

A study of the dynamics of price fluctuation of the prime tuna species in determining operational strategies of tuna gillnet vessels in Pakistan

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ABSTRACT

Gillnet fishing operations are the only method of exploitation of tuna and tuna-like species in the coastal and offshore waters of Pakistan. Pakistan has a fleet of about 700 tuna gillnet vessels, which are primarily based in two major landing centres (Karachi and Gwadar) along the coast of Pakistan. The main target species of these vessels are yellowfin tuna, skipjack tuna, longtail tuna, narrow-barred Spanish mackerel (kingfish), marlins (black, blue, and striped), and sailfish, whereas queenfish, dolphinfish, and coastal tunas (kawakawa, frigate, and bullet tunas) are mainly caught as opportunistic species. Tuna species are not locally consumed and mainly transported to neighbouring countries. Prevailing prices in Karachi Fish Harbour is usually about 30 to 50 % less than prices in Gwadar. Despite low prevailing tuna prices, Karachi Fish Harbour appears to be attractive to tuna gillnet vessels because of facilities for repair and maintenance, transportation, proximity to important fishing grounds on the vast continental shelf, and the supply of inputs; however, fuel prices are much higher. It was common practice for smuggled fuel to be readily available at sea aboard other fishing vessels and dedicated supply vessels. Gwadar, located near the neighbouring country, is also an attractive and important operational base because of the availability of cheap fuel prices, as well as usually high but fluctuating prices for tuna and tuna-like products.

Karachi Fish Harbour remained a major operational base for tuna gillnet vessels in the past (before 2020) because of available facilities; however, in the last six years, high prices for tuna species in Gwadar have shifted the entire tuna gillnet fleet from Karachi to Gwadar. This also resulted in a shift in fishing grounds, as now a major part of the fleet operates in deeper offshore waters off the Balochistan coast. The major shift of the fishing fleet from Karachi to Gwadar since 2021 is attributed mainly to prevailing prices and system of grading of fish in the Karachi Fish Harbour, and to a lesser extent on the availability of cheap fuel in Gwadar.

INTRODUCTION

Historical Background

Tuna fishing is one of the oldest economic activities along Pakistan's coast. Vessels from the coastal area of Pakistan have been used to harvest tuna and tun-like species from the coastal and offshore waters of the Arabian Sea for centuries. Large sail-driven vessels used to operate in the waters of Pakistan, Oman (Masira and Al-Hallaniyat Islands), Yemen (including Socotra), and Somalia were some of their main fishing grounds. The main centres for tuna fisheries along the Pakistan coast were Karachi, Gaddani, Ormara, Pasni, Sur, Gwader, Phushukan, Ganz, and Jiwani. Fishermen used to carry salt, which was used for preservation, on board fishing vessels. It was very interesting that tuna species are not consumed in Pakistan; however, the tuna species that these vessels used to be harvested are processed in more than 1000 fish curing yards located in the coastal waters of Sindh and Balochistan. Salted-dried tuna used to be sent from various parts of British India, including Bangladesh, India, Myanmar, and Sri Lanka, as well as to Malaysia, Indonesia, and Hong Kong. The fishery for large pelagic continued in the same way till the early 1950s, when a major modification was made when cotton net was replaced by nylon net.

Another major change that took place between 1950 and 1960 in the tuna gillnet fleet when inboard engines in the tuna gillnet fleet, which substantially reduced the period of the fishing trips from three months to only 40 or 50 days. During the 1960s and 2000s, Sri Lanka remained the only market for salted dried tuna and tuna-like species. In the 1990s, most tuna fishing boats installed net haulers in their boats, which made the fishing operation comparatively easier. The construction of the Makran Coastal Highway in Pakistan in 2002-2003 has opened a new avenue for the tuna from Pakistan. Transportation of tuna in chilled form to the neighbouring country was started initially from Karachi to Gwadar by road, and from Gwadar to the neighbouring country by sea. Later on, direct transportation from Karachi to the neighbouring country by road was also started. This brought a major change in the fishing boats with the construction of fish holds to store about 6 to 12 tons of fish with ice. There are some large tuna gillnetters registered in Pakistan that have on-board freezing facilities. Such vessels undertake long fishing trips (more than two months) and land their catch in the neighbouring country in frozen form.

