

## Fishing Performance and Marketing Channel of the Marine Fisheries: An Empirical Study Using Primary and Secondary Data

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### Abstract

The Bay of Bengal is an important resourceful asset of Bangladesh, which has a lot of impact on the economy through its proper use. Marine fish and fishermen are the essential mechanisms for the economy. Thus, the investigation was undertaken to explore the assessment of marine fishing performance and fish marketing channels. Two marine fishing locations and 90 marine fishermen were selected. Information was gathered with a structured interview schedule. About 50% of fishing crafts were large; 8 to 17 fishermen operated those in the deep region of the Bay of Bengal and the majority of them (52.2%) were rented. About 48% of fishermen used their gear, 51% had large gear mostly rented and 54.4% received loans with interest from traders, banks, and NGOs. Shrimp/prawn production is lucrative for marine fishers and supportive of the national economy. The major problems faced by most of the fishermen of the two locations were the weather, engine breakdown, and prohibition of fishing time and Robbers in the Moheshkhali deep sea, whereas the use of pass cards, wild animals, protection by forest office and use of poison in Mongla. There are four marketing channels for marine fish and most (81%) sell to the whole sellers. A present marine fish marketing channel is more time-consuming for a great number of intermediaries, insufficient road links and landing points/centers. To minimize this problem, modern information technology should be introduced, set up collective markets at coastal landing places, and reduce the number of middlemen.

### Keywords

Marine Fishing, Marketing Channel, Survey Data

### Introduction

The seaside of Bangladesh is wealthy in likely reserves contributing numerous perceptible and non-perceptible welfare to the nation. Fisheries resources are extremely valuable to uphold the socioeconomic and food haven in Bangladesh. The overall fish production was 4,600,000 metric tons in Bangladesh where the marine production was 700,000 metric tons i.e. 14.7% of the overall production in the year 2020-21 (Manik, 2022) those were only from marine catches. Bangladesh was ranked 14th among the best 30 marine water animal producer countries in 2021-22 (FAO, 2024). A large portion of the coastal zone is the territory for commercially significant finfish, crab, prawn, shrimp, and seaweed species (AftabUddin et al.,

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2021). Bangladesh is prosperous in marine and coastal resources but has a lack of controlling authority (Shamsuzzaman et al., 2017) in respect to management aspects. Therefore, the country faces problems in meeting the animal protein requirement, earning additional foreign currency, and controlling its biodiversity.

The rich marine resources both in sea area and biological fullness in Bangladesh play a significant part in the national economy, job creation, and ensuring food availability in bettering the route of socioeconomic conditions (Islam et al., 2024). The sea atmosphere of Bangladesh is enhanced with nutrients from the land and high yield due to the hot tropical climate and enough rainfall (Hossain, 2001). In Bangladesh, a lot of people are engaged in fishing activities in the coastal region as a source of their livelihood. Directly or indirectly 10 million shoreline fishers depend on their earnings (Hoque et al., 2021) and 270,000 fishing households sometimes trust marine fish catch for livelihood (Islam and Shamsuddoha, 2018). The coastal region has grown considerably over the period and is playing a very important role in the local economy, foreign exchange earnings, and livelihood of the local community. The marine fish distribution channel plays a crucial role in fish marketing, as it is perishable. Channels are essential aspects during the time consumed from basis to consumers since channel choice directly affects the disposal pursuits and profitability.

Smallholder fishers in the coastal region catch marine fish on the shoreline and sometimes in the deep sea for their household expenses. They use various kinds and sizes of fishing vessels and gear and sell the fish to the people of various kinds of markets. They have limitations and face a lot of problems in fishing like lack of robber, weather-prohibited time, etc., and also sell their caught fish. All kinds of fishing vessels involved in fishing have been banned from 2019 on the Bay (Baul, 2022) hence causing pressure among the fishers, as most of them are disadvantaged. Therefore, it is crucial to identify and assess the mode of operation of fish catch, types of fishing materials, and fish distribution channels. Also, it is essential to assess various issues and limitations in fishing and distribution or marketing channels. The information will carry sustainable progress and better the livelihood state of concerned stakeholders in the study areas. Considering all the features into account the existing study was taken on to the statistics of marine fish catches, marine fishers fishing performance, distribution channel, and problems in fishing and marketing.

