

*Research article*

## **Fish availability, marketing system and value chain analysis of some important commercial marine species at local markets of Cox's Bazar, Bangladesh**

*Sumit Kanti Dey<sup>2</sup>, Tahsin Sultana<sup>1\*</sup>, Subrata Kumar Ghosh<sup>1</sup>, Tabassom Rehnuma Raisa<sup>1</sup>, Nafisa Nawar Tamzi<sup>1</sup> and Md. Faisal<sup>1</sup>*

<sup>1</sup>Department of Fishing and Post-Harvest Technology, Chattogram Veterinary and Animal Sciences University, Chattogram-4225, Bangladesh

<sup>2</sup>Department of Aquaculture, Chattogram Veterinary and Animal Sciences University, Chattogram-4225, Bangladesh

**A R T I C L E I N F O**

Article history:

Received: 18/10/2022

Accepted: 07/06/2023

*Keywords:*

Fish market, Marine fish, Marketing Channel, Cox's Bazar

*\*Corresponding author:*

Cell: +88-01851367123

E-mail: tahsin@cvasu.ac.bd

**A B S T R A C T**

The diversity of fish is crucial for aquatic resources of Bangladesh to be sustainable in the future. Fish biodiversity is threatened by stresses brought on by overfishing, climate change, habitat loss, eutrophication, and pollution. In order to make recommendations for effective management of a fish marketing system in Cox's Bazar, this research was created to look at the availability of fish species, marketing channels, value chain analyses, and constraints connected with three fish marketplaces. Primary data were collected by using questionnaire interviews, Participatory Rural Appraisals (PRA) and cross-check interviews with key informants from Kolatoli, Baharchara, Boro Bazar fish markets for almost two months from the midway of September 2021 to November 2021. Data were analyzed using Microsoft Excel Software. A total number of 96 fish and shellfish species were recorded during the study period in the three fish markets of Cox's Bazar. Fish market was dominated by the Hilsa fishes (22%) followed by pomfret (14%), seabass (11%), Bombay Duck (9%), Ribbon Fish (8%), Croaker (8%), Tuna (7%) and other species. Hilsa was dominated in the studied market because all of the markets are located in the Southern coastal belt. Among freshwater fishes, species such as Kajuli, Bheda, Gulsha tengra, Tara baim, Shal baim, Tit punti, Rani, Lomba chanda were rare and Gura tengra, Guchi baim, Kakila, Darkina, Dhela, Gutum were very rare in the market due to inadequate supply. Price of Golda chingri (*Macrobrachium rosenbergii*) (600-1200 tk/kg) and large size Hilsha (800-1200) were always high in all of the three markets. In the distribution channel of the fish trade, three tiers of market or marketing systems were observed: primary, secondary and final consuming markets. The landing area's main attraction was the primary market. Following the primary and secondary markets, the consumer market had a substantially larger marketing margin and revenue. Inadequate ice facilities as well as lack of preservation facilities were highlighted as the key problem at three fish markets in Cox's Bazar during the current study.

**To cite this paper:** S. K. Dey, T. Sultana, S. K. Ghosh, T. R. Raisa, N. N. Tamzi and M. Faisal, 2022. Fish availability, marketing system and value chain analysis of some important commercial marine species at local markets of Cox's Bazar, Bangladesh. *Bangladesh Journal of Veterinary and Animal Sciences*, 10(2):22-33.

## 1. INTRODUCTION

Fisheries sector of Bangladesh is rapidly expanding that has a great chance of blossoming into a stable economic engine. Marine fish is regarded as a valuable source of protein in Bangladesh because the supply of freshwater fish is dwindling. Each year, Bangladesh makes a substantial sum of foreign currency through exporting products derived from marine fisheries. The fisheries sector contributes 3.57% to the national GDP and more than one-fourth (26.50%) to the total agricultural GDP (DOF, 2021). Approximately 70% of the fish used and distributed for marketing purposes is fresh fish, 25% is dried fish and other locally processed fish, including fermentation, and the other goods are frozen (Hussain, 2012). Before reaching the end users in the marketing process, fish travels via a variety of market players and exchange venues. An efficient marketing system is required to make fish available to consumers at the right time and in the right place. The viability of this sector is interlinked with various factors related to fisheries like fisheries biodiversity, fish availability, fish production and its marketing systems, fisheries personnel, institutional infrastructures and developmental facilities etc. Among these, fish market and marketing system imply two-way approach where products are collected from the producers through intermediary channels and consumers go there for their desired commodities. Fish farmers, fishermen, fish landing centers, local or village markets, township markets, gathering sites, wholesale markets, and retail markets are some of the sequential events that make up the fish marketing system, which is mostly based on private ownership activities (Rahman et al., 2012). This market's sequential structure, which connects the production and consumer sectors through a few intra- and interlinkage middlemen, is known as the marketing channel. The fish marketing system in Bangladesh is entirely managed by the private sector, and it affects the livelihoods of a significant number of people involved in fish farming, processing, and packaging, as well as the supply chain. In our country, a typical fish market depicts a frequent scenario of disorderly activities that govern certain powerful people in the area, as well as a wide spectrum of social, economic, and political elements. Fishermen and fish growers are

frequently obligated to sell their catch to the trader/middleman (Aratdar/ Paikar) at a price set by the Aratdar/ Paikar. Because of their reliance on them for cash flows and their inability to speak up for proper pricing of their products, fishermen and fish growers are unable to fight against the low prices established by the direct intermediaries. Fishermen in the Cox's Bazar area of Bangladesh catch a vast number of marine fish. Hilsha, pomfret and seabass are major captures among these marine fishes. These fish are distributed around the nation through marketing channels. In Bangladesh, marine fish marketing is beset with issues such as rough treatment, incorrect cleaning and packaging, exploitation of fishermen by traders, insufficient transportation and inadequate storage facilities, a lack of finance, and market restrictions (Sabur and Rahman, 2014). To assure that fish is delivered to customers in a fresh state in a reasonable timeframe, consumers must rely on an effective fish marketing system. The prime objectives of this investigation are to know the present status of fish availability, marketing system of fish in Cox's Bazar along with their pricing mechanism as well as some issues that affects the fishermen, traders and other stakeholders.

