

Value Chain Analysis of Small Scale Dry Fish Species in *Haor* Area of Sunamganj District, Bangladesh.

ABSTRACT

This study determined dry fish production and its value chain system in selected areas of Sunamganj district. A simple random sampling technique was used in selecting the respondents. Data were collected through interview schedule. Small, medium and large size of small indigenous fish species like Veda, Puti, Tengra, Taki, Baim, Escha and Chela were considered for calculation. It appears from the study that processor bought 85% fresh fishes from fishermen directly and after drying fresh fish processor sold most of their product to wholesaler (85%) through *aratdar*. Wholesaler bought a big portion (90%) from processor through *aratdar* and sold their product to retailer and consumer and it was 80% and 20%, respectively. Retailers sold the entire dry fish to ultimate consumers and buy 5% from processor 10% from processor through *aratdar* and 85% from wholesaler. The highest value added in case of Baim large size which were accounted for Tk. 381.97/kg followed by small sized of Escha Tk. 291.23/kg. The value chain actors gained maximum profit by selling of these species due to the highest demand of two species by the local consumer as well the people migrated from Sylhet area to the different country. The lowest value added by intermediaries in case of medium sized Tengra which were calculated Tk. 127.64/kg followed by Chela small size Tk. 129.23/kg. In the study area traders are facing several problems like inadequate capital, price instability, lack of transport facilities, inadequate storage facilities, etc.

Keywords: Value chain, Dry fish, *Haor* areas, Bangladesh.

1. INTRODUCTION

In Bangladesh, fisheries is one of the major sub-sector in the agricultural sectors and plays a vital role in the socio-economic development of rural area, fulfilling the animal protein demand, creating employment opportunity, alleviating poverty and earning foreign exchange for the country. In FY 2014-15, Bangladesh earned US\$ 1,154.80 million by exporting agricultural products which was 3.70 percent of total export earnings [1]. Drying of small scale fish species is very common in *haor* area of Bangladesh. *Haors* with their unique hydro-ecological characteristics are large bowl shaped floodplain depressions located in the north eastern regions of Bangladesh. The *haor* people usually use sun drying method

as it is also considered as least expensive method of fish preservation. The primary activities of value chain of dry fish focus on taking the inputs like fresh fish, converting them into outputs like dry fish and delivering dry fish to the customer. The support activities like processing, packaging, storing and transporting play an auxiliary role to the primary activities. The demand for small scale dry fishes have demand both in domestic and international market. The reason behind higher demand is less value addition by value chain actors, lower extent or no using of preservatives and delicious test. In 2013-2014, quantity of dry fish exported were 2636 metric tons generating value of Tk. 29.69 million [2].

2. REVIEW OF LITERATURE

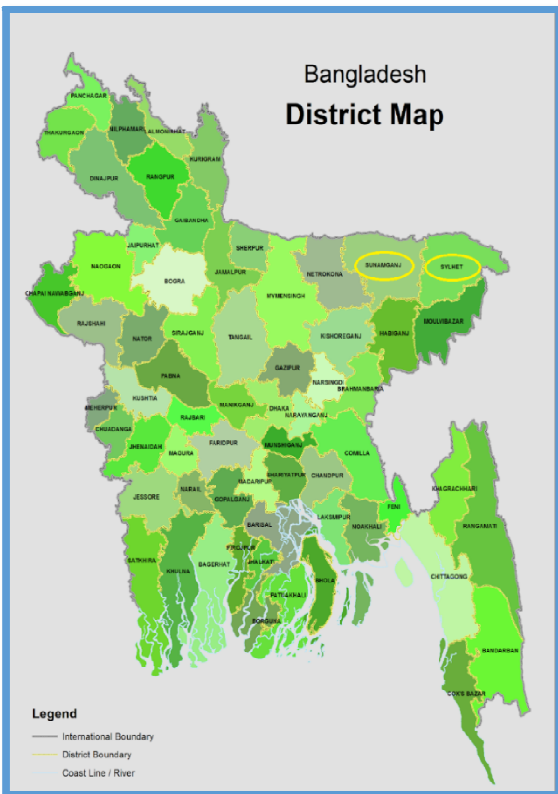
The price of dried marine fish was minimum in winter season and rising up to the maximum in the lean season[3]. The marketing margin as well as marketing profit both was relatively higher in consumer markets followed by primary and secondary markets where *bepari* and *aratdar* (A person who negotiate between buyers and sellers of dry fish and receive commission namely *aratdari* commission) were involved [4]. The producer have no influences over supply