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ORIGINAL RESEARCH ARTICLE



Marketing structure and factors affecting retail price of coastal area fish market in Bangladesh

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ABSTRACT

To demonstrate a systematic and organized marketing strategy, it is necessary to have insight about fisheries marketing structure and fish availability of that fish market. This study was conducted to explain the pricing dynamics, species availability, and marketing system of fish in Kabirhat Upazila, Noakhali district, Bangladesh, from July 2024 to February 2025. Data were collected from four major fish markets through questionnaire surveys (n = 289) based Cochran's formula for calculating sample size. Microsoft Excel and statistical PAST 4.03 software were used to analyse the data collected by questionnaire surveys and cross-check interviews with key informants. A total of 23 fish species and 2 crustacean species were recorded, where average price of *Tenualosa ilisha* (1294.16BDT/kg) and *Penaeus monodon* (769.16BDT/kg) were recorded higher in all the fish markets. Nine marketing channels involving multiple intermediaries between fisher and consumer were identified. Marketing cost analysis indicated icing (34%) and transportation (27%) as principle cost components. Fishers' share of consumer prices ranged from 61.46% to 73.83%, while intermediaries' share ranged from 16.90% to 29.90%. Most respondents were middle-aged (41–50 years), educated up to Class VI–XI, and had 10–20 years of marketing experience. Regression analysis revealed that landing center distance ($\beta=-1.714$), age ($\beta=-2.302$) and years of experience ($\beta=-1.511$) affected negatively, whereas marketing channels ($\beta=0.553$), marketing costs ($\beta=1.929$), and education level ($\beta=0.216$) had significant positive effects ($p < 0.05$) on retail prices. The findings indicate the requirement of improved infrastructure and streamlined marketing channels to enhance market efficiency and fishers' income.

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INTRODUCTION

Fisheries sector of Bangladesh, which ranks fourth position in world aquaculture production and contributes 3.5% of country's GDP, has a great chance of becoming a sustainable economic sector (DoF, 2020). A variety of fisheries-related variables like fisheries natural diversity, fish farming and distribution systems, fisheries workers, institutional systems, and developmental facilities, are linked to the sector's sustainability and resilience.

The fish market and fish trading system suggest a bilateral strategy where both fishers and consumers are participated. A properly arranged fish marketing structure and identified marketing channels are compulsory for consumers to have access to fish at the correct time and location (Deb & Dey, 2020; Kamaylo *et al.*, 2021). The socioeconomic status of personnel related to fish farming and marketing systems has affected by fish marketing structure which usually is conducted through the private sector (Debnath *et al.*, 2019). People related to fish marketing

channels viz. fishers/farmers, auctioneers, dealers (*aratdars*, *paikers*, and *beparies*) wholesalers, retailers, and workers are generally struggle with severe economic deprivation (Yasmin et al., 2024). With their illiteracy and dependence for credit on intermediaries, it generally becomes difficult for fishermen who deal with *aratdar* to sell their catch at a better price from landed as their bargaining power remains low and they do not have much option but to take the price fixed by the middlemen (Kamaylo et al., 2021). Fishermen and intermediaries will obtain proper prices and a reasonable profit margin by establishing a continuous and permanent market regulations throughout the marketing channel (Kaygisiz & Eken, 2018; Sambuo et al., 2021). Premium goods at affordable price is the first choice to all of the costumers. Therefore, Therefore, it is crucial for the marketer to choose the best channel or way for the distribution of fish and products while preserving their affordability and quality. So, extended market regulation can be established by fixing a suitable prices and market margins which will help to guaranteed a stabilized profit scale for fishers and intermediaries participated there (Kamaylo et al., 2021; Sambuo et al., 2021). Research has been conducted to investigate marketing channel of fish, and fish traders' livelihood status in different geographical locations of Bangladesh, including Lakshmipur (Chakraborty et al., 2025), Jalokathi (Al-Hasan et al., 2025), Mymensingh (Yasmin et al., 2024), Rajbari (Nadia et al., 2022), Paikgachha (Roy et al., 2020) and Gazipur (Debnath et al., 2019). These research investigations attempted to identify appropriate marketing strategies for these regions and describe the fisheries marketing mechanisms in those areas. The geographical position of the area and the nearby fishery resources also affect marketing approaches, fish preference, and item varieties. Noakhali is one of the prominent districts in Bangladesh's southern coastal strip, located adjacent to the Meghna River. The Meghna is country's major river is directly connected to the Bay of Bengal and receives water from many tributaries and distributaries. According to different market survey conducted in Noakhali, marine fishes, Hilsha, and prawns was recorded over 17%, 15.7%, and 4% respectively (Leela et al., 2018). Kabirhat Upazila (185.25 sq. km) is an upazila of Noakhali District, has surrounded by Noakhali Sadar Upazila, Begumganj Upazila, Companiganj Upazila to the west, north and east respectively (Islam et al., 2012). Because Kabirhat is an agriculturally intensive riverine district, rich in wild, diversified fish species, and it is also a prospective fisheries area. Additionally, the upazila is crossed by the Noakhali Canal as it runs north (Islam et al., 2012). Fishes available in Kabirhat fish markets are primarily supplied from aquaculture farms, canals, dighis and estuary. Fishes and shellfish are also transported here from Cumilla, Sitakunda, and Shatkhira by trucks, freezer van and other means of transportation, which significantly contributes to the participation of multiple middlemen in the marketing channels. The variety of fish species, marketing structure, sources of supply, participation of middlemen, long supply chain, consumers' demand and fishers' socio-demographic characteristics (age, education level, experience) collectively influence price variability and thereby establishing the fish markets of this

