with major pulses of aquatic pollutants and nutrients entering marine ecosystems with heavy rains at the beginning of the rainy season (Pratt, C. and Lottermoser, B.G. 2007). The network of corridors provides access to forests and their natural resources, allowing collecting of plants and hunting of wildlife (Laurance et al. 2009).

3.4 CORRIDOR, FISHERIES AND LIVELIHOOD

A livelihood comprises of the assets (physical, natural, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household. Most studies of small-scale fisheries in low income countries in the last 25 years have tended to emphasize small scale fisher folks' resource dependence and the open access nature of fisheries that together lead to resource degradation. Small-scale fisheries are frequently characterized as ''the occupation of last resort'' and fisher folk as ''the poorest of the poor'' (Pauly1997).

Daily needs, force the fish worker to resource degradation, to create other employment opportunities for the fishermen to conserve fish stocks through a combination of management to limit the access and gives incentives to current participants to leave the fishery. Orthodox fish workers in developing countries have concentrated to enhance incomes by increasing the fishing effort more efficiently (Platteau 1989). That's why fish stock depletion due to over-fishing has been raised. The livelihoods of artisanal fishermen depend on the fishing vessels (boats and nets), although many artisanal fishers may also own land and combine fishing with farming (Bailey and Pomeroy 1996). Fishermen in Gwadar do fishing with classical techniques of artisanal fishery. Almost entire community is involved in fishing sector

according to the last fifteen years data (fisheries department). Number of fish workers and number of the boats at Gwadar increases while fish stock is depleted and fish production is also decreases which creates marine ecosystem in balances and per capita production of the fisher men decreases which is serious threat to the fishermen.

3.5 GOODS AND SERVICES PROVIDED BY MARINE ECOSYSTEM

The marine ecosystem is crucial for the existence of life on our earth and supports the livelihood of people living and depending on coastal resources. Marine ecosystems are the areas where water and land join to form an environment with a distinct structure which provides a wide range of goods and services to people. They comprise mangrove marshes salt marshes estuaries and bays which are home to various different kinds of plants and animals. These animals and plants are very sensitive to ecological variations even some areas are stressed to preserve their diversity due to anthropogenic activity. Coastal ecosystems provide a huge range of goods and services which provide human welfare. These goods and services take transaction in appropriate markets such as raw material food and furnish goods and raw material as well as non-market goods and services such as nutrient cycling, climate regulation, and protection of shorelines from erosion and opportunities for recreation. The 2005 Millennium Ecosystem Assessment (WRI, 2005) also provides a typology, categorizing ecosystem services as supportive, regulating, provisioning or cultural. The report figures many examples and descriptions of ecosystem services. The value of environmental goods and services is constantly ignored by the ecosystem management in a conclusion on whether to protect these environmental resources for future or used now for growth and development (Wattage & Mardle, 2005).

3.6 USE OF CONTINGENT VALUATION METHOD IN DIFFERENT SCENARIO

History of Human-lead seascapes reveals habitat destruction and overfishing in Europe, however the size and drivers of this loss has been broadly categorized (Myers & Worm 2003,

Pandolfi et al. 2005, and Morato et al. 2006). The ecosystem-based management underlying this idea has recently been suggested within the European Union as a decision making strategy to enhance the social and marine ecological functions of Europe's seas (Mee et al. 2008). People and government concerns to the non-marketed goods and services (erosion control, climate regulation, water purification) of ecosystem whether land or coastal ecosystem and the marketed goods and services (fisheries) of ecosystem also need efficient use and preservation. It needs more effective and fair conservation policies to preserve marine ecology, it is insisted to estimate the value of public goods and services (Sutherland et al. 2009, Carpenter et al. 2006, 2009, and TEEB 2010). Identifying the motivations underlying people's values is critical for understanding how individuals make choices involving environmental goods and to identify social concerns about ecological changes. Another key challenge for conservation science is to understand the role of socio-geographic and cultural perspectives in shaping people's values (Ressur- reigao et al. 2012). Gwadar coastal people are thoroughly depended on fishery sector for their livelihood, socioeconomic indicators showed very poor condition of the people. It is very difficult to do the wise use of marine resources until unless compensation is not provided and awareness is not created. This research paper was not try to thoroughly review the validity of CVM. It has been done by (Venkatachalam 2004). Some aspect of the environmental resources like scenic view of the mountains, seashores, forest**,** biodiversity**,** ecotourism agro tourism and marine eco parks (public goods) give utility to humans but either have no market values or have very minimal value which is not the true economic value of its provision to use a marine Eco park. We may be paying entry fee but it may not be the actual value of utility it provided similarly some of us may not using the environmental resource now but he would like to use it in the future.

Chapter 4

DATA AND METHODOLOGY

In this chapter we have discussed the survey methodology adopted for the study, sample selection and about the contingent valuation survey and valuation method. The descriptive analyses of the collected data are organized on the bases of offered bid prices to different respondent's samples. For this purpose we used Stata software.