### **Methodology**

Firstly, Bagerhat and Cox's Bazar districts were selected out of 19 coastal districts adjacent to the Bay of Bengal. Secondly, Mongla upazila was selected from Bagerhat district consisting of 9 upazilas which is located at 22.4833°N 89.6083°E while Maheshkhali upazila was selected from Cox's Bazar district consisting of 9 upazilas which is located at 21.5500°N 91.9500°E. Thirdly, Chila and Charpai unions out of seven unions from Mongla upazila and Dhalghat unions out of eight unions from Maheshkhali upazila were selected for the required study. The main criterion for the selection of the study locations was a suitable geographical coverage for fisheries and concentration of different types of marine fishermen in fishing activities in the Bay of Bengal. In the selected location, a good number of fishermen are engaged in marine fishing, there are 6655 licensed marine fishermen in Mongla upazila and 7255 in Maheshkhali. Around 900 marine fishermen were listed from two selected unions Chila & Chadpi and 900 from Dhalghat considered as population. A sample (90 fishermen) of representative farms, 45 from each upazila comprising younger, middle-aged, and elderly experienced fishers, was chosen in such a way that the information met the purpose of the study.

To achieve the objectives of the study, a comprehensive interview schedule was used to collect data. Firstly, a draft survey schedule was prepared and pre-tested in such a way that reliable data could be collected from the marine fishermen. After that, the draft schedule was improved, rearranged, and modified in light of the actual and practical experience gained during the pre-test. After making necessary adjustments a final survey schedule was developed in a logical sequence so that the marine fishermen could answer chronologically. The data were collected from the marine fishermen through face-to-face interviews when they were not so busy with their activities. The questions were asked systematically in a very simple manner with explanations whenever it was felt necessary and the replies were recorded on the schedules. Field records were gathered in the uttermost fishing season from April to September 2022. In addition, the secondary information having relevance to this study was also collected and discussed for this research from different reports; and published and unpublished documents of the Government of Bangladesh like the Statistical Yearbook of Bangladesh and Bangladesh Economic Review. Computer software packages like Microsoft Excel and Statistical Package for Social Science (SPSS) were used for analyzing the data. The final results of the analysis were summarized and presented in tabular forms with meaningful interpretations.

## **Results and Discussion**

### **Statistics of marine fish harvest in Bangladesh**

In terms of land area, 32% (47,200 km<sup>2</sup>) of Bangladesh belongs to the coastal zone with a population of about 40 million, which is 28% of the country's total (Akandah et al., 2015). The slope of the continental edge is very steep and it seems trawling is not possible in waters deeper than 180 meters. Artisanal fisheries play a vital role for the people in the shoreline parts. Usually, fishers catch fish from near-shore water for their livelihoods, operating traditional fishing practices by ordinary boats and modest gear. Artisanal fishing represents 80 percent (534,600 tons) of the total marine production (671104 tons) in 2019-20 (Alam et al., 2021). About 67,669 mechanized and artisanal boats were engaged in traditional fishing with mechanized and non-mechanized gear allowed up to 40 meters deep sea in the Bay of Bengal. Whereas, 231 industrial trawlers out of 262 industrial fishing trawlers were active and were allowed to operate up to 200 meters to the end of the EEZ in the fiscal year 2020-21 (Fisheries Department Annual Report, 2021-2022). The traditional artisanal fishing boats near the shore use relatively simpler gear such as gillnets, set bag nets, and trammel nets, involving three to five fishers whereas long-liners and purse seiners are used for industrial fishing trawlers. The amounts of catches of marine fish from 1965-66 to 2019-20 are shown in Table 1. Production of marine fish has increased steadily for the last few years, indicating a viable alternative for more fish production to meet the demand of the vast population of the country. Shrimp cultivation in saline water distributes a meaningful export portfolio adding to the economy of the country. Yearly 137,021 MT of shrimp and prawn were produced (Yearbook of Fisheries Statistics of Bangladesh, 2022) of which 30,571 MT of shrimp were exported.