region as an important fisheries hub. However, no research on the fisheries marketing system has yet been done in Kabirhat, Noakhali District. Therefore, knowledge of the present fisheries marketing systems, their limitations, and their future potential is essential for the fisheries sector to thrive in this area, but it is currently inadequate. Additionally, it is a prospective fishing location, and the markets provide a diverse amount of fish species. The present study will give an insight of the species availability in the fish market along with its marketing channel and the associated factors influencing price appraisal. With this information, further thorough research might be done to determine the margins and sustainable, prosperous marketing channels for both local and broad-ranging fisheries products in this area.

MATERIALS AND METHODS

Study area and study period

The current research was carried out in the Kabirhat Upazila of Noakhali District, Bangladesh, examining major fish markets including Kabirhat Fish Market (22°50'10.602"N; 91°12'11.532"E), Dhan Shalik Market (22°47'56.816"N; 91°14'12.233"E), Chaprasir Hat (22°49'1.223"N; 91°14'27.336"E), and Vhuyiar Hat / Dhan Siri (22°51'28.854"N; 91°13'37.806"E) (Figure 1). These are the major fish landing and marketing zones of present study area from where the data was collected over eight-month study period from July 2024 to February 2025.

Data collection procedure

Market surveys was conducted to obtain primary data that began with a thorough examination of the study area. Data collection involved conducting questionnaire interviews, and validation interviews with key informants. The data was collected from four different markets where the precision level and degree of confidence using formula of Cochran (1977) (often known as Yamane's formula) for calculating sample size for a finite population (as the population proportion is unknown) expressed as follows:

$$n = \frac{N}{1 + N e^2}$$

Where n is the required sample size, N is population size and e is the desired level of precision (margin of error, 0.05 for 5%).

In the present study a preliminary survey was conducted where the traders and average customers' appearance was recorded. The total value of traders (15, 20, 17, 19) and average customers (215, 350, 320, 264) for four selected markets Kabirhat Fish Market, Vhuyiar Hat Market, Chaprasir Hat, and Vhuyiar Hat respectively was calculated (15+215)+(20+350)+(17+320)+(19+264)= 1220. Therefore, the sample size was calculated following the above mentioned formulae:

$$n = \frac{1220}{1 + 1220 (0.05)^2} = 301.23$$

According to Bailey (2009), a subsample size of 30 respondents is the minimum for studies in which statistical analysis can be

Table 1. List of data collection tools, participants and sample size of the study.

Tools	Participants	Sample size
Individual interview	Fish retailers	10-11 per market
	Wholesalers	2-3 per market
	Aratdars	2 per market
	Consumers	60 (Total= 240)
Cross-check interviews	Upazila Fisheries Officer (UFO)	1
	The Chairman and the Vice-Chairman of Kabirhat Union Parishad as policymakers (lowest tier of local government)	2
	Non-governmental organization (NGO) employees (BRAC, ASA, Proshika)	9 (3 employees from each organizations)

done; therefore, a sample of 300 fishermen was selected.