Information about tuna gillnet fisheries of Pakistan is known through the work of Ahmed (1989), Imad (1988), Kazmi *et al.* (2019), Khan (2016), Moazzam (2011, 2012a-c, 2014, 2018a-b, 2020a-b, 2021a-b, 2022a-b, 2025), Moazzam and Ayub (2015, 2017), Moazzam *et al.*, (2016, 2017, 2019a-b, 2020), Nawaz and Moazzam (2014), and Shahid *et al.* (2018). These studies were based mainly on the fisheries statistical data that were published by the Marine Fisheries Department, Government of Pakistan. A Crew-based Observer Programme initiated by WWF-Pakistan in 2012, which was completed in September 2019, but a number of these observers are still providing information, which is also incorporated in the studies during 2020 and 2026.

Fishing Fleet

The Pakistani tuna fleet consists entirely of about 700 locally made wooden boats. A census of the fishing boats carried out in December 2011 reveals that most of the boats involved in tuna fishing range between 15 and 25 m. Details of the fishing fleet and facilities on board are given in Moazzam (2025).

Fishing Gears

Gillnetting made of polyamide is primarily used for catching tuna in Pakistan. The net has a stretched mesh size ranging between 13 cm and 17 cm (average 15 cm) with a hanging ratio of 0.5. The length of a typical gillnet may vary between 5 and 10 km. Details of the fishing fleet and facilities on board are given in Moazzam (2025).

Operational Base

Although about 80 % of the tuna boats used to be operated from Karachi, about 20 % of the fleet was based in Gwadar between 2010 and 2020; however, since 2021, almost the entire tuna fleet has shifted its operation from Karachi to Gwadar, mainly because of prevailing higher prices, other marketing issues, and high fuel prices in Karachi Fish Harbour. Now, almost the entire tuna fishing operation is undertaken from Gwadar (Fig. 1); the tuna fleet shifts to Karachi before the onset of the close season (June and July) mainly for undertaking annual repair and maintenance.

It is generally believed that the migration of the fishing fleet from Karachi to Gwadar has taken place because of the availability of cheap fuel (diesel) at Gwadar; however, a detailed analysis of this migration of the fleet was undertaken to examine factors that compelled this migration and how it has affected the operation of the tuna gillnet fleets of Pakistan. The migration of the fleet from Karachi to Gwadar has an impact on the marketing of tuna and tuna-like fishes, but also has impacts on the socio-economic conditions of the fishermen communities associated with this fishery.