Historically artisanal fisheries are the most valuable contributor of coastal fisheries in Bangladesh. The major used fishing crafts are trawlers, mechanized boats, and non-mechanized boats. Only 24 trawlers were used in 1980-81 whereas its number increased to 255 in 2019-20 i.e. per year increases 6 trawlers. The major used fishing gears are gill nets, long lines, and seabed nets. The major fish catches in the Bay of Bengal are salmon, hilsa, catfish, shark and skates, jewfish, Bombay duck, shrimp, and prawn. There are 475 species of finfish,

36 species of shrimp, 16 species of crab, and 165 species of seaweed in Bangladesh (Tora, et al., 2022). One of the problems facing the marine and coastal fishing communities of the region is the unsustainable harvesting of resources. Another problem is the continuous degradation of highly productive coastal and near-shore marine habitats such as coral reefs, mangroves, estuaries, sea-grass beds, and other shallow spawning and nursery areas. The sustainability of the marine fisheries resources is a great challenge to Bangladesh, although it has great potential to increase the productivity of shrimp and prawns by introducing intensive and semi-intensive methods of farming. Recently, climate conversion and the connection of coal-based power plants approaching the seaside have been the key concerns for upholding the marine water ecosystem. Furthermore, marine fisheries resources have not yet been harvested rationally due to a lack of stock assessment; lack of modern fishing vessels, and scientific management strategies.

### **Fishing Performance**

In the study area, it was found that 46.7% of fishermen have their own gear and 53.3% others (neighbor fishermen or fish traders, etc.), whereas 26.7% having small gear (which gear operated by 1 to 2 fishermen), 22.2% having medium gear (3 to 6 fishermen operated) and 51.1% having large gear (8 to 17 fishermen operated). Numerous kinds of gears (like gillnets, set bag nets, long line nets, etc.) and crafts (like DINGI, BALAM, CHANDI Boat, trawler, etc.) were used in the study areas. It was observed that 47.8% of fishermen have their craft and 52.2% of fishers depend on others' craft (Table 2). It was also found that 28.9% of fishing craft were small operated by 1 or 2 persons in the shallow water, 21.1% were medium operated in the coastal region of Sundarbans by 4 to 6 fishers and 50% of fishing crafts were large operated by 8 to 17 persons in the deep region of Bay of Bengal.

The fishing frequency of marine fishermen was regular (87.8%), occasional (7.8%), and very rare (4.4%). Two types of fishing modes were observed in the study areas (i) independently (27.8%) and (ii) fishing with groups (72.2%) consisting of 4-20 fishermen (Table 2). Most of the fishermen are involved with fish traders, NGOs, and banks in the study area. Mainly, two sources of funds were observed, e.g. 45.6% of the fishermen used their funds and the remaining fishermen received loans with interest like 34.4% from fish traders and 20% from bank loans or NGOs. Similar findings were expressed by Alam and Bashar (1995). Ali (2013) found that 62.5% of the fishermen of the coastal river received credit facilities. It was observed that 65.6% of fishermen invested 200 – 500 USD in fishing, 24.4% of fishermen invested more than 1000 USD and only 10% of fishermen invested more than 2000 USD for fishing.

### **Problems with fishing**

Progress of marine fisheries has been given low priority compared to overall fisheries and hence management activities are far from perfect. Frequent constraints have been known as inadequate information and knowledge on fish stocks, artisanal fishermen overfilled in shallow waters, scarce landing conveniences, the nonexistence of contemporary lighting technology, lack of finance, etc. Alam and Thomson (2001) found similar kinds of results. Marine adulteration has grown at a disturbing stage, vessel cleaning or contravention as well as imported boat clearing is harmful and even dangerous garbage in recent years. The main problem faced by most of the fishermen (88.9%) in Maheshkhali was the robbery of their trawlers in the deep sea, but this figure was 22.2% in Mongla. Weather and engine breakdown in the deep sea were found to be major problems for 78.9% and 61.1% respectively of the total

marine fishermen (Table 3). They have nothing to predict in advance or seek shelter quickly and that's why adverse weather conditions are very painful for them.