Questionnaire interviews

A draft version of the questionnaire was created before the preparation, and it was pre-tested within the study area. Adjustments were made to the draft questionnaire based on insights gained from the survey, leading to modifications and improvements. Sixty fish traders (15 from each market) and 240 consumers (60 from each market) were randomly surveyed at the market for the questionnaire interviews during the study duration (Table 1). Among the 300 questionnaire copies was collected, properly filled was only 289 (96%) copies that were used in data analysis which is the acceptable standard (Bailey, 2009). The interviews provided insights into fish marketing, pricing strategies, trading practices and challenges faced in fish marketing system.

Cross-check interviews

Non-governmental organization (NGO) employees, Upazila Fisheries Officer (UFO) and policymakers, participated in cross-check interviews for surveyed four fish markets throughout the study period (Table 1).

Market margin analysis

Fishers and intermediaries market share is calculated using the following formula (Rahman et al., 2012).

$$\text{Marketing share (\%)} = \frac{(\text{Selling price} - \text{Buying price})}{\text{Selling price}} \times 100$$

Data evaluation and analysis

Data collected from questionnaire interviews was interpreted and analyzed by Microsoft Excel software (version 2016) and the statistical program PAST 4.03 was used to represent the data using flowcharts, tables, and graphs.

RESULTS AND DISCUSSION

The socio-demographic profile of the respondents

The majority respondents belonged to the middle-aged group, with 35% aged 41–50 years, followed by 22%, 19%, 13% and 11%, in the 30–40, below 30, 51–60 and above 60 years' category respectively. Regarding educational status, most respondents had education up to Class VI–XI (33%) and lowest percentages (12%) was recorded as illiterate. Sambuo et al. (2021) reported

that the majority of respondents were aged 27–44 years, with an average experience of 14 years. Educational qualifications in the present study were higher than those reported by Sambuo et al. (2021), who found that 79% of respondents had only primary education, incomplete schooling, or were illiterate. In terms of experience in fish marketing, nearly half of the respondents (46%) had 10–20 years of experience, while 30% had less than 10 years and 24% had more than 20 years of involvement in fish marketing activities (Table 2). Ahmed (2020) found the highest percentages (39.17%) of the fish traders showed 6–10 years' experience in all the markets and the lowest percentages was recorded 28.33%. These differences may be attributed to variations in geographic location.

Availability of fish species

A total of 23 fish species and 2 crustacean species were documented, encompassing 25 genera, 13 families, and 9 orders was recorded in the current study. Cypriniformes contributed the most (8 species of each order), followed by Siluriformes (5); Anabantiformes (3); Clupeiformes, Perciformes and Decapoda (2 species of each order); Scombriformes, Cichliformes and Osteoglossiformes (1 species of each order). The 'Common' fish species available in the markets included catla (*Labeo catla*), common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*), rohu (*Labeo rohita*), climbing perch (*Anabas testudineus*) and some other species. A 'Few' fish species, which are less abundant yet still present in reasonable quantities and rare fish species (Long whiskered catfish) are those with small populations often facing threats such as habitat loss, overfishing, or pollution (Table 3). The result of the present investigation showed similarity with the findings of Leela et al. (2018) but dissimilarity with Nadia et al. (2022), Deb & Dey (2020), who conducted their work in Rajbari district and Hobiganj District respectively. Different geographic locations and consumer demand might be the reason behind this disparity. Majority (70%) of fish species are supplied from local areas areas (ponds, aquaculture farms, dighi, estuary) and 30% from other parts of the country which showed coincidence with the study of Deb & Dey (2020) and Islam et al. (2021).

Price of dominant fish species

Price of same species was recorded almost similar among the retail prices in all the surveyed markets (Table 5) whereas rohu (*L. rohita*), catla (*C. catla*), mozambique tilapia (*O. mossambicus*),

Table 2. Age, educational level and year of experience in fish marketing of the respondents.

	No. of respondents	Percentages (%)
Age (years)		
Below 30	12	19
30-40	13	22
41-50	21	35
51-60	8	13
Over 60	6	11
Educational level		
Illiterate	7	12
Up to class V	14	23
Class VI to XI	20	33
SSC	10	15
HSC	9	16
Year of experience in fish marketing (years)		
Below 10	18	30
10-20	28	46
Above 20	14	24

Table 3. Availability of different groups of fishes in four surveyed markets.