## 2. MATERIALS AND METHODS

### Study area

The research was based on a market survey that included fishermen, fish traders, intermediaries, and fish retailers. Data for the present study were collected from three different fish markets in the Cox's Bazar district named Kolatoli, Baharchara and Boro bazar fish market. The survey also included the evening market in kolatoli fish market and boro bazar as baharchora fish market is out of context in this time frame. This study was carried out at three different types of fish markets: primary, secondary, and consumer markets. The survey had a total sample size of 120 people, with 45 fishermen, beparis and depot owners, 35 brokers and marketing agents, 25 retailers and 15 consumers making up the majority of the participants. The study's pertinent information was gathered via a questionnaire.

### Data collection methods

Primary data were gathered by field survey for a period of about two months from the midway of September 2021 to November 2021.

### Participatory rural appraisal (PRA)

Fishermen, bepari, retailers and their family members were taken into consideration through this strategy to ensure the maximal participation in the survey. The benefits of PRA over other strategies include better community engagement and a higher likelihood that the data collected is accurate (Chambers, 1992).

### Questionnaire survey

The questionnaire study involved interviews with a variety of market participants, including fishermen, assemblers, distributors, and retailers.

### Personal interview

Personal interview was taken from different contributors associated with the fish marketing system which included fishermen, bepari, retailer etc. in order to gather information about their own particular jobs.

### Rapid market appraisal (RMA)

RMA is a quick and easy approach to get policy-relevant and intervention-oriented data on any commodity sub-sector (Holtzman, 2003). Semi-structured interviews were taken from the key informants of associated stakeholders.

### Focus group discussion (FGD)

The focus group discussion (FGD) was utilized to acquire a better understanding of specific concerns.

### Cross check analysis

The accuracy of the data collected from the fishermen and intermediaries was examined through interviews with resource personnel in the study area, such as the Upazilla Fisheries Officer (UFO) at the Department of Fisheries (DOF) and the Manager of Bangladesh Fisheries Development Corporation (BFDC).

### Data processing and analysis

After being collected from the field, the data were checked for accuracy and consistency.

Data were prepared, and then Microsoft Excel software was used to evaluate the results.

### Ethical statement

Participants' consent was taken into account before the questionnaire survey. All of the respondents were made aware of the primary objective and potential advantages of the study before the poll was launched.

### Calculation

Total Marketing Margin (%)

$$\frac{\text{Consumer Purchase Price} - \text{Fishermen Sales Price}}{\text{Consumer Purchase Price}}$$

Total Marketing Profit

$$= \text{Total Marketing Margin} -$$

Total Marketing Cost

Table 1. List of Some Stakeholders in the Fish Marketing System of Cox's bazar

Name	Location	Occupation
Gias Uddin	Dorianagar	Fisherman
Rubel Hossain	Dorianagar	Fisherman
Monjur Ahmed	Nazirartek	Fisherman
Abu Taher	Nazirartek	Faria, Aratdar
Nur Ul Kader	Nuniachora	Fisherman
Idris Molla	Nuniachora	Faria, Aratdar
Rahim Uddin	Landing Centre	Aratdar
Abdul Karim	Landing Centre	Aratdar
Enayet Ali	Rijukhal	Aratdar
Imam Hossain	Sonapara	Retailer

## 3. RESULTS AND DISCUSSION

### Fish Availability and Price in the Market Sources of Fishes in the Market

According to the current study, the majority of fish species come from marine waterbodies (55%), with 25% coming from culture ponds and at least 20% coming from rivers, canals, ditches, and rice fields (Figure 1). Most of the fish (80%) were brought from different areas of the upazilla (Chakaria, Kutubdia, Maheshkhali) and the remaining part (20%) from Chattogram, Satkhira, Jashore, region

### Species Availability in the Fish Markets

A total of 96 (Table 4, 5 and 6) fish species belonging 42 freshwater, 44 marine and estuarine and 10 crustaceans and molluscs

species were available in the fish market. Generally, most number of fish species are found during the rainy season and lowest number of fish species can be spotted during summer season in three markets. A total number of 96 fish and shellfish species were recorded during the study period in the three fish markets of Cox’s Bazar. Al-Hasan et al. (2014) recorded

122 fish and shellfish species from three fish markets of Cox’s Bazar district which was higher than the present study. This could be due to a discrepancy in the time frame or duration of the survey. Aside from these factors, Loss of biodiversity owing to destructive fishing gear, pollution in the nature can be a probable reason for fewer species in the present study.

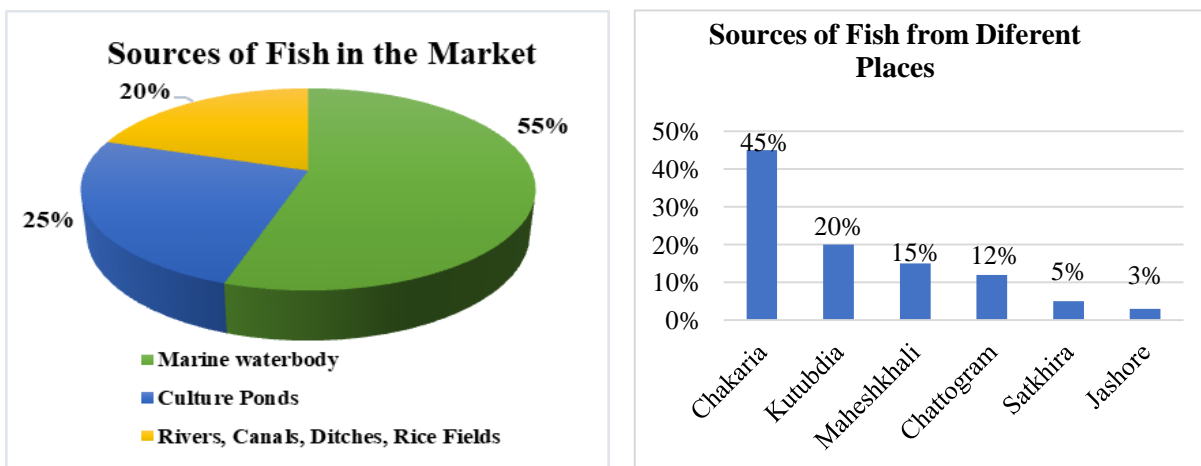


Figure 1. Sources of Fish in the Market

Table 2. List of Fish and Shellfish Species Coming from Different Places to Cox’s Bazar