4.1 Survey Methodology

This study used contingent valuation technique for the estimation of willingness to accept to switch the fisher men from fishing sector to industrial sector. The study area district Gwadar (tehsil Gwadar) coastal area, it is simplified for the respondents that excessive fishing and banned nets uses endangered the marine biodiversity and also affect fisher men's livelihood in long run, now alternate sources of livelihood are at their door step, new industrial zone will be developed and economic activities will soar and these economic activities and government will likely to provide different types of jobs to people of Gwadar. The respondents were queried to response in "yes" or "no" for the acceptance of specific amount per month to leave fishing occupation and shift to the industrial sector.

CVM was used to display the "economic value" of environmental goods and services. The term 'economic value' well-defined in the standard economic theory is the measurement of changes in individual well-being (Dr. Wattage 2010). For these goods and services this research created a hypothetical scenario of job market through which, current research estimated willingness to switch (WTS) of the fishing labor to shift into industrial sector. The major elicitation techniques used in the literature were open-ended, take it or leave it (Dichotomous choice), double bound dichotomous choice method, and modified dichotomous choice method. First we asked fishermen to state their preference of switching amount (open ended). After this we tried to reveal their real preference

through offering them set of bids, three bids specifically for WTS calculation we offered to the fishermen (respondents). This is called double bound dichotomous choice technique. It is an iterative second round means double bound question used by Hannemam et al in 1991. First we offered a bid (25000) to fisherman to switch from fishing to industrial sector; the respondent who say "yes" then we decreases the bid to minimum (15000) and asked him to state his answer against the bid "yes" or "no". Again we offered the bid of 25000 and the respondents who refused the bid average income (25000), than we asked them to switch by offering 35000, maximum income. Three bids of minimum, average and maximum provided us better idea about their willingness to switch from fishing to industrial sector. This process of calculating willingness to switch also logically provided us closer value to exact distribution of income of the available fishermen. Moving from average income offer to minimum income offer on their agreement and from average to maximum on their disagreement is double bound dichotomous choice biding approach and test it in a hypothetical job market, this technical process turned it to Contingent Valuation Method.

4.2 Sample selection

This study was conducted in district Gwadar (Balochistan). The 600 km long coastlines is comprises many tehsils e.g. Pasni, Jiwani and Ormara. Only tehsil Gwadar was being focused for survey due to limited financial resources and time. The total number of fishermen in Gwadar is 58075. Using 95% CL and 6% CI, a sample size of 266 respondents (fishermen) was selected from tehsil Gwadar coastal area by using Random sampling technique. However, after cleaning the data, we are left with a sample size of 234 respondents.

4.3 Data Analysis

The data sources were primary. Data was collected through surveys from the field and analyzed to assess the responses of some variable to the corresponding socio economic variables of that particular individual. For this purpose Stata software was used for analysis and graphical representation and their explanation is given.

4.4 VARIABLES

Willingness to accept to switch from fishing to industry were regressed on a set of variables according to the statements based on following components of their demography.

4.4.1 Current income

This study examined the current income impact on willingness to switch (WTS) and use monthly expenditure plus their savings as a single variable for income in order to gain correct answer from the respondents. Respondents were hesitating to answer the question related to their monthly income directly and for that, indirect calculations were taken. Respondent with higher income may less willing to switch to industry or demand higher compensation to shift to industrial sector because they are settled with the old profession.

4.4.2 Marital status

Marital status was taken as a dummy variable in the study. If the respondent is married, it will take the value 1; 0 otherwise. The respondent who were married will more willing to switch because to spare time for the family and earn at least the same income from industrial sector. It was also expected that the person who was not married was also willing to switch to avail new job for higher income and secured future.

4.4.3 Education

Education is another variable by which WTS of the respondent depends. This study measured it using years of schooling. Respondent with more education may be more willing to switch to the industrial sector but it was not so, there is no impact of education on switching the fisher men because literacy rate was very low and required technical education in the industrial sector was rare.

4.4.4 Household size

House hold size is an independent variable which has impact on willingness to switch (WTS) of the fishermen to shift from fishery to industrial sector. It's taken as number of family members who share kitchen. If the household size large the fisher men may easily be ready to switch to industrial sector to get certain job to meet the necessities of all family members.

4.4.5 Age

This is taken as number of years. It is an important variable because higher age citizen cannot work in industrial sector as labor, as they can make some money in fishing sector. Moreover, aged fisher men would be less willing to leave their current profession and learn new skills.

4.4.6 Distance

Distance is an important variable because for most of the workers it could cost their half of income per day, they are outstation. The respondent who lived near the special economic zones may shift to industrial sector easily and vice versa. The question which was asked from respondent was, will you shift from fishing sector to industrial sector if the distance is from home to workplace is greater than current distance?. When the answer was "Yes" it was equal to 1; 0 otherwise.