Order	Family	Local Name	English Name	Scientific Name	Kabirhat Fish Market	Chaprashir Hat	Vhuiyar Hat	Dhansalik Fish Market	Availability
Cypriniformes	Cyprinidae	Catla	Catla	<i>Labeo catla</i>	√	√	√	√	Common
		C. Carp (Big)	Common Carp	<i>Cyprinus carpio</i>	√	√	√	√	Common
		Grass Carp	Grass Carp	<i>Ctenopharyngodon idella</i>	-	√	-	√	Common
		Kalibaush	Orangefin labeo	<i>Labeo calbasu</i>	√	√	√	√	Few
		Rui	Roho labeo	<i>Labeo rohita</i>	√	√	√	√	Common
		Sor puti	Olive barb	<i>Systemus sarana</i>	√	√	-	-	Few
		Bata	Bata	<i>Labeo bata</i>	√	√	√	-	Few
Decapoda	Penaecidae	Mrigal	Mrigal carp	<i>Cirrhinus cirrhosis</i>	√	√	√	√	Common
		Chingri (Small)	Shrimp	<i>Penaeus indicus</i>	-	√	-	-	Few
		Chingri (Big)	Black tiger shrimp	<i>Penaeus monodon</i>	√	√	√	-	Few
Clupeiformes	Clupeidae	Ilish(Big)	Hilsa shad	<i>Tenulosa ilisha</i>	√	√	√	-	Few
		Ehiravidae	Kachki Lar	<i>Corica soborna</i>	√	√	-	-	Common
Anabantiformes	Anabantidae	Koi	Climbing Perch	<i>Anabas testudineus</i>	√	√	√	-	Common
		Channidae	Shol (Big)	Snakehead murrel	<i>Channa striata</i>	√	√	-	-
		Shol (Small)	Snakehead murrel	<i>Channa striata</i>	-	√	√	-	Few
		Taki	Spotted snake-head	<i>Channa punctate</i>	√	-	√	-	Few
Perciformes	Gobiidae	Baila	Bartail flathead	<i>Platycephalus indicus</i>	√	√	√	√	Few
		Sciaenidae	Poa	Large eye croaker	<i>Otolithoides pama</i>	-	√	√	-
Siluriformes	Bagridae	Pabda	Padba	<i>Ompok pabda</i>	√	√	√	√	Common
		Shing (Small)	Stinging catfish	<i>Heteropneustes fossilis</i>	-	√	√	-	Few
		Ayer	Long whiskered catfish	<i>Sperata aor</i>	√	√	-	-	Rare
	Pangasiidae	Tengra	Tengra catfish	<i>Mystus tengara</i>	√	√	-	-	Few
	Pangus	Pangus	<i>Pangasius hypophthalmus</i>	√	√	√	√	Common	
Scombriformes	Scombridae	Surma	Indian mackerel	<i>Rastrelliger kanagurta</i>	-	√	-	√	Few
Cichliformes	Cichlidae	Tilapia	Mozambique tilapia	<i>Oreochromis mossambicus</i>	√	√	√	√	Common
Osteoglossiformes	Notopteridae	Chitol	Indian feather-back	<i>Chitala chitala</i>	√	-	√	-	Few

Note: "√" = Yes and "-" = No (Based on survey) in Table (3).

orange-fin lebeo (*L. calbasu*), pangus (*P. hypophthalmus*), pabda (*O. pabda*) and common carp (*C. carpio*) (big) was identified as seven dominant fish species. The price of *L. rohita* in Kabirhat fish market, Chaprashir hat, Vhuyiar hat and Dhansalik fish market varied from 262.5±12.11 to 285.26±12.11 BDT/kg with a mean value 273.88±12.11 BDT/kg. According to Acharjee et al. (2023), Koirala et al. (2021), Debnath et al. (2019), in southwestern Bangladesh, *L. rohita* was one of the most highly priced fish, next to *L. catla*, *C. cirrhosus* and other exotic carps. The mean price of *C. catla* fish (326.50±10.34 BDT/kg) was comparatively higher in the selected markets and the lowest price was for *P. hypophthalmus* (177.13±11.53 BDT/kg). However, the price of *L. catla* was determined to be higher than that of *L. rohita* in the current study. It could be because there is a lower supply of *L. catla* than consumer demand. The price of *C. catla*, *L. calbasu*, *C. carpio*, *P. hypophthalmus*, *O. mossambicus*, *O. pabda* were varied from 303.63±10.34 to 350.90±10.34, 242.22±10.99 to 262±10.99, 228.33±10.61 to 268.33±10.61, 166.19±11.53 to 188.06±11.53, 222.5±17.38 to 245.34±17.38 and 333.07±21.36 to 340.5±21.36 BDT/kg, respectively (Figure 1). Variation in consumers' purchasing power and population density across regions likely explain this discrepancy. The national fish, *Tenualosa ilisha*, is very costly for its flavor and acceptance to the consumers. Again, the requirement of this fish is enhanced in the market at festival time and during the month of Ramadan compared to the other months Dey et al. (2022) and Deb & Dey (2020). Because fish supply and demand vary periodically, prices typically fluctuate as well. Fish prices were significantly affected by species, supply chain complexity, freshness, weight, and origin and seasonality of fish.