Chakaria	Kutubdia	Maheshkhali	Chattogram
<p><b>Freshwater Fish:</b> Rui, catla, mrigal, silver carp, grass carp, common carp, bighead carp, kalibaush, tilapia, kachki, mola, dhela, koi, pangas etc.</p> <p><b>Marinewater Fish:</b> Ilish, rupchanda, folichanda, coral, loitty, churi, lal poa, shada poa, bash poa, mullet, khorsula, lakhua, tobol fish etc.</p> <p><b>Shellfish:</b> Bagda chingri, chaga chingri, harina chingri, shela kakra, squid, lobster etc.</p>	<p><b>Freshwater Fish:</b> Rui, catla, mrigal, kalibaush, tilapia, kachki, mola, dhela, koi, pangas etc.</p> <p><b>Marinewater Fish:</b> Chandana ilish, rupchanda, kakila, chapila, phasa, coral, loitty, churi, lal poa, bash poa, mullet, nuna baila, nuna tengra, khorsula, Datina, Barguni, lakhua, etc.</p> <p><b>Shellfish:</b> Bagda chingri, chaga chingri, harina chingri etc.</p>	<p><b>Freshwater Fish:</b> Rui, catla, mrigal, kalibaush, tilapia, koi etc.</p> <p><b>Marinewater Fish:</b> Ilish, rupchanda, kakila, chapila, phasa, coral, loitty, churi, lal poa, bash poa, mullet etc.</p> <p><b>Shellfish:</b> Bagda chingri, harina chingri, shela kakra</p>	<p><b>Freshwater Fish:</b> Rui, catla, mrigal, kalibaush, tilapia, koi, pabda, shing, magur, pangas etc.</p> <p><b>Marinewater Fish:</b> Rupchanda, chapila, coral, loitty, churi, poa, mullet etc.</p> <p><b>Shellfish:</b> Golda chingri, chaga chingri, shela kakra</p>

Table 3. Marketwise Fish and Shellfish Availability in Cox's Bazar

Name of Fish Market	Freshwater Fish	Marine water Fish	Crustaceans	Molluscs
Kolatoli	20	23	6	1
Baharchara	27	35	7	0
Boro Bazar	35	40	8	0
Evening market	24	23	6	2

The Hilsa fish (22%) sealed the fish market, with pomfret (14%), seabass (11%), bombay duck (9%), ribbon fish (8%), croaker (8%), tuna (7%) and other species following. In light of the fact that all of the marketplaces are situated in the Southern coastal area, Hilsa prevailed in the market under study. Al-Hasan et al. (2014) also represented Hilsa fishes (27%) as dominated species from the market of Cox's Bazar district. It was observed that rui, catla, thai pangus, silver carp, mirror carp, ilish, bata, tilapia, tengra, taki, koi, kachki, lottia, coral, poa, bhangan, phasa, chapila, chewa, prawn and shrimp species were most available in the market because those species have the highest demand in the market which showed similarity with Ali et al. (2014).

Among freshwater fishes, Species such as kajuli, Bheda, Gulsha tengra, Tara baim, Shal

baim, Tit punti, Rani, Lomba chanda were rare and Gura tengra, Guchi baim, kakila, Darkina, Dhela, Gutum were very rare in the market due to inadequate supply and habitat destruction of these species. Nurullah et al. (2001) found that 143 species of small indigenous fish in which Darkina, Puti, Tengra, Chapila, Batasi, Kholisha, Kakila, Golchanda, Gutum, were endangered in the fish market. The current study matches this result. Azam et al. (2016) represented that Ek thuitta, Foli chanda, Baghair, daat poa, Tulardandi, Saplapata, Hangor were absent in the market of coastal district. But the study recorded these marine fish species though they were not plenty in number. This might be happened due to place and time variation of survey. Another factor could be the survey conducted after the 22-day ban period in the ocean.

Table 4. List of Freshwater Fish Species in Different Markets of Cox's Bazar

Local name	Common name	Scientific name	Availability	Kolatoli	Baharchara	Boro Bazar	Evening Market
Koi (P)	Climbing perch	<i>Anabus testudineus</i>	Common	yes	yes	yes	yes
Kajuli (C)	Gangetic ailia	<i>Ailia coila</i>	Rare	No	No	yes	No
Shing (P)	Stinging catfish	<i>Heteropneustes fossilis</i>	Common	yes	yes	yes	yes
Magur (P)	Walking catfish	<i>Clarias batrachus</i>	Common	yes	yes	yes	yes
Bheda/mini (R)	Gangetic leaffish	<i>Nandus nandus</i>	Rare	No	No	Yes	No
Air (R,C)	Giant river catfish	<i>Sperata seenghala</i>	Common	Yes	Yes	Yes	Yes
Boal (R,P)	Fresh water shark	<i>Wallago attu</i>	Few	No	Yes	Yes	No
Bata (R)	bata	<i>Labo bata</i>	Common	Yes	Yes	Yes	Yes
Baila (R)	Scribbled goby	<i>Awaous grammepomus</i>	Few	No	No	yes	No
Chital (P)	Clown knife fish	<i>Chitala chitala</i>	Few	No	Yes	Yes	No
Foli (P)	Bronze featherback	<i>Notopterus notopterus</i>	Few	No	Yes	Yes	No
Gulsa tengra (R)	Gangetic tengra	<i>Mystus bleekeri</i>	Rare	No	yes	No	No
Tengra (P)	Striped dwarf catfish	<i>Mystus vittatus</i>	Few	No	No	Yes	Yes
Gura Tengra (C, D)	Hummingbird catfish	<i>Rama chandramara</i>	Very rare	No	No	No	Yes
Pangas (P)	Pangas catfish	<i>Pangasius pangasius</i>	Few	No	Yes	Yes	No
Taki (P)	Spotted snakehead	<i>Channa punctata</i>	Few	yes	No	No	yes
Shol (P)	Snakehead murrel	<i>Channa striata</i>	Few	No	Yes	Yes	No
Gusibaim (C, R)	Barred spiny eel	<i>Macrognathus pancalus</i>	Very rare	No	No	yes	No
Tarabaim (C, R)	One-stripe spinyeel	<i>Macrognathus aral</i>	Rare	No	No	Yes	No
Baim/shal baim (C,R)	Zig-zag eel	<i>Mastacembelus armatus</i>	Rare	No	No	Yes	No
Nandina (R)	Nandi Labeo	<i>Labeo nandina</i>	Very rare	No	No	Yes	No
Kakila (R)	Asian needlefish	<i>Xenentodon cancila</i>	Very rare	No	No	yes	No
Pabda (P)	Pabdah catfish	<i>Ompok pabda</i>	Common	Yes	Yes	Yes	Yes
Bhadi/jatpunti (C, P)	Pool barb	<i>Puntius sophore</i>	Common	Yes	Yes	Yes	Yes
Tit punti (C)	Ticto barb	<i>Puntius ticto</i>	Rare	No	No	Yes	Yes