4.4.7 Skill adaptation

The respondents were asked that if the training is given to you people, will you adopt training and shift from fishery to industrial sector/government sector. The fishermen who were able to adopt a new skill, trainings and say "Yes" it was taken as equal to 1:0 otherwise. It is an important factor because skill adaptation will be the first need of these workers in new sector. The respondents who were able to adopt new kills were more willing to shift to industrial sector.

4.4.8 Transportation

The question which was asked is “Do you require any transportation facility to reach your workplace from home”. The respondent who said “Yes” took the value 1; 0 otherwise. When transportation provided from home to the work place, respondents were more willing to shift industrial sector and avoid fish catch.

4.4.9 Dependency ratio

Ratio of working family members to total member in the family of respondents was taken as an important variable because it helped the fisherman to make an easy decision regarding switching from fishing sector to expected industrial sector on the given income offers. Higher the dependency ratio respondent may be more ready for shifting to industrial sector.

4.4.10 Nature of job

Nature of job is a very vital variable. What kind of jobs fishermen are willing to accept. The question which was asked from the respondents (fishermen) was, if the job is daily wages base will you shift, and if the job is contract/permanent base will you shift, to industrial sector. The answer “Yes” is equal to 1; 0 otherwise.

Table No 4.1: Potential Jobs in Industrial Sector

Oil Refinery	**Manufacturing Industry**	**Textiles**	**Garments Industry**
Engineer	Engineering	Engineering	Supervisor
Control Panel Operator	Technician	Technician	Operator
Shift Supervisor	Supervisor	Supervisor	Sewing work
Pump System Operator	Polymer	Polymer	Cutting work
Boiler Maker	Tool making	Tool making	Helper
Pipe Fitter	Packing	Packing	Packing

Welder	Loading unloading	Loading unloading	Helper
Security guard		Helper	Security guard
Driver	Driver	Driver	Driver
Wage labor	Wage labor	Wage labor	Wage labor
Construction labor	Construction labor	Construction labor	Construction labor

4.5 MODEL SPECIFICATION

Following model was used in the study. This model was adopted from Ressurreigao et.al (2012).

$$\mathbf{WTS = \beta_0 + \beta_1 (IN) + \beta_2 (MS) + \beta_3 (EDU) + \beta_4 (HHsize) + \beta_5 (AGE) + \beta_6 (DIS) + \beta_7 (SA) + \beta_8 (TR) + \beta_9 (DR) + \beta_{12} (NOJ) + \mu_i}$$

Where:

WTS = willingness to accept to switch

IN = Income of the household

HHS = Household size

EDU = Education of the household

AGE = Age in years

DIS = Distance

SA = Skill adaptation

TR = Transportation

MS = Marital status

DR = dependency ratio

NOJ = nature of job (contract and daily wages based)

CHAPTER 5

RESULTS AND DISCUSSION

This chapter presents the results and discussion. It consists of the calculation of mean willingness to accept a biding amount to switch from fishing industry to the jobs available in the industrial sector as a result of CPEC projects in Gawadar. Moreover, it also examines the impact of fish catch per month on the willingness to accept to switch. Lastly, this chapter will discuss about the hurdles that prevails in switching of the fishermen to industrial sector.

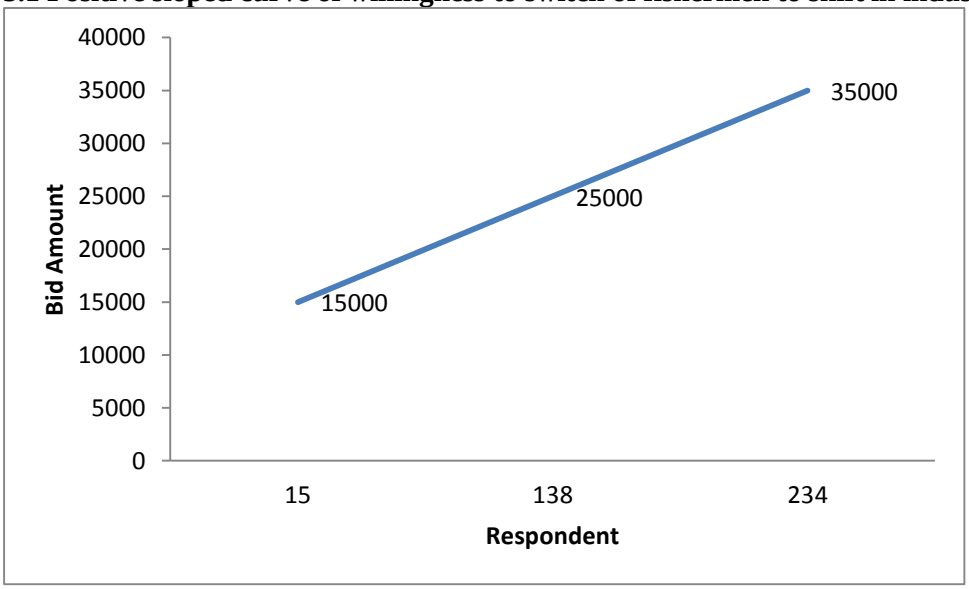
In this chapter we discussed the use of double bound dichotomous choice method to elicit the responses. These responses are “Yes” or “No” for the initial bid which is offered to the respondents. The respondents who respond “Yes” for the initial bids were offered a lower bid (minimum) and if the respondents refuse the initial bid, we increased the bid to maximum amount. By focusing on “yes” and “no” responses for the proposed bids we got a curve which is positively sloped (Figure 5.1) sharing that as the bid amount was increased willingness to accept of the fishermen to switch also increased. Data summary, results of logistic regression for mean willingness to accept to switch and simple linear regression models and the relevant tables are given in the next sections.