Monthly variation of fish weight

The daily supply of fish was observed about 1-2 mt (metric ton) 4-5 mt, 2.5-3 mt and 0.7-1 mt in Kabirhat fish market, Chaprashirhat, Vhuyiarhat and Dhansalik market respectively. Monthly variation of fish weight ranges from lowest 89992 kg to highest 108531 kg in February 2025 and December 2024, respectively. Total fish sold from surveyed market was found lower in August'24 to October'24 then after an increasing rate was (November and December) again a fall was recorded gradually from January to February, 2025 (Figure 2). The Noakhali region was highly flooded from mid-July to October, 2024. High fish supply after flood can be happened due to escaped fish from farms, increased fishing activity, easy catching as floodwater recedes and urgent selling of fishes by farmers. Fish are less active in cold water, lower water level and fishing effort or slow growth in aquaculture could be the reason behind gradual low fish availability in winter (January and February).

Marketing cost

According to the present study result, the various marketing expenses and the profits made by middlemen at every stage of the marketing process cause fish prices to rise. Seven different sectors of marketing costs were recorded in the fish marketing of Kabirhat Upazila. The highest 34% of the total marketing cost

was for icing followed by transportation (27%), market toll (19%), electricity (11%), labour cost (5%), security (3%) and others (1%) (Figure 3). On the other hand, Pathak et al. (2023), Acharjee et al. (2023) and Deb & Dey (2020) recorded highest marketing cost percentage for transportation and handling than icing in Mymensingh and Hobiganj District, Bangladesh. Lack of proper and sufficient cold storage and deep refrigerator might be the cause behind the highest percentages of icing in the current surveyed fish markets of Kabirhat. However, Deb & Dey (2020) in Hobiganj, Bangladesh and Nwachukwu (2025) in Benue State, Nigeria calculated higher marketing cost than the present study. Differences in the marketing cost of fish is influenced by different cost structures, regional conditions and varying profit margins.

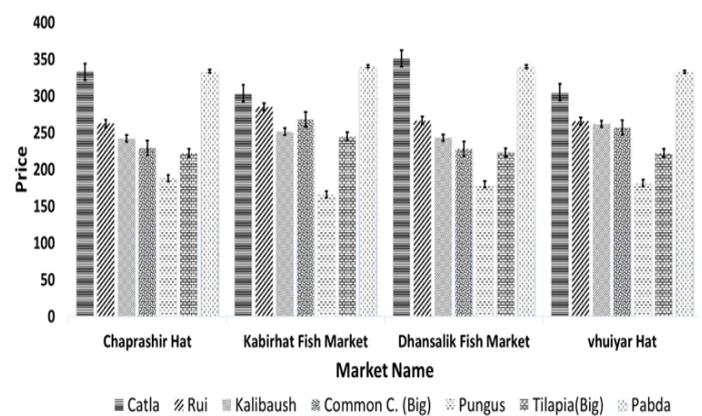


Figure 1. Price of seven dominant fish species in different market.

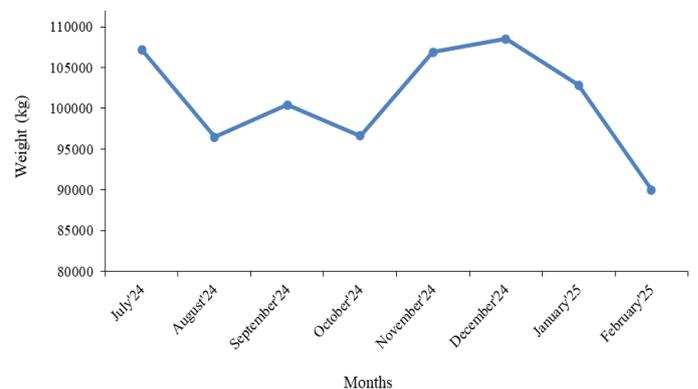


Figure 2. Monthly variation of fish weight in different fish markets.