Rani/bou Mach (C,D)	Bengal loach	<i>Botia dario</i>	Rare	No	No	Yes	No
Mola (P)	Mola carplet	<i>Amblypharyngodon mola</i>	Common	Yes	Yes	Yes	Yes
Dhela (D, P)	-	<i>Osteobrama cotio</i>	Very rare	Yes	No	No	No
Gutum (R)	Guntea loach	<i>Lepidocephalichthys guntea</i>	Very rare	No	Yes	No	No
Lomba chanda (C, R)	Elongate glass-perchlet	<i>Chanda nama</i>	Rare	No	Yes	No	No
Ranga chanda (C, R)	Indian glassy fish	<i>Parambassis ranga</i>	Few	No	Yes	Yes	No
Kachki (P)	Ganga river	<i>Corica saborna</i>	Common	Yes	Yes	Yes	Yes
Rui (P)	Indian major carp	<i>Labeo rohita</i>	Common	Yes	Yes	Yes	Yes
Catol (P)	Catla	<i>Gebelion catla</i>	Common	Yes	Yes	Yes	Yes
Mrigal (P)	Mrigal carp	<i>Cirrhinus cirrhosus</i>	Common	Yes	Yes	Yes	Yes
Silver carp (P)	Silver carp	<i>Hypophthalmichthys molitrix</i>	Common	Yes	Yes	Yes	Yes
Grass carp (P)	Grass carp	<i>Ctenopharyngodon idella</i>	Common	Yes	Yes	Yes	Yes
Common carp (P)	Common carp	<i>Cyprinu carpio</i>	Common	Yes	Yes	Yes	Yes
Minor carp (P)	Mirror carp	<i>Cyprinus carpio var. specularis</i>	Common	Yes	Yes	Yes	Yes
Bighead carp (P)	-	<i>Aristichthys nobilis</i>	Common	Yes	Yes	Yes	Yes
Kalibaus (P)	Orange-fin labeo	<i>Labeo calbasu</i>	Few	No	No	Yes	Yes
Tilapia (P)	Nile tilapia	<i>Oreochromis niloticus</i>	Common	Yes	Yes	Yes	Yes

\*C-Canals \*\* D-Ditches \*\*\* P-Ponds \*\*\*\* R-Rivers

Table 5. List of marine water fish species in different markets of Cox's Bazar

Local name	Common name	Scientific name	Availability	Kolatoli	Bahar chara	Boro Bazar	Evening Market
Ilish	Hilsa shad	<i>Tenuolos ilisha</i>	Common	Yes	Yes	Yes	Yes
Chandana ilish	Toli shad	<i>Tenualos toli</i>	Common	Yes	Yes	Yes	Yes
Rupchanda	Chinese pomfret	<i>Pampus chinensis</i>	Common	Yes	Yes	Yes	Yes
Falichanda	Silver pomfret	<i>Pampus argenteus</i>	Common	Yes	Yes	Yes	Yes
Coral	Seabass	<i>Lates calcarifer</i>	Common	Yes	Yes	Yes	Yes
Loittyta	Bombay duck	<i>Harpadon nehereus</i>	Common	Yes	Yes	Yes	Yes
Churi	Ribbon fish	<i>Trichiurus haumela</i>	Common	Yes	Yes	Yes	Yes
Churi	Smallhead hairtail	<i>Eupleurogrammus muticus</i>	Very rare	No	No	Yes	No
Churi	Savalani hairtail	<i>Lepturacanthus savala</i>	Very rare	No	No	Yes	No
Poa	Pama croaker	<i>Otolithoides pama</i>	Common	Yes	Yes	Yes	Yes
Ful/ Rupali Poa	Belanger's croaker	<i>Johnius belangerii</i>	Few	No	Yes	Yes	No
Bash poa	Hammer croaker	<i>Johnius borneensis</i>	Few	No	No	Yes	No
Daat poa	Tigertooth croaker	<i>Otolithoides ruber</i>	Few	No	Yes	Yes	No
Lal poa	Silver jew	<i>Johnius argentatus</i>	Common	Yes	Yes	Yes	No
Sada poa	Silver jew	<i>Otolithes argentatus</i>	Common	Yes	Yes	Yes	No
Bom maitta	Tuna	<i>Euthynnus affinis</i>	Common	Yes	Yes	Yes	No
Datina	Bengal seabram	<i>Acanthopagrus datnia</i>	Common	Yes	Yes	Yes	No
Bhangan	Mullet	<i>Mugil cephalus</i>	Common	Yes	Yes	Yes	Yes
Barguni	Jarua terapon	<i>Terapon jarbua</i>	Few	No	Yes	Yes	No
Maitya	Jack and pompanos	<i>Cybium guttatum</i>	Common	yes	Yes	Yes	Yes
Nuna baila	Bumblebee goby	<i>Brachygnathus nuna</i>	Few	No	Yes	Yes	No
Nuna tengra	Whiskers catfish	<i>Mystus gulio</i>	Few	Yes	No	No	Yes
Phasa	Gangetic anchovy	<i>Setipinna phasa</i>	Common	Yes	Yes	Yes	Yes
Potka	Green pufferfish	<i>Tetraodon flaviatilis</i>	Very rare	No	No	No	Yes
Kakila	Asian needlefish	<i>Xenentodon cancila</i>	Few	No	Yes	Yes	No
Chapila	Indian river shad	<i>Gudusia chapra</i>	Common	Yes	Yes	Yes	Yes
Baghair	Goonch	<i>Bagarius bagarius</i>	Few	No	Yes	No	Yes
Bishtara/ Chitra	Spotted scat	<i>Scatophagus argus</i>	Rare	No	No	Yes	No
Kamila	Indian pike conger	<i>Congresox talabonoides</i>	Few	Yes	No	Yes	No
Rupsha	Skipjack tuna	<i>Katsuwonus pelamis</i>	Rare	No	Yes	No	No
Tulardandi	Lady fish	<i>Sillaginopsis panijus</i>	Few	No	Yes	Yes	No
Mullet	Flathead grey mullet	<i>Mugil cephalus</i>	Common	Yes	Yes	Yes	Yes
Khorsula	Corsula	<i>Rhinomugil corsula</i>	Few	Yes	No	Yes	No
Lakhua	Indian salmon	<i>Polynemus indicus</i>	Common	Yes	Yes	Yes	Yes
Samudra koi	Atlantic tripletail	<i>Lobotes surinamensis</i>	Rare	No	No	Yes	Yes
Sagor rita	Whale catfish	<i>Rita rita</i>	Rare	No	Yes	Yes	No
Saplapata	Pale-edged stingray	<i>Dasyatis zugei</i>	Few	No	Yes	Yes	No
Tailla	Fourfinger threadfin	<i>Eleutheronema tetradactylum</i>	Common	No	Yes	Yes	Yes
Olua/ Sundari.	Olua	<i>Coilia sp.</i>	Common	Yes	Yes	Yes	Yes