5.1. Willingness to Accept to Switch and positively sloped curve

The answers of the respondents to get jobs (compensation) in industrial sector to leave fishing sector were elicited through double bound dichotomous choice offers. According to Figure 5.1 for the initial bid amount which was 25000 PKR the number of respondents who were ready to switch to industrial sector were 123 which contributed 52.56% of the total 234 respondents. When the respondents were not ready by the initial bid offer, bid 2 amount of

35000 PKR offered to them which was the maximum bid offered for those respondents who rejected the initial bid 25000 PKR. When the respondents, who were ready to switch with initial bid1 25000 PKR the bid amount was decreased to 15000 PKR which is the minimum compensation offered to them. 15 (6.4%) respondents were ready to switch to industrial sector with the minimum bid amount. The respondents who were ready to shift to industrial sector by getting minimum bid amount 15000 were obviously want to shift by initial bid amount which was 25000 thousand PKR. Now the total respondents who were willing to switch by 25000 thousand PKR were 138 (15+123) respondents. All the respondents were ready to switch to industrial sector with maximum bid2 amount. It is because of the fact that the previous compensations offered to them were less than this maximum compensation. The respondents who were ready to shift by 15000 PKR and 25000 PKR compensation offers were automatically willing to shift with the compensation of 35000 PKR. The positive sloped curve (Figure 5.1) shows that as the amount of compensation increases, fishermen (respondents) are more willing to avoid fishing and switch to industrial sector.

Figure 5.1 Positive sloped curve of willingness to switch of fishermen to shift in industrial sector



5.2. Descriptive Statistics

The descriptive statistics about different variables are provided in Table 5.1. The data in this table shows that only 47 percent respondents were willing to switch to the final bidding amount. The biding amount, with a mean of 26090, varies between 15000 and 35000 PKR.

Table 5.1: Descriptive Statistics

Variables	Mean	Standard deviation	Minimum	Maximum
Fish catch per month	5.73	10.25	0.6	150
Willingness to switch 1 (Yes, No)	0.52	0.50	0	1
Willingness to switch 2 (Amount)	30110.64	7721.964	15000	35000
Income of the households	26089.74	9655.241	9000	70000
Age	34.09	10.51	17	70
Education	2.14	3.54	0	14
Marital status	0.82	0.38	0	1
Household size	9.08	4.03	1	20
Fishing in breeding months after job provision	0.21	0.41	0	1
Trust	0.55	0.49	0	1
Total cost of trips/month 5 years ago	100837.6	67901.65	30000	300000
Total cost of trips/m now	158127.7	112799.5	30000	750000
Time spent all trips/month 5 years ago	360.20	142.11	40	240
Time spent all trips/m now	120.06	47.37	40	240
Observations	234	234	234	234

Source: Author's calculation

The average household income, on the other hand, is approximately 26000 rupees. The table further shows that average education in the area is very low whereas almost 82 percent respondents are married. The household size was very large with a mean value of 9 persons per household. Overall, the descriptive statistics present a very grim picture of the socioeconomic situation of the sample area.

5.3. Estimation of Mean Willingness to Switch (WTS) of Fishermen using logit model

The mean willingness to accept to switch is a monetary amount by which fishermen switched from fishing sector to industrial sector. The logit results presented in Table 5.2 shows that the bid amount coefficient is 0.0004 and its sign is positive in model 1 which shows the positive and highly significant impact of bid amount on mean willingness to switch. Bid amount is positive and highly significant in model 1 when other variables are not controlled in the model. Similarly the bid amount is also positive and highly significant in model 2 where other variables are controlled in the model 2. Bid amount (Compensation amount offered) have positive relationship with willingness to accept to switch to industrial sector.