Pass cards are essential for those who harvest fish in Sundarbans area, which is a big problem for 100% of the fishermen in this area. To go fishing for seven days they have to deposit some money in the government treasury, but they have to spend 40-50 USD extra for some local miscreants. Fishers faced problems with restricted fishing time in 81.1% of cases. Prohibited time occurs on specific species but at this time, they could not catch other species, and the government could not help them properly. These constraints may be overcome to some extent by exploitation of deeper sea pelagic, through control of fishing vessels, prohibition of risky fishing techniques and gears, the nuisance of a restricted fishing season, and other regulatory procedures.

### **Shrimp culture in coastal areas**

Shrimp culture has a substantial impact on the socioeconomic prestige of the societies, which performs a dynamic role in the financial rise of coastal inhabitants (Washim et al., 2020). Shrimp culture has exposed rapid growth with a serious contribution to the economy of Bangladesh (Hossain and Hasan, 2017). A large extent of brackish water under shrimp cultivation in the southwestern (greater Khulna region) and southeastern (Cox's Bazar region) of the country practices either monoculture or rice or salt alternative. Production and export of shrimp have endured swift growth throughout the last two decades (Table 4). Shrimp and prawn jointly signify the second leading exportable products for foreign earnings of the country. The shrimp industry employs 87 thousand individuals in cultivation activities, while more than 5 to 6 thousand households are employed in shrimp processing and additional businesses. Shrimp/prawn and crab culture have developed into a hugely profitable industry due to enormous demand in international markets (Ahmed and Glaser, 2016). Thus, shrimp farming is a profitable attempt for the poor coastal communities, having the privileged prospect of harvesting welfare and providing to the national economy of the nation.

Most of the brackish water shrimp culture follow extensive farming practices (Hasan et al., 2020) totally trusting on usual production where little management in respect of drying the pond bottom, plowing, liming, fertilization, and feeding with stocking density of 2-15 thousand PLs/ha and annual yield is 160- 230 kg/ha. On the other hand, an improved extensive method is a slight modification of the traditional extensive method, whereby farmers apply a few aspects of shrimp farming technologies with a stocking density of 10-25 thousand PLs/ha and yearly harvest of 350-500 kg/ha. Production of shrimp and prawns was 251,964 MT of which 46,297 MT (18.3%) was from marine sources during 2020-21 (DoF, 2022). Shrimp farming technology in Bangladesh has been strengthened over the previous years, but the invention of flats has not expanded acceptably because of improper and irrational input supply. The soil, water salinity level, and promising climate are extremely suitable for shrimp farming, so shrimp and prawns can be farmed at least twice a year. Bangladesh's shrimp industry both in cultivating and processing has improved but needs to continuously promote the quality guarantee package as per the obligation of the importing countries to recall its position in the global market.

## Marketing channel

Ruling of fish production and ingesting through sale is known as fish marketing, which is a unified share of the fish industry. The disposal or market channel arrangement of harvested marine fish is one of the fundamental issues and it is a multifaceted sequence from harvester/fisherman to consumer. First of all, after harvest, fish are categorized into several classes according to size, washed, and held at low temperatures. A group of people handle the process and dispense the fish. Marine fish are disposed of by numerous kinds of intermediaries. When a fishing boat or trawler reaches the bank of the sea, fish are shifted to first-hand buyers through tenders, or fishes are shifted to processing plants that have their vessels. Purchased fish are preserved in cold storage for quality maintenance and storage at distribution centers. In the next stage, two kinds of buyers purchase fish (i) send it to the local market for local consumers and (ii) buyers process it further in the processing plants and export it to various countries later. These kinds of buyers are considered as the second stage of middlemen. Local market representatives termed as ARATDAR purchase fish from the second kind of middlemen from the cold storage or directly from the party. The last kind of middlemen of the fish disposal channel is termed as retailers who have no stable establishment but have set spaces to sit in the marketplace or retail fish to the ultimate consumers roving from door to door with heads.