Hangor	Hangor	<i>Scoliodon sp.</i>	Few	No	Yes	Yes	No
Tek chanda	Moonfish	<i>Mene maculate</i>	Common	Yes	Yes	Yes	No
Ekthuiitta	Congaturi halfbeak	<i>Hyporhamphus limbatus</i>	Common	Yes	Yes	Yes	Yes
Tobol fish	Giant trevally	<i>Caranx ignobilis</i>	Few	No	Yes	Yes	No
Ghogho fish	Largescaled terapon	<i>Terapon theraps</i>	Few	No	Yes	Yes	No

Table 6. List of crustaceans and molluscs in different markets of Cox’s Bazar

Local name	Common name	Scientific name	Availability	Kolatoli	Bahar chara	Boro Bazar	Evening Market
Golda chingri	Giant fresh water prawn	<i>Macrobrachium rosenbergii</i>	Common	Yes	Yes	Yes	Yes
Bagda chingri	Giant tiger shrimp	<i>Penaeus monodon</i>	Common	Yes	Yes	Yes	Yes
Gura chingri	Kuncho river prawn	<i>Macrobrachium lamaerrei</i>	Common	Yes	Yes	Yes	Yes
Chaga chingri	Indian prawn	<i>Penaeus indicus</i>	Common	Yes	Yes	Yes	Yes
Harina chingri	Brown shrimp	<i>Metapenaeus monoceros</i>	Rare	No	No	Yes	No
Shela kakra	Mud crab	<i>Scylla serrata</i>	Few	No	Yes	Yes	No
Sataru kakra	Swimmer crab	<i>Portunus senguinilentus</i>	Common	Yes	Yes	Yes	Yes
Lobster	Mud Spiny Lobster	<i>Panulirus polyphagus</i>	Common	Yes	Yes	Yes	Yes
Squid	Loligo/Squid	<i>Loligo vulgaris</i>	Rare	No	No	No	Yes
Octopus	Octopus	<i>Octopus vulgaris</i>	Rare	Yes	No	No	Yes

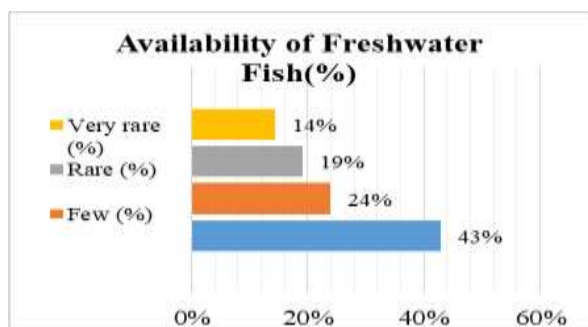


Figure 2. Availability of freshwater fish species in the market

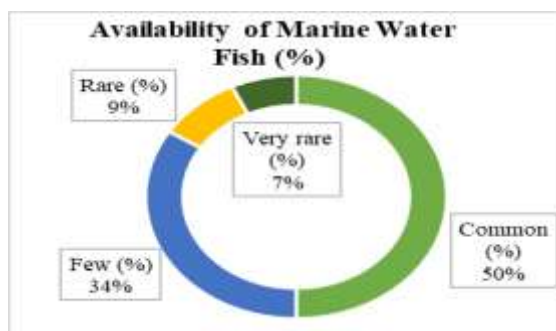


Figure 3. Availability of marine water fish species in the market

**Seasonal Variation of Fish Species**

Present research listed highest number of fish species during the winter season and lowest number of fish species in summer season as per the interviews of different stakeholders. Al-Hasan *et al*, (2014) recorded highest species in rainy season. During the interview of current investigation, most of the fishermen said that the abundance of fish was greater in rainy season. But they could not grab the opportunity due to severe weather condition in the ocean. As a result, the supply of fish became fewer in the rainy season than the winter. Consumer and retailer ensured that various types of SIS and native species are available in the rainy season due to available water in canal, beel, lake and river.

**Amount of Fish Sold**

According to the assessment, the Kolatoli fish market had an average daily supply of 2-3 MT of fish, compared to 4-5 MT in Baharchara and 6-8 MT at Boro Bazar. The evening market

offered about 3-4 MT of fish and shellfish species each day.