Table 5.2: Results Logistic Regression for Mean Willingness to Switch

Variables	Model 1	Model 2
Bid Amount	0.0004***	0.0019***
	(0.0001)	(.0007)
Age	---	-0.6016
		(.5038)
Age Squared	---	0.01118
		(0.00914)
Education	---	-0.125903
		(0.104758)
Household Size	---	-0.030269
		(0.085597)
Log of Income	---	2.344484
		(2.802134)
Marital Status	---	-32.8860**
		(14.88)
Constant	-11.39***	-47.32
	(1.84083)	(30.66)
Observations	234	234
Mean WTS (WTA)	**28475**	**30326**

The above table *, ** and * describing the significance level at 1%, 5% and 10% bench mark.**

In model 1, the mean willingness to accept to switch from fishing to industrial sector is 28475 PKR. This is approximately 2500 rupees higher than the mean income of the households in

this region. However, model1 does not control for other characteristics and this may bias the mean willingness to accept to switch (WTS). Hence, in model 2 we controlled for these other characteristics and found the coefficient of bidding amount to 0.0019 which is positive and statistically significant the mean willingness to accept for switching in this case is Rs30326 which is again significantly higher than the mean WTS in model 1. Hence model was under estimating the mean willingness to accept to switch.

5.4. Determinants of Final biding amount to switch

Simple regression model is estimated in this study to find minimum monetary amount that people are willing to accept to switch from fishing sector to industrial sector. The regression results of these variables are mentioned in the Table 5.3. The regression coefficient of fish catch per month is 0.0015 in model 1 which shows that as fish catch per month increases by 1 tone on average final willingness to accept to switch increased by 0.15%. Hence there is a positive relationship between final willingness to accept to switch and fish catch per month, when other variables are not controlled however Fish catch per month is insignificant in Model 1. Hence in model 2 we control for other important characteristics.

The regression coefficient for fish catch per month is 0.003 in Model 2 which shows that as fish catch per month increases by 1 tone on average, the minimum willingness to accept to switch increased by 0.3 percent as the dependent variable is in log form. So, there is positive relationship between minimum willingness to accept to switch and fish catch per month when other variables are controlled in the model. Fish catch per month has also a highly significant relationship with minimum (Final) willingness to accept in model 2.

The coefficient value of variable income in model 2 is 0.852 which shows the positive and significant association with willingness to accept to switch to industrial sector. This

shows that when income increased by 1%, the total amount of willingness to switch to industrial sector increased by 0.852 percent, keeping other variables constant. All other variables in this model are insignificant, suggesting that the respondents (Fishermen) do not differ significantly within characteristics.

Table 5.3: Results Simple Linear Regression Model

Variables	**Model 1**	**Model 2**
Fish catch per month	0.0015 (0.0016)	0.003*** (0.0007)
Age	---	0.0067 (0.0001)
Age squared	---	-0.0000 (-0.0001)
Education	---	0.0014 (0.0058)
Household size	---	0.0047 (0.0058)
Marital status	---	-0.032 (0.0695)
Log of Income		0.852*** (0.051)
Trust	---	-0.013 (0.036)
Time spent before 5 years/month	---	-0.000 (0.0003)
Time spent now/month	---	0.0000 (0.000)
Total cost 5 years/m	---	-4.19e-07 (3.96e-07)
Total cost now/m	---	3.94e-08 (1.96e-07)
Family members involve in fishing	---	0.027 (0.021)
Constant	10.01*** (0.030)	1.257** (0.5077)
R-Squared	0.0013	0.628
Observations	234	234

Source: Author's calculation

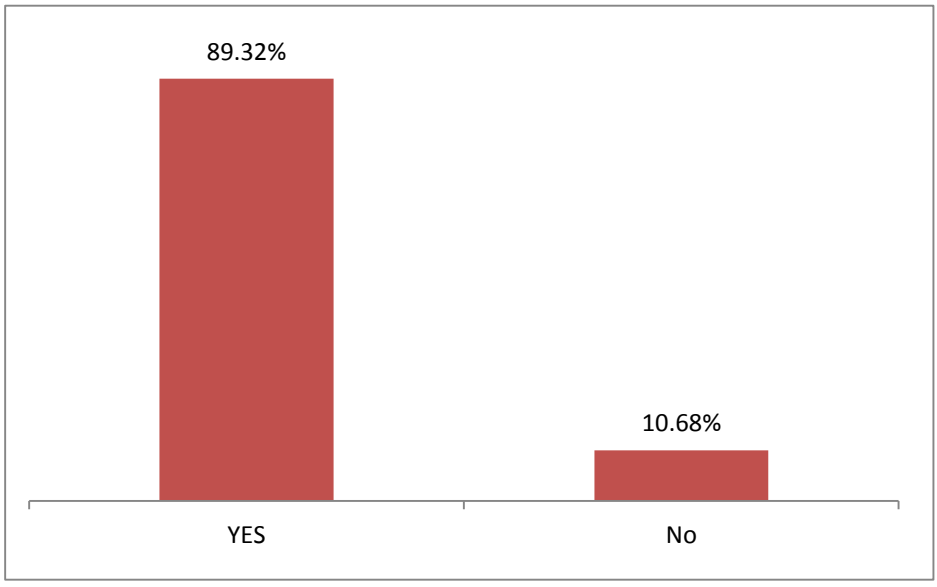
5.5 Hurdles in Switching Fishermen to Industrial Sector

The main hurdles that the fishermen can face in switching to industrial sector are technicalities of job, skill requirement issue, nature of job whether job is permanent/contract based or daily wages based etc. Now we explain these hurdles one by one.