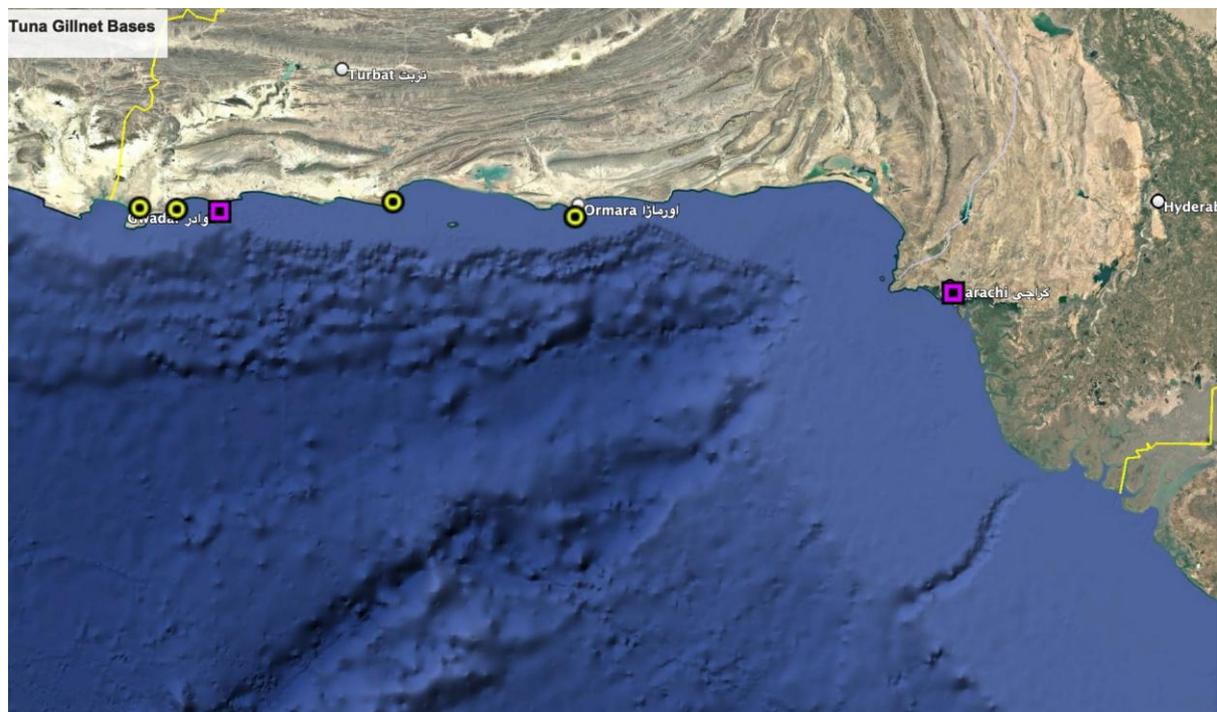


Fig. 1. Major Bases of Tuna Gillnet Vessels

Supply of Inputs

For the operation of a fishing vessel, including those involved in tuna gillnetting, 5 major inputs are required before the onset of fishing operations. These include fuel (diesel), food supplies (rations), lubricating oil (POL), ice (for chilling of fish), and potable water (for drinking).

Fuel (Diesel): In Karachi, diesel can be procured from the designated pumps located in Karachi Fish Harbour, as well as from the oil supply vessels at a rate which is fixed by the Government

fortnightly. Since a fishing trip lasts for about 30 to 40 days (average 35 days), about 8,000 to 10,000 litres of diesel is procured before a fishing trip. Present prices of diesel in Karachi (as fixed by the Government) are Rs 280.86/litre (before the recent War). Therefore, the expenses on the procurement of fuel for a trip ranged between Rs 2.247 and 2.809 million. Since the prices of diesel are much lower as it is brought from neighbouring countries through traditional channels, and its prices depend on the supply and demand, and there is no Government control on the prices. Prevailing prices during the last three months ranged between Rs 170.0 and Rs 178.0; therefore, the cost of procurement of fuel for a trip of an average of 35 days would be around Rs 1.36 to Rs 1.70 million.

It may be added that although the difference between the cost of fuel between Karachi and Gwadar is substantial, however, this is not the main reason for shifting of fleet from Karachi to Gwadar, because usually these gillnet vessels procure only small quantity of fuel from Karachi on Government rate and procure cheaper fuel from other fishing vessels (which have base in Gwadar) or from fuel supply vessels (these are fishing vessels which are not involved in fishing for tuna) rather sell fuel to fishing vessels operating along the coast of Pakistan and in the offshore waters. The prices of fuel available in the offshore waters are, although a bit higher than those at Gwadar (usually Rs 5 to 10/litre), still much lower than the prevailing prices in Karachi.

Food Supplies (Ration): For the procurement of food supplies for the crew of the fishing vessels for a 30 to 40-day trip, usually an expenditure of Rs 0.3 to 0.4 million is incurred. There seems to be a minor difference between the prices of food supplies in Karachi and Gwadar (about 5 to 10 %); however, the difference in the cost of food supplies is not one of the reasons for the shifting of the fleet from Karachi to Gwadar.

Lubricating Oil (POL): In most cases, about 20 litres of lubricating oil is required during a fishing trip that lasts for 30 to 40 days. For the purchase of lubricating oil and grease, an expenditure of Rs 0.30 to 0.35 million is incurred, and there are no major differences between the rates of lubricating oil (POL) between Karachi and Gwadar; therefore, it is not one of the reasons for the shifting of the fleet from Karachi to Gwadar.

Ice: For the purchase of ice, an expenditure of Rs 0.15 to 0.20 million is incurred, and there are no major differences between the rates of ice between Karachi and Gwadar; therefore, it is not one of the reasons for the shifting of the fleet from Karachi to Gwadar.

Potable Water: It is a minor expenditure, as only Rs 0.020 million is incurred if potable water is procured at Karachi and Rs 0.025 million if procured at Gwadar. There is a shortage of potable water in Gwadar, but it can still be procured at a bit higher price than in Karachi. Since there is no major differences between the rates of potable water between Karachi and Gwadar, it is not one of the reasons for the shifting of fleet from Karachi to Gwadar.

Shifting of the Fishing Grounds

The fishing boats engaged in tuna fishing operate within a radius of 200 to 300 km from their base stations; however, boats based in Karachi and Gwadar have wider areas of operation, as far as 500 km from the base station. The information gathered during a study from 2012 to 2026 revealed that there are 10 major fishing grounds along the Pakistan coast. Of these, off Ghorabari seems to be the most preferred location for boats based in Karachi, whereas off Ormara and Malan are also important fishing grounds for boats operated from Gwadar. Larger tuna vessels operate in offshore waters of the Area beyond National Jurisdiction (ABNJ) and waters in Somalia and Yemen.

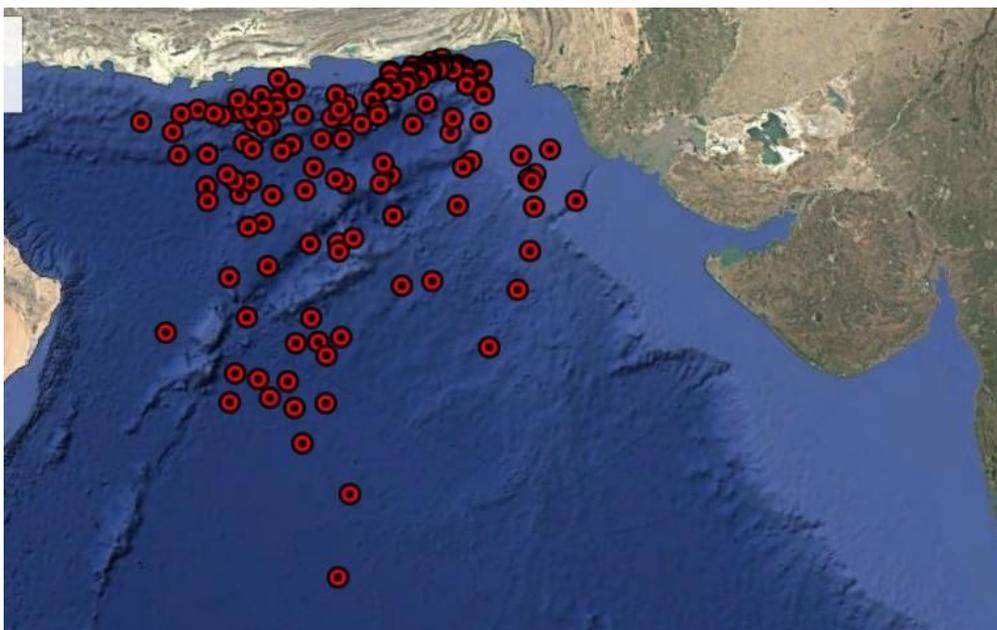


Fig. 2. Fishing grounds of tuna gillnet vessel based in Gwadar

In the area between 2012 and 2014, most tuna gillnet vessels used to operate in the Ghora Bari area, the continental shelf area of Sindh, and deeper waters off the Sindh coast, mainly because of the threat of Somali Piracy. There were several reports of hijacking Pakistani tuna gillnet vessels from the offshore waters of Balochistan, Iran, and Oman during that period. In some months (February to April), fishing vessels operate in the Sonmiani Bay area between Ormara and Phor as catches of large pelagic, especially longtail tuna, narrow-barred Spanish mackerel (kingfish), queenfish, and large trevallies are comparatively higher in the area. Narrow-barred Spanish mackerel (kingfish), queenfish, and large trevallies fetch high prices in Pakistan, whereas longtail tuna used to be transported to the neighbouring country.

Between 2014 and 2021, the trend changed substantially because of the cessation of Somali piracy, as most of the vessels started operating in the offshore waters of Pakistan. The operation of the tuna gillnet vessels was not confined to the continental shelf area of Sindh, and deeper waters off the Sindh coast, but vessels also started their operations in the offshore waters of Balochistan, and more frequently operated in the ABNJ off Pakistan. Their main area of operation was observed in the waters off Ormara and Phor; however, at the beginning of the fishing season (August-September), their operational area was on the eastern coast of Pakistan.

With the onset of the fishing season in 2021, almost the entire tuna gillnet fleet, which used to be based in Karachi, shifted its operational base to Gwadar. Accordingly, the operational area of the tuna gillnet vessels has shifted more towards the western part of Pakistan. Their main area of operation was observed in the waters off Ormara and Phor; however, some of the vessels continue to operate in the Ghora Bari area, especially during September and December. Their frequency of operations in the offshore waters and in ABNJ area was observed to have increased. The entire fleet is now based in Gwadar and takes their supplies before the start of a fishing trip and offloads the catch at Gwadar or the transport boats near the border with the neighbouring country. In rare cases, especially if the repair of the engine is required, a few vessels may offload their catch at Karachi Fish Harbour. It was observed that while operating from Karachi, the crew of the vessels is frequently changed. In case of failed fishing trips or when the catch is low, the crew opts to change to other fishing boats or to other fishing operations. While operating from Gwadar, the crew does not choose to shift to other fisheries or fishing boats; therefore, they are usually bound to be associated with a particular gillnet vessel. This saves a substantial amount of time because for the replacement of the crew, a new

set of documentation is required, which at times is time-consuming and usually leads to a delay in the start of the new fishing voyage. This is one of the reasons that captains prefer to operate from Gwadar in comparison to Karachi.

Marketing of the Fish Catch

Tuna species are not locally consumed and mainly transported to neighbouring countries. Yellowfin, skipjack, and longtail tuna, as well as billfishes and narrow-barred Spanish mackerel, are in high demand in the neighbouring countries, whereas neritic tunas, including kawakawa and frigate tuna, are mainly salted-dried and exported to Sri Lanka. An analysis of the prevailing prices of prime tuna species in Karachi market indicates that they fluctuate between Rs 200 and 350/kg during 2012 and 2026. The prices in the same period in Gwadar fluctuated between Rs 300 and 450/kg. The difference in unit prices is an attraction for tuna gillnet vessels to operate from Gwadar, but most tuna vessels operate from Karachi because of the facilities available at Karachi. Before 2021, the vessels based in Karachi used to sell a part of the catch to transport boats, if they were operating in the area near a neighbouring country. In addition, a system of trans-shipment to other fishing vessels at high seas was also available, through which a part of the prime catch used to be disposed of.

It may be pointed out that tuna caught offloaded at Karachi is ultimately and directly transported to the neighbouring country, mainly by road routes. However, a substantial part of the fish offloaded at Karachi is transported by road to Gwadar, from where it is shipped to the neighbouring country by transport boats. By 2021, most tuna vessels had decided to shift their operational base to Gwadar, and since last 6 years, almost the entire tuna gillnet fleet is operated from the area.

It may be added that in Karachi Fish Harbour, all landed tuna is open auctioned and is categorized as Grade A, B, C and D. Grade A tunais the one which is more than 20 kg for yellowfin, 10 kg for longtail and 5 kg for skipjack and fish must be properly preserved in ice with no bruises, cuts or marks on the skin and usually fetch highest of the prevailing prices. It was observed that about 40 % of the catch of a 35-day fishing trip is categorized as Grade A. Grade B include tuna species of comparatively smaller sizes and have minor bruises, cuts, and marks of the body. Such a fish fetch about 50 % of the prevailing marketing prices. It was observed that about 30 % of the catch of the 35-day fishing trip is categorized as Grade B. The

fish that have visible bruises, marks, or cuts are rated as Grade C, which accounts for about 20 % of the catch of a 35-day fishing trip. It fetches about 25 % of the prevailing prices. Grade D includes fish that are damaged, or have mutilated body which are rejected and usually end up for fishmeal or local consumption. In most cases, about 10 % of the catch of a 35-day fishing trip is categorized as Grade B. It may be pointed out that this system of grading was prevailing in Karachi since long time, but has been strictly implemented by auctioneers and middlemen since 2020.

There is almost no categorization prevailing in Gwadar. In most cases, tuna gillnet vessels operating from Gwadar offload their catch on transport boats (locally known as “Kayak”), which take the fish to canning plants located in the neighbouring country through middlemen. These transport boats procure all fish at premium prices and only reject only fishes that are fully damaged, or have grossly mutilated bodies, which accounts for only less than 5 % of the catch. Because of the grading system and lower prices prevailing in Karachi Fish Harbour, fishermen get almost half through sale proceeds as compared to the same quantity of tuna sold through the system prevailing in Gwadar.

CONCLUSION

A major shift in the operational base of tuna gillnet vessels from Karachi to Gwadar was made since 2021, and now only a few such vessels are operating from Karachi. This major change occurred mainly because of high prices being offered at Gwadar, simplicity in the marketing or sale of fish (tuna are not graded on the basis of quality), and, to a lesser extent on the availability of cheap fuel in Gwadar. It may be added that the prices of fuel was always low in Gwadar; however, since cheaper fuel was available at high seas to fishing boats that were operated from Karachi, therefore, it was not a major attraction for the fishing vessels to operate from Gwadar. It is worth mentioning that a large number of tuna vessels that were originally registered in Gwadar (and other parts of the Balochistan coast) used to operate from Karachi Fish Harbour prior to 2021. The migration of the tuna gillnet fleet from Karachi to Gwadar has made major changes in the tuna fishing operations.

- Tuna gillnet vessel earn more because of high prices as well as the non-prevalence of the grading system.

- Since fuel is the major expenditure in the tuna gillnet operations, the fishing operation became cheaper, resulting in more savings for the crew and captain of such vessels.
- Because of the shifting of the tuna gillnet fleet to Gwadar, the operational area of such vessels has shifted more towards the Balochistan coast.
- Replacement of crew has been reduced substantially, therefore, turnaround time for fishing vessels operating from Gwadar is reduced.
- Gwadar is a small town that is not an important shopping area; therefore, those fishermen (mainly crew) make more savings, as they do not spend money on shopping for their families. This has a noticeable impact on the socio-economic condition of the fishermen.
- Karachi Fish Harbour is heavily congested, and the operation of the fishing vessel in such cramped environment with different categories of boats (for offloading and loading of ice and other supplies) results in frequent damage to the gillnet boats. Operation from Gwadar is hassle free, as Gwadar Fish Harbour is not congested.
- There are some additional payments that are to be made if fish is offloaded at Karachi Fish Harbour, including a charge of about 6 to 10 % on gross sale, which is paid to auctioneers. Additionally, other payments such as loading of ice and supplies, and offloading of the catch. No such payment is to be made in Gwadar.

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