The findings of this study were a little bit different from the above discussion where four channels of marine fish marketing were observed and are shown in Figure 1. It was found that the maximum fishermen sell their fish to the sellers in the study areas. The sale place of marine fishermen to sell their catches was found 81.1% wholesalers, 5.6% on landing centers, and 13.3% to consumers and retailers. Marine fishers spend their major time fishing and selling fish to commission agents or wholesalers but fishers have small vessels sale directly to the consumer (Jadhav and Bogave, 2022). There was no remarkable fishing technology except mobile phones (37.8%). Fourth-type marketing practices were done to distribute fish to different divisions of the country. The present disposal system uses more time from harvest to end-users because of the syndicate consisting of a great number of intermediaries (Ahsan et al., 2016) and the activity of tender initiates after the entrance of the fishing vessels in the seashore. In addition, there are no particular road links, landing points, or centers and a deliberate convey network. As a result, opportunities create money for the middlemen and increase the buying price for the final consumer. On the other hand, for the above causes and the lack of preservation facilities, the quality of the fish is affected severely. To overcome these adverse situations, online selling schemes may be introduced, and contemporary information technology to minimize the information gap by reducing middlemen and safeguarding the quality of fish and consumer buying prices.

Marine fishers usually use outdated fishing crafts that are landed in insufficient landing places. Notable portions of the fish are damaged due to having very poor transport facilities, causing food security and health problems. Wholesale markets of marine fish suffer from auction huts, packaging huts, terminals for landing and drainage services, and the retail markets from insufficient sale places, cleaning, washing, water resources, and maintenance (Begum et al., 2014). A study by Rabbani et al., (2017) found that 62% of fish traders face fish marketing problems, 73% of marine fishers suffer from a deficiency of fish landing centers, 68% from poor transport coordination, and 15% from inaccurate market facts in time. Establishing contemporary wholesale marine fish markets in urban areas and establishing well-operative assemblage markets at coastal landing places will be helpful for fishers as well as sustainable marketing.

The above information is summarized in the following tables and figures. Table 1 shows the marine fish harvest from 1965 to 2020. Followed by Table 2 which depicts Fishing Gears and Crafts Used and Fishing Status. In Table 3 the problems in Marine Fishing Faced by the Fishermen are presented. Then Table 4. Shrimp Production and Export in Coastal Region are presented. Figure 1 shows the Marine Fish Marketing Channel.

Table 1. Marine Fish Harvest in Bangladesh

Year	Catches (MT)	Proportion of marine catches to country total (%)
1965-66	81000	10.11
1970-71	85000	10.44
1975-76	95000	14.84
1980-81	125000	19.23
1985-86	207401	26.12
1990-91	241538	26.96
1995-96	269702	21.44
2000-01	379407	21.30
2005-06	479810	20.61
2010-11	546333	17.84
2015-16	626528	16.15
2019-20	671104	14.90

Table 2. Fishing Gears and Crafts Used and Fishing Status

Fishing gears and crafts		Fishing status and sale place	
Variable/ Category	Number of fishers	Variable/ Category	Number of fishers
Gear own		Fishing frequency	
Own	42	Regular	79
Rented	48	Occasional	07
Gear size		Rare	04
Small	24	Fishing mode	
Medium	20	Independent	25
Large	46	Dependent	00
Craft own		Group	65
Own	43	Sale place	
Rented	47	Landing center	05
Craft size		Fish ARAT	73
Small	26		12
		Retailer/Consumer	
Medium	19		
Large	45		

Table 3. Problems in Marine Fishing Faced by the Fishermen (%)