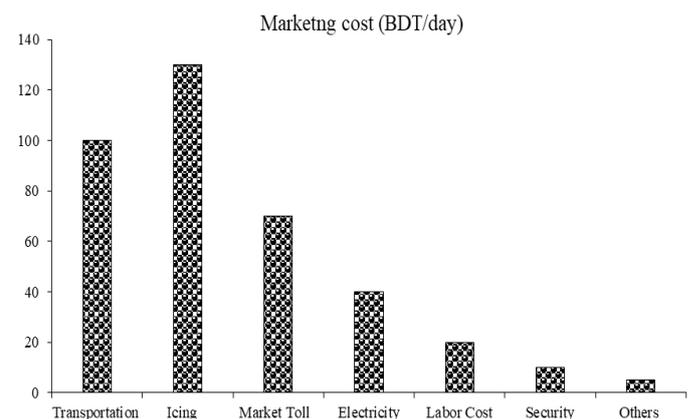


Figure 3. Marketing cost composition in fish marketing.

Table 4. Fish name, marketing cost and marketing margin of different intermediaries in fish marketing channel of Kabirhat Upazila.

English Name	Average Retail Price (BDT/kg)	Percentage of marketing cost on average retail price (%)	Intermediaries share on consumer's payment (%)	Percentage of net profit on average retail price (%)	Retailers' share on consumer's payment (%)
Catla	323.25	1.32	24.74	8.01	65.91
Tengara catfish	636.80	0.64	23.55	7.24	68.56
Common Carp	245.83	1.56	24.40	9.63	64.38
Shrimp	387.14	1.09	20.66	11.80	66.43
Black tiger shrimp	769.16	0.56	29.90	4.55	64.98
Common Carp	192.30	1.66	20.80	11.59	65.93
Grass Carp	161.81	2.08	18.53	13.23	66.14
Hilsa shad	1294.16	0.40	27.04	7.40	65.14
Orange fin labeo	249.77	1.73	24.02	7.79	66.45
Climbing Perch	243.33	1.34	24.65	10.95	63.03
Snakehead murrel (B)	660.93	0.50	18.15	7.50	73.83
Bartail flathead	354.91	1.12	19.72	12.03	67.12
Mrigal carp	155.99	2.01	19.23	14.52	64.22
Padba	336.86	1.22	26.71	9.09	62.96
Snakehead murrel (S)	267.38	1.18	18.69	12.16	67.95
Pangus	178.92	1.71	19.56	13.21	65.51
Roho labeo	270.03	1.18	24.07	9.26	65.47
Olive barb	256.33	1.46	17.55	10.07	70.89
Stinging catfish	352.05	0.96	19.88	11.63	67.51
Ganges river sprat	169.84	2.34	24.71	21.46	61.46
Indian mackerel	246.66	1.23	20.27	9.90	68.77
Indian featherback	514.28	0.74	23.33	7.08	68.83
Mozambique tilapia	228.50	1.31	17.50	12.59	68.58
Large eye croaker	591.66	0.53	16.90	11.83	70.73
Spotted snakehead	309.62	1.07	24.22	7.77	66.92
Long whiskered	598.46	0.77	25.06	7.71	66.44
Bata	398.75	1.02	20.06	8.24	70.66

Note: B= Big size, S = Small size.

Fish price and market intermediaries' share on retail price

Fish harvesting areas, transportation process, icing, handling are the main factors behind the freshness and quality of fish which ultimately related with pricing in market. The price of ilisha (BDT 1294.16/kg), black tiger shrimp (BDT 769.16/kg), snakehead murrel (BDT 660.93/kg), tengra catfish (BDT 636.80/kg), long whiskered catfish (BDT 598.46/kg) was recorded higher compared to other fish species. On the other hand, lowest mean price was observed for mrigal carp (BDT 155.99/kg) in the present survey result (Table 4). Fishers and intermediaries' share on different fish species retail price ranged from (16.90-29.90) % and (61.46-73.83) % respectively found in present study result. The higher percentages (73.83%, 70.89%, 70.73% and 70.66%) of fishers' share was found related to the comparatively lower value of intermediaries' share (18.15%, 17.55%, 16.90% and 20.06%) for snakehead murrel, olive barb, large eye croaker and bata, respectively (Table 4). This finding was more or less similar to the findings of Islam et al. (2021) where producers and middlemen got 45-50% and 35-40% respectively. But, fish producers still receive just slightly higher than half to roughly two-thirds of the final price paid by the consumers. This is largely due to lot of middlemen, commission agents, lower fish supply and marketing cost percentage who take away with a share of the profit.

Profit of fish retailers

C. soborna fish showed the higher profit percentages (21.47%) with average retail price BDT 169.84/kg and related profit BDT 36.46/kg. Additionally, *C. cirrhosis*, *P. hypophthalmus* and *O.*

mossambicus represented profit percentages (14.52%, 13.21% and 12.59%) with retail price (155.99 BDT/kg, 178.92 BDT/kg and 228.50 BDT/kg) and related profit (22.65 BDT/kg, 23.63 BDT/kg and 28.78 BDT/kg) respectively. On the other hand, *P. monodon*, *Mystus tengara*, *T. ilisha* and *C. striata* showed lower profit percentages 4.55%, 7.24%, 7.40% and 7.50% respectively (Figure 4). Here, profit percentage was recorded higher for small and locally available fishes than the large size fishes (big shrimp, hilsa, big shol). Transportation cost and intermediaries' share might have added more price to the large size high value fish species which might be the reason behind the low demand and low profit percentages of them.

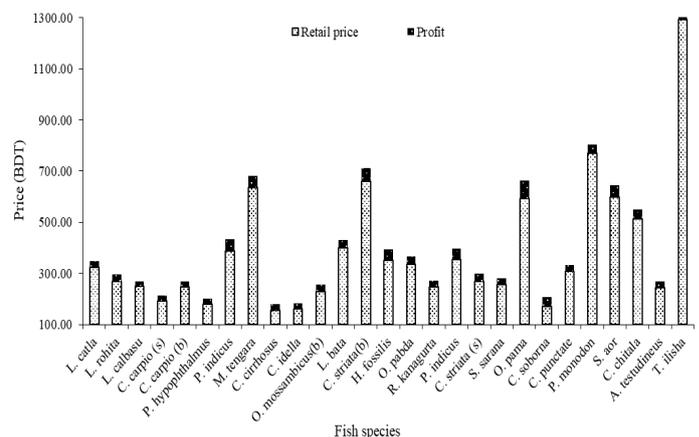


Figure 4. Average retail price and related profit; s=small, b=big.

Table 5. Regression results of factors affecting fish retail price (n = 289).

Variables	Coefficients	Std. Errors	T	p value	Collinearity Statistics	
					Tolerance (T)	VIF
Distance from landing center	-1.714	0.266	-2.435	0.023*	0.953	1.044
Marketing Channels	0.553	0.068	8.060	0.015*	0.933	1.071
Marketing costs	1.929	1.733	6.880	0.020*	0.974	1.025
Number of buyers	3.358	2.406	1.545	0.262	0.544	1.836
Age	-2.302	0.601	-3.825	0.051*	0.879	1.136
Education level	0.216	0.052	4.090	0.044*	0.893	1.119
Years of experience	-1.511	0.353	-4.277	0.050*	0.901	1.109
Goodness of fit	R ² = 0.924	Adjusted R ² = 0.878				

Notes: *Significant at 95% confidence level. There is no multicollinearity as VIF < 2.5 and VIF = 1/Tolerance (T).

Marketing channels

A marketing channel is a pathway through which a product or service reaches the end consumer. Nine distinct marketing channels were identified - Channel I: Fishers > Consumer; Channel II: Fishers > Retailer > Consumer; Channel III: Fishers > Wholesaler > Retailer > Consumer; Channel IV: Fishers > Aratdar > Retailer > Consumer; Channel V: Fishers > Aratdar > Wholesaler > Retailer > Consumer; Channel VI: Fishers > Wholesaler > Aratdar > Retailer > Consumer; Channel VII: Fishers > Paikers > Aratdar > Retailer > Consumer; Channel VIII: Fishers > Paikers > Wholesaler > Retailer > Consumer; Channel IX: Fishers > Paikers > Wholesaler > Aratdar > Retailer > Consumer. According to the results of the current study, the various marketing expenses and the profits made by middlemen at every stage of the marketing process cause fish prices to rise. There are four types (Paiker, Aratdar/Mahajan, Wholesaler, Retailer) of intermediaries were found to be involved in marketing channels of the surveyed markets from fishers to consumers. Acharjee *et al.* (2023), Nadia *et al.* (2022), Islam *et al.* (2021), Deb & Dey (2020), and Halder *et al.* (2020) observed less number of marketing chains than the present study in Noakhali district might be because of the presence of more intermediaries in the study area.

Factors affecting retail price

The regression analysis (Table 5) shows that fish retail price (n = 289) is significantly influenced by several factors. Distance from the landing centre had a significant negative effect on retail price ($\beta = -1.714$, $p = 0.023$). In contrast, marketing channels ($\beta = 0.553$, $p = 0.015$) and marketing costs ($\beta = 1.929$, $p = 0.020$) showed significant positive relationships with fish retail prices. Among socio-demographic variables, age ($\beta = -2.302$, $p = 0.051$) and years of experience ($\beta = -1.511$, $p = 0.050$) were negatively associated, while education level had a significant positive effect ($\beta = 0.216$, $p = 0.044$) with fish retail price. However, the number of buyers did not significantly influence retail price ($p > 0.05$). The regression results indicate that both market- and seller-related factors play an important role in determining fish retail prices. The negative effect of distance from the landing centre suggests that longer transportation increases handling time and quality deterioration, which may force retailers to lower prices to remain competitive. Sambuo *et al.* (2021) suggested that the coefficient is negative in relation to price change, implying that shorter distance contributes to the freshness of the fish, hence

better price. On the other hand, in the present study, the positive impact of marketing channels and marketing costs expressed the engagement of more intermediaries and their share on retail price tends to increase expenses, which are often transferred to consumers to pay higher retail prices also supported by Gordon & Hussain (2015). Socio-demographic characteristics also show notable effects. The negative influence of age and years of experience with retail price may suggest that more aged and experienced fishers tend to depend on traditional marketing practices and accept lower prices, whereas young and comparatively educated sellers may have stronger bargaining power and market information, allowing them to secure higher prices which was also supported by Sambuo *et al.* (2021). The number of buyers poses non-significant impact on price formation is suggested that price is more strongly influenced by marketing structure than by buyer availability. Similar findings were also identified by Sambuo *et al.* (2021). Collinearity diagnostics indicate no multicollinearity problem among the explanatory variables, as tolerance values are above 0.5 and VIF values are well below the acceptable threshold of 2.5.

Major constraints of fish marketing

The main obstacles to the fish marketing system in Kabirhat Upazila are similar to those facing Bangladesh's fish marketing systems as a whole. Major issues in Kabirhat fish markets include the existence of lengthy fish marketing channels, low cost of fish at the producer/fisherman level, the involvement of unnecessary middlemen, high expenses for transport, unsafe fish handling, a lack of deep-freezing facilities for cold storage, and a lack of pure water supplies. Similar marketing challenges were also observed by Mandal *et al.* (2021), Nadia *et al.* (2022), Deb & Dey (2020) and Debnath *et al.* (2019) in fish markets at different parts of Bangladesh. So improvement of existing marketing system and appropriate action should be taken.

Recommendations for efficient fish marketing

Construction of more cold storage, enhancement of the current fish market framework, commercial and practical aid, upgradation of drainage, hygienic, and washing facilities, adequate electrical power supply, proper training on the credit system and establishment of refrigerated fish vans to preserve the cold chain during transit could be suggested for the efficient fish marketing of the present study area.

Conclusion

An effective fish marketing system is a crucial requirement for raising fishermen's revenue and ensuring the security of their livelihood. The present study revealed that the fish marketing system of Kabirhat Upazila is characterized by a predominance of middle-aged traders with moderate educational backgrounds and considerable marketing experience. A total of 25 fish species and crustacean were recorded, among them 7 species showed dominance. *Labeo catla* showed a comparatively higher mean price than *Labeo rohita*, while *Pangasianodon hypophthalmus* recorded the lowest price among major cultured species. Additionally, *Tenulosa ilisha* and *Penaeus monodon* commanded significantly higher retail prices due to strong consumer demand and seasonal influence. Fish availability was recorded highest after flood periods and lower supply during winter months. Marketing costs were largely dominated by icing and transportation, which indicates inadequate cold storage facilities in the study area. Nine marketing channels and participation of multiple intermediaries results price fluctuations and receiving a significant share from the fish retail prices. Distance from landing center, marketing costs, marketing channels, and education level of farmers had significant influence on retail price was clearly confirmed from regression analysis. The fish trading system in Kabirhat is moderately effective, despite the fact that the market is not competitive due to the large disparity between supply and demand, many middlemen involvement, poor management, an improper state of market structure, and unsanitary and speculative conditions. Despite numerous obstacles, the Kabirhat fish market offers a variety of fish species from both fresh and marine waters, making it a prospective fisheries location. Therefore, for the commercial application and enhancement of the current fish marketing system in Kabirhat upazila, Noakhali, Bangladesh, participation of government and NGOs partnerships are required.

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DECLARATIONS

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