5.5.1 WTS (WTA) for Technical and Non-Technical job

Literacy rate in Gwadar coastal area is very low especially education condition of the respondents (fishermen) was deplorable. The total number of respondents was 234 fishermen and the highest education level achieved is matriculation. This for is achieved by very few as most of the respondents never attended school. Most of the fishermen were preferred non-technical and low ranked jobs. Only 25 (10.68%) respondents were ready to shift and adopt technical and semi technical works like Control Panel Operator, supervisor, and plumber which were offered as alternative employment to leave fishing sector and switch to industrial sector. Rest of the respondents who were 209 (89.32%) people preferred non-technical employment which was mentioned as alternatives jobs options like driver, security guard, packing, helper etc. which is shown in the Figure 5.2. below.

Figure 5.2: WTS (WTA) for technical and non-technical job

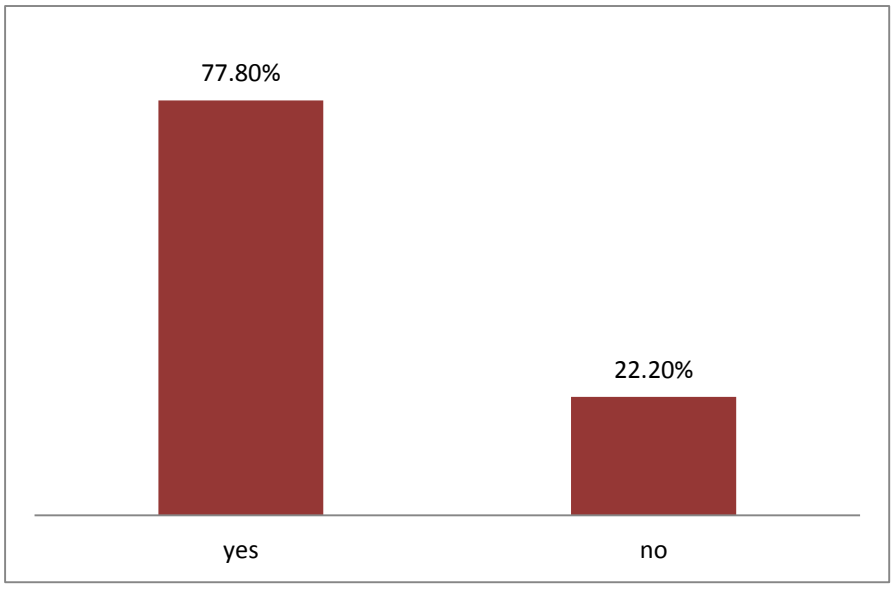


5.5.2 Willingness to Switch and Skill Adaptation

The respondents were asked that if the training is given to you people, will you adapt training and shift from fishery to industrial sector/government sector.

52 respondents out of 234 respondents replied that they did not adopt any type of trainings and skills the answer was “No”. The respondents who said “No” to the question were 22.2% of the total respondents and the number of respondents who answered the question “Yes” was 182 respondents who were 77.8% of the total 234 respondents. The shifting of fishermen to industrial sector is not very easy task. It requires totally different skills. More people ready to acquires new skills and trainings to equipped their selves to run the newly assign jobs of the new sector. This is shown in figure 5.3. This means that if skills are provided (The cost is bear by the government or employer), more people would be willing to shift.