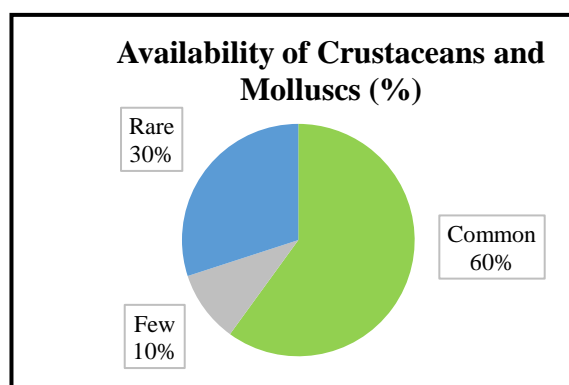


Figure 4. Availability of crustaceans and molluscs in the market

**Available Processed Fish Products in the Market**

This investigation identified three different categories of processed fish products: dried fish (82.77%), salted fish (10.67%), and smoked fish (6.56%). Among dried fish, more than 70% of total dried fish (churi shutki, loittyia shutki,

phasa shutki, olua shutki, chingri shutki, rup chanda shutki, surma shutki) were originated from marine fishes and arrived from nazirartek, the largest shutki yard of Bangladesh. About 15% dried fish came from Sundarban. Chingri, loitty, churi shutki etc. were commonly available and their consumer demand was very high. In contrast, five species (kachki shutki, tengra sutki, chapila shutki, chela shutki and mola shutki) originated from freshwater, were commonly available and their consumer demand was medium. The salted fish products include hisha, tuna, rupchanda etc. Chingri was the predominant species among the smoked fish products. The price range of freshwater dried fish was from 400-800 tk per kg in wholesale market and from 600-1000 tk per kg in retail market. Also, the range of marine dried fish price was from 400-3200 tk per kg in wholesale market and from 500-3800 tk per kg in retail market. The price of the processed fish was comparatively higher than that of the raw fish

because it depends on species, size of species, drying procedure, quality of fishes, labor cost, long marketing channel, transportation and seasons.

### Fish and Shellfish Price in the Market

Price of Golda chingri (*Macrobrachium rosenbergii*) (600-1200 tk/kg) and Large size Ilish (800-1200) were always high in all of the three markets. Ali et al, (2014) also recorded highest price for Golda chingri from Southern Bangladesh. Al-Hasan et al, (2014) recorded highest price for hilsa from three market of coastal district. Owing to continuous supply, transportation facilities, high selling rate etc., the price of fish is relatively lower in Boro Bazar fish market. Market price was comparatively high in the Kolatoli fish market due to presence of higher class consumer. Most of the restaurants are situated in Kolatoli. It is considered as hotspot for the tourists.

Table 7. Fish and Shellfish Price

Most available fish species	Kolatoli (tk/kg)	Baharchara (tk/kg)	Boro Bazar (tk/kg)	Evening Market (tk/kg)
Rui ( <i>Labeo rohita</i> )	180-280	180-250	180-250	180-280
Catol ( <i>Gebelion catla</i> )	250-300	220-280	220-300	250-300
Silver carp ( <i>Hypophthalmichthys molitrix</i> )	160-350	150-320	150-300	160-280
Common carp ( <i>Cyprinus carpio</i> )	140-180	130-160	130-200	140-180
Tilapia ( <i>Oreochromis niloticus</i> )	140-180	140-180	120-160	130-160
Boal ( <i>Wallago attu</i> )	250-700	200-650	200-600	200-700
Thai pangas ( <i>Pangasianodon hypophthalmus</i> )	110-140	100-120	100-120	110-130
Baila ( <i>Awaous grammepomus</i> )	400-650	400-600	400-600	400-650
Taki ( <i>Channa punctata</i> )	200-300	180-250	180-250	200-250
Shol ( <i>Channa striata</i> )	400-600	350-550	350-600	400-600
Ilish ( <i>Tenualosa ilisha</i> ) (Large size)	1000-1200	800-1000	800-1000	900-1200
Ilish ( <i>Tenualosa ilisha</i> ) (medium size)	500- 700	450-650	500-650	500-650
Ilish ( <i>Tenualosa ilisha</i> ) (small size)	120-350	100-300	100-300	110-300
Poa ( <i>Otolithoides pama</i> )	350-500	300-500	400-600	350-550
Sada poa ( <i>Otolithes argentatus</i> )	350-500	300-500	400-600	350-550
Kalo Rup chanda ( <i>Parastromateus niger</i> )	700-800	650-850	600-800	700-800
Koral ( <i>Lates calcarifer</i> )	500-800	450-850	400-800	450-750
Tailla ( <i>Eleuotheronema tetradactylum</i> )	350-520	300-500	450-500	350-500
Churi ( <i>Trichiurus haumela</i> )	300-320	300-320	250-300	360-300
Loitty (Harpadon nehereus)	100-140	100-120	100-120	100-120
Olua ( <i>Coilia</i> sp.)	120-140	120-130	120-130	120-140
Phaissa ( <i>Setipinna phasa</i> )	200-250	200-220	200-220	200-240
Chapila ( <i>Gudusia chapra</i> )	80-120	70-120	80-120	80-120
Saplapata ( <i>Himantura uarnak</i> )	250-300	220-280	220-280	220-280
Hangor ( <i>Scoliodon</i> sp.)	150-200	140-180	140-200	150-200
Golda chingri ( <i>Macrobrachium rosenbergii</i> )	700-1000	600-1000	650-1200	700-1200
Bagda chingri ( <i>Penaes</i> sp.)	600-800	600-900	600-900	600-900
Chaga chingri ( <i>Penaes</i> sp.)	600-700	550-650	550-650	600-650
Lobster ( <i>Panulirus polyphagus</i> )	800-1200	700-1500	800-1500	400-1200