Problems	Mongla	Moheshkha li	Total
Robber	22.2	88.9	55.6
Weather	77.8	80.0	78.9
Engine breakdown	55.6	66.7	61.1
Pass card	100	00	50
Wild animal	66.7	00	33.3
Prohibited time	77.8	84.4	81.1
Forest office	88.9	00	44.5
Poison using	73.3	00	36.7

Table 4. Shrimp Production and Export in Coastal Region

Year	Area (Hectare)	Production (MT)	Export of Frozen Shrimp (MT)
1985-86	87300	14658	13631
1990-91	108280	20335	17985
1995-96	137996	46223	25225
2000-01	141352	64646	29713
2005-06	217877	85510	49317
2010-11	276492	108939	54891
2015-16	294917	125699	40726
2019-20	257888	270114	

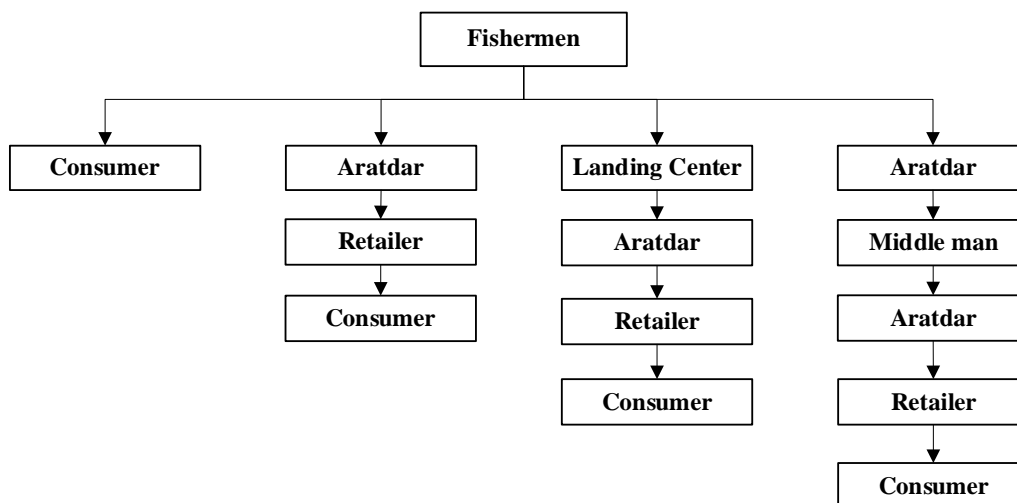


Figure 1. Marine Fish Marketing Channel



## Conclusion

A smaller number of fishermen have their fishing gear and craft to fish in the sea and they do not have any modern technology with which they can harvest large quantities of fish in the deep sea. All types of regular or irregular fishermen fish in the deep sea in a groups for eight to ten days and sell the fish to the traders. To overcome the difficulties of the deprived fishers, profound implementation of the fishing regulations to conserve the sea resources, effective extension service to create awareness regarding sustainable fishing, management of the Sundarbans forest, establishing income creating activities, conservation of market value chain, monetary as well as training support from organizations and fishery cooperative are required. Moreover, to improve the socio-economic condition their problems in fishing should be eradicated from the root level. It is crucial to ensure the security of the fishermen from all kinds of dangers by strengthening forest guards and police force with coast guard involvement to give the maximum benefit to fishers and legal resource extraction.

The government should establish a credit system to provide short-term loans and alternative livelihood prospects to the fishermen. The marketing channel should be developed by government interference so that the fishermen obtain the actual price of the fish. There are no strict rules and regulations as well as consciousness among the people in the study area. The government should provide loans to the fishermen and establish strict rules and regulations for developing the existing fishing and marketing channels practiced by fishermen. Sea fish disposal in Bangladesh is overwhelmed with several unresolved issues. Efficient and quicker disposal of marine fish may be possible by proper use of information arrangement and by introducing and managing an appropriate supply chain. Wholesale and retail fish markets need to be improved and it is necessary to offer government and extension facilities including more research in fish marketing.

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