Figure 5.3: WTS and Skill Adaptation

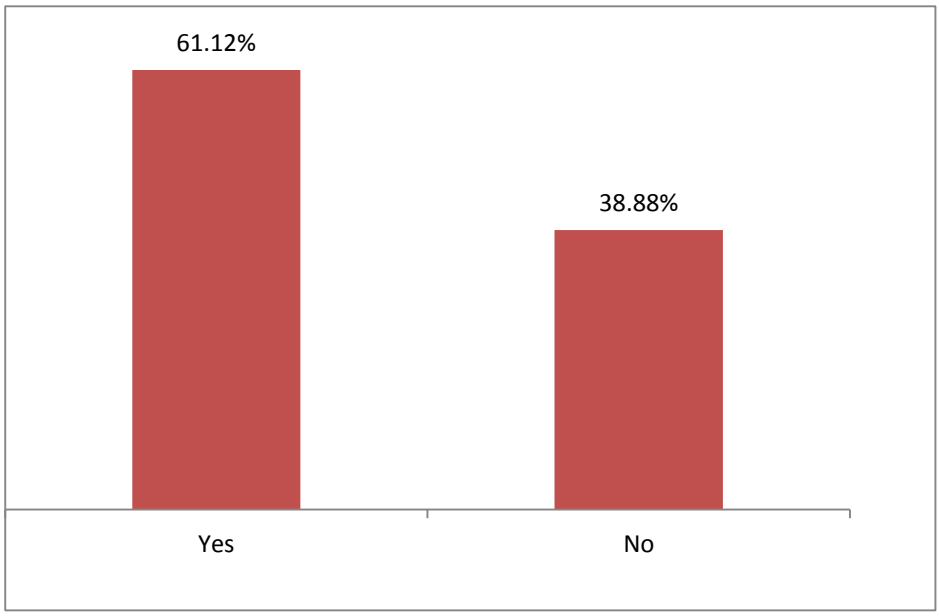


5.5.3 Willingness to Switch and Transportation Facility

The question was asked is “Do you require any transportation facility to reach your workplace from home”. 52 respondents out of 234 respondents replied that they do not need any type of transportation and opted for “No” which is 22% of the total respondents. The number of respondents who answered “Yes” was 182 respondents who were 77.8% of the

total respondents. This is shown in Figure 5.4. It means more people require transportation facility and this could prove a hurdle in their switching. If the industrial sector is interested in attracting these workers, they could need to remove this hurdle and provide them transportation facility from home to work and back.

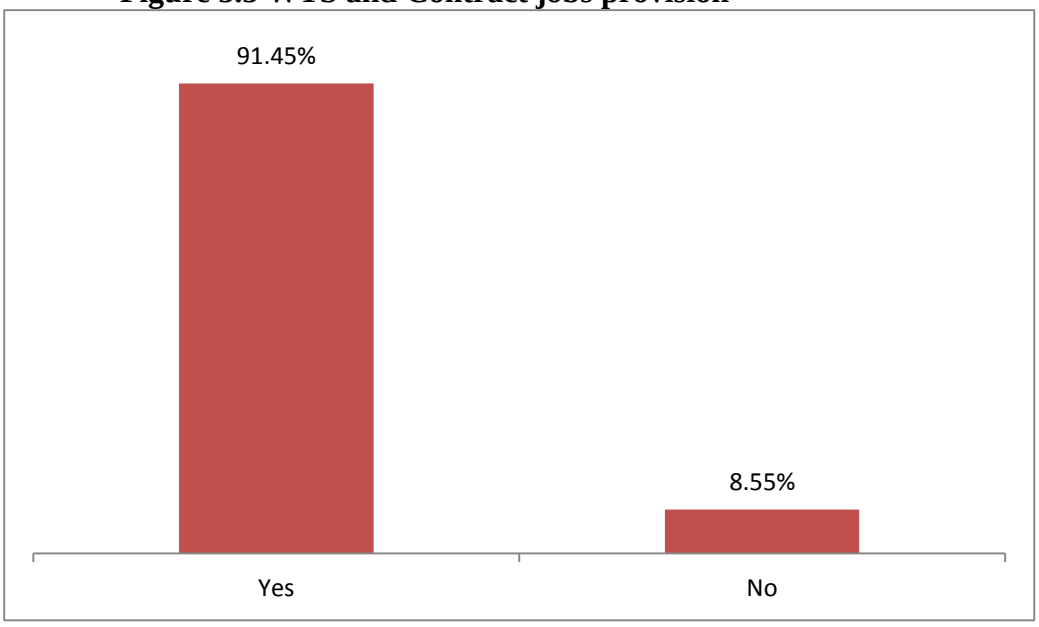
Figure 5.4: WTS and Transportation facility



5.5.4 Willingness to switch and Nature of job

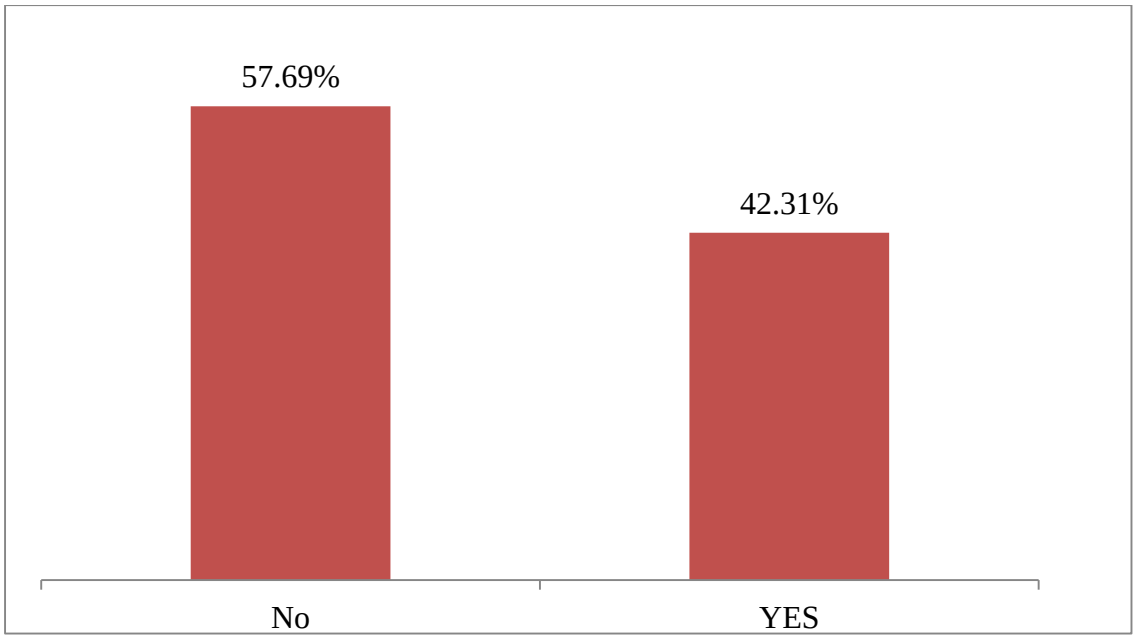
The question which was kept before them was," if the job is contract/permanent based, will you shift?" The fishermen want certainty in new jobs and most of the fishermen agree to shift on the regular based employment in newly projected industrial sector rather than uncertain jobs (daily wages). 20 respondents said "No" to the question which is only 8.5% of the total number of respondents; on the other hand 214 respondents answered "Yes" which 91.5% of the total 234 respondents. These responses are shown in Figure 5.5. Fishermen are willing to switch to industrial sector if contract jobs will be provided to them. They are already facing and struggling with uncertain earnings in fishing sector and want best alternative jobs and remunerations. These respondents were then offered for their willingness to switch in case, "if they are offered daily wages jobs".

Figure 5.5 WTS and Contract jobs provision



The question which was given to the respondent to be answered was, if the job is daily wages, will you shift? The Figure no 5.6 shows that the respondents who answered the question "No" were 135 people which is 57.7% of the total number of respondents and only 99 (42.3%) respondents were ready to shift to industrial sector even if daily wages jobs were provided to them. Looking at the responses in Figures 5.5 and 5.6, we see that more people are willing to switch if they are offered contract all jobs instead of daily wages jobs. This point's to the fact that these respondents want job security and less volatility in their monthly income. Hence daily wages job offer could prove to be a hurdle in switching from fisheries. Therefore contract long term jobs should be offered to them to convince them to switch.

Figure 5.6 WTS and Daily wages job provision



CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1. Conclusion and Recommendation

Economic corridors lead to economic growth and development but it has adverse and also positive impact on environment. Development projects are the need of the hours which should comprise of connectivity by roads, highway, railways and different special economic zones to create employment opportunities to increase living standard and improve socioeconomic condition of the people to reduce poverty. Infrastructure development is the main cause of pollution and environmental degradation through emissions, water pollution and noise pollution, massive access to the biodiversity habitat and hunting near roads which was discussed in detail in chapter 1. Corridors could also have positive impacts on marine ecology where continued and excessive fish catch endangered the marine ecosystem. In the current context a very important positive impact of CPEC projects could be the preserving of fish stock at Gwadar. More than 90% of the population in Gwadar relies on fish hunting which has resulted in the depletion of fish stock and is a threat to the livelihood of the poor fishermen (Gwadar profile, 2016). By shifting the fishermen to industrial sector through creation of employment opportunities in industrial sector and make them adept through workshops, trainings to runs the industries. It could be reduce pressure on the resource.

The major findings based on the research conducted, shows that the average age is 34 years and the average income of the respondents is 26 thousands PKR per month. Income is significantly associated with minimum willingness to accept to switch in model 2 when other variables are included in the model while it is insignificant in model 1. When income of the respondents increases willingness to accept to switch also increases. Average education is 2 years that is primary which is insignificant but positively related to the minimum willingness

to accept to switch as under matriculation people do not differentiate themselves from those who have never been school by having or adoption of technical skill to shift to industrial sector. The average household size is 9 people per household. House hold size is also positively related but not significant. Average fish catch per month was 5.73 tones. Fish catch per month is significant and positively related to willingness to accept to switch. The respondent who catches more fish were ready to shift to industrial sector and demanded higher compensation. Logit regression model was estimated to quantify willingness of the respondents, where they were willing to switch to industrial sector. The mean willingness to accept to switch is found approximately 30 rupees.

The estimated results of curve between bid amounts and willingness to accept to switch and logit regression proposes that there is positive relationship between bids offered and willing to accept to switch. The percentage of the respondents who are willing to switch to industrial sector increases as bid offer increases. The study further found that lack of skill and transportation facility, nature of job offered, contract and daily wages, could affect people willingness to switch from fishing sector.

6.2 Recommendations

Based on the findings of the study, following recommendation are made to convince fishermen to switch to the industrial sector:

1. The mean willingness to accept is found to be approximately 30,000 PKR, Hence the jobs that offered should at least offered this amount 30000 rupees or above or any amount that is at least more than 5000 rupees of the household average monthly income.
2. The fishermen should be offered free of cost trainings to adapt new skills for the industrial sector.

3. They should be offered contract or long term jobs to ensure them job security and reduce their income volatility.
4. They should be provided with transportation facility for their potential works (that these current fishermen).

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