Table 8. Price variation with size

Species Name (Local Name)	Size ratio	Fish Number per kg	Available Size (Inch)	Maximum Size (Inch)	Price (tk/kg)
Hilsha	Small	2	10	12	1000-1200
	Medium	1	13	15	1200-1800
Koral	Medium	1	18	26	600-800
Rup chanda	Small	6	5	7	400-600
	Large	4	8	12	700-800
Loittyta	Medium	10-15	7	11	120-140
Lal Poa	Small	15-20	4	8	200-220
	Medium	6-8	7	12	250-280
Tuna	Medium	3	6	8	180-220
Bagda Chingri	Small	14	8	11	500-600
	Medium	8	13	16	650-750

### Storage and transportation

In order to ship to markets throughout the world, only processing facilities in the shrimp business employ adequate storage methods. Fish are also moved between locations by other middlemen who solely utilize ice. Fish farmers and middlemen move products from the production areas to the consumption centers using a variety of transportation methods, including vans, rickshaws, trucks, passenger buses, pickup trucks, nasimons (locally made pick-up type vans for transporting passengers and goods), head loads, etc. Highest number of species (83) was recorded from Boro Bazar fish market because of exorbitant fish supply and accessible consumer. Boro Bazar fish market is located at the centre of the city from where it can grab a wide range of customer.

### Source of finance

The majority of fish farmers, fisherman, aratdars, and paikers are self-sufficient. Aratdars and paikers can also borrow from banks, non-governmental organizations (NGOs), friends

and relatives. However, aratdar/mahajon is the sole source of funding for hilsha fisherman (who provides dadan). Fishermen who get dadon from aratdars/mohajans are obligated to sell their catch to them, often at predetermined prices that are lower than market pricing in most circumstances. In a shrimp transaction, the farmer, aratdar, bepari, and retailer are all self-funded. For shrimp funding, depot owners utilize a combination of their own funds, banks, non-governmental organizations, and aratdars. Paikers operate their business with the help of aratdars and their own funds. Bank loans are used by account holders and processing plant owners to accelerate business activities.

### Constraints associated with fish market

The fish market in Cox's Bazar has been linked to a variety of issues. The fundamental issue was that the preservation facilities were known to be poor. In the fish market, there was no mechanical freezer. The remaining fish were preserved by an inexperienced fish seller using flake ice with a random ratio of fish and ice. A steel or wooden box was used to store the fish.



Figure 5. Inappropriate icing and preservation (on-board and market)

Moreover, lack of pure water supply, poor transport facilities, Poor drainage and sanitation system were major problems in the fish market which should be addressed as early as possible.

**Fish marketing system in Cox’s Bazar**

**Marketing Channel**

In accordance with the study, local paikers (faria) sell fish to retailers with the aid of aratdars and carry roughly 50% of the catch from fish farmers to the markets on their own or with the help of rented vehicles. Given the increasing prevalence of middlemen in the marketing channel, consumers at the Baharchara fish market must pay a higher price. Diverse sorts of intermediaries were discovered to be engaged in the marine fish marketing chain,

including wholesalers, commission agents, beparies, aratdars, paikers (local market, distant market), and retailers. Khalil, (1999) noted that fishermen, beparies, aratdars, merchants, and customers make up the primary marine fish marketing channel in the Cox's Bazar and Chattogram districts. Munir *et al*, (2006) revealed that several players, including farmers, distributors, aratdars, intermediaries, retailers, and ultimately consumers, make up the marine dried fish supply chain in general. The supply chain of fish comprises of six intermediaries namely farmer, aratdar, paiker, trader, retailer and consumer for the distant domestic market (Alam and Bashar, 1995). So the results from the present study were more or less similar with previous study.

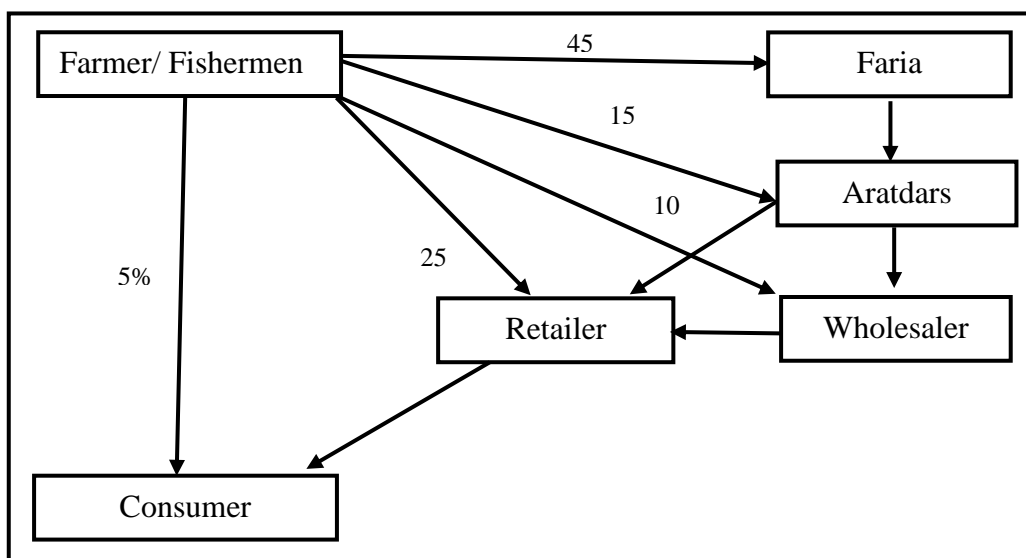


Figure 6. Marketing Channel of Fish Market in Cox’s Bazar

Table 9. Marketing cost of different intermediaries

Area of Cost	Farmers	Aratdars	Paiker	Retailer
Transportation	25%	0%	55%	40%
Baskets	0%	10%	6%	12%
Icing	5%	5%	12%	20%
Wage and Salaries	0%	70%	5%	0%
Aratdar's Commission	65%	0%	15%	0%
House rent	0%	5%	2%	12%
Security	0%	3%	1%	5%
Electricity	0%	5%	2%	8%
Others	5%	2%	2%	3%

### Value chain analysis of some important marine fish

The consumer market had a considerably greater marketing profit and margin than the main and

secondary sectors, which included beparies and aratdars. It was fairly obvious that fish with high prices required higher marketing expenses than fish with low prices. As shown in the survey, the cost of transportation was higher for highly prized species than for less highly valued ones.

**Table 10.** Value Chain Analysis

Market Level	Particulars of Marketing	Hilsha (tk/kg)	Seabass (tk/kg)	Pomfret (tk/kg)	Tuna (tk/kg)	Ribbon Fish (tk/kg)
Primary Market	Purchase Price (PP)	700	300	650	75	160
	Marketing Cost (MC)	11	12	15	8	12
	Sales Price (SP)	800	400	730	115	200
	Marketing Margin (MM=SP-PP)	100	100	80	40	40
	Marketing Profit (MP=MM-MC)	89	88	65	32	28
Secondary Market	Purchase Price (PP)	800	400	730	115	200
	Marketing Cost (MC)	8	7	11	6	13
	Sales Price (SP)	900	470	780	150	240
	Marketing Margin (MM=SP-PP)	100	70	50	35	40
	Marketing Profit (MP=MM-MC)	92	63	39	29	27
Consumer Market	Purchase Price (PP)	900	470	780	150	240
	Marketing Cost (MC)	14	9	18	7	17
	Sales Price (SP)	1000	550	850	200	300
	Marketing Margin (MM=SP-PP)	100	80	70	50	60
	Marketing Profit (MP=MM-MC)	86	71	52	43	43
<b>Consumer Purchase Price</b>		1000	550	850	200	300
<b>Total Marketing Margin</b>		300	250	200	125	140
<b>Total Marketing Profit</b>		267	222	156	104	98

#### 4. CONCLUSION

It is attributed that the availability and market price of freshwater fish and shellfish in the three markets of Cox's Bazar depend on consumer demand, sources, seasonality and marketing channel. Despite the fact that Bangladesh's fish marketing sector is plagued by a variety of issues, several encouraging developments have taken place recently and are anticipated to enhance the sector's environment. The transition from subsistence to commercial fish farming, the rise of super-markets, and a transformation in social perception of fish marketing where it is no longer seen as a dishonorable profession are some of these positive causes. However, the

Bangladeshi government must make sure that all market intermediaries throughout the seafood value chain have access to the appropriate infrastructure and social capital for effective participation. The government is in charge of developing road networks since they are sorely required. Market rules must be rigorously adhered to. It is necessary to increase the monitoring of fish quality. Similar to this, it is the government's duty to ensure that shipments may arrive at their destination without having to pay pointless tolls and membership fees. The creation of effective road and transportation systems can lessen the need for unnecessary middlemen, which may be advantageous to both customers and farmers or fishermen. In order to

assess the perishability of the fish and allow the assembling centers to make bulk sales to the next location, refrigerated storage facilities for assembly centers may indeed be conjured up. This may lower post-harvest losses and boost prices for farmers or fishers.

### ACKNOWLEDGEMENT

The authors would like to express appreciation to the Chattogram Veterinary and Animal Sciences University as well as Nutrition and Processing Laboratory of Faculty of Fisheries, Chattogram Veterinary and Animal Sciences University for providing laboratory facilities for this study.

### REFERENCES

- Alam, M. F. and Bashar, M. A. 1995. Structure of cost and profitability of small scale riverine fishing in Bangladesh. *Journal of Research Programme*, 9(2): 235-241.
- Al-Hasan, A., Shahjahan, M., Hossain M.M. and Haque, M.M. 2014. Fish availability and marketing system at three markets in Cox's Bazar, Bangladesh. *International Journal of Innovation and Applied Studies*, 7(4): 765-773.
- Ali, M.M., Rahman, M.M, Hossain, M.Y, Rahman, M.Z. and Hossen et al. 2014. Fish marketing system in Southern Bangladesh: Recommendations for efficient marketing. *Our Nature*, 12(2): 28-36.
- Azam, M., Rahman, M.B., Ruma, M., Azad, S.M.O., Alom, M.Y. and Islam, S.M. 2016. Marketing system of some fish species in the North-Eastern region of Bangladesh: An empirical study. *Journal of Entomology and Zoology Studies*, 4(3): 923-927.
- Chambers, R. 1992. *Rural Appraisal: Rapid, Relaxed and Participatory*. IDS Discussion Paper No. 311, Institute of Development Studies (IDS), Brighton, UK.
- DOF, 2021. *Fishery statistical yearbook of Bangladesh 2020-2021*. Fisheries Resources Survey System, Department of Fisheries, Dhaka, Bangladesh.
- Holtzman, J.S. 2003. *Rapid Appraisals of Commodity Sub-sectors*. Associates Inc., Bethesda, USA.
- Hussain, M. M. 2012. Status of Development of the Fishery a Seafood Processing Industry in Bangladesh. Proceeding of a Workshop on Sustainable Development of Marine Fisheries Resources in Bangladesh. FAO-UNDP Assistance to Fisheries Research Institute, Mymensingh
- Khalil, M.I. 1999. Marine fish marketing in some selected areas of Bangladesh. MS Thesis, Department of Co-operative and Marketing, Bangladesh Agricultural University, Mymensingh, pp. 76.
- Munir, A., Nazrul, I. and Shamsuddoha, M. 2006. Value Chain Analysis in the Dry Fish Production and Marketing of Post-Harvest Fishery Products (PHFP) in the Coastal Belt of Bangladesh. Bangladesh Fisheries Research Forum publication, pp.87-112.
- Nurullah, M., Kamal, M., Wahab, M.A., Islam, M.N. and Yasmin et al. 2001. Present status of harvesting, transportation and marketing freshwater Small Indigenous Species of Fish (SIS) of Bangladesh. *Bangladesh Journal of Fisheries Research*, 9(4): 159-168.
- Rahman, M. M., Hossain, M. A., Tasnoova, S., Ahamed, F., Hossain, M. Y. and Ohtomi, J. 2012. Fresh fish marketing status in the northwestern Bangladesh: Recommendations for sustainable management. *Our Nature*, 10(1), 128-136.
- Sabur, S. A. and Rahman, L. 2014. Marine Fish Marketing in Bangladesh. *The Bangladesh Journal of agricultural Economics*, 2(1): 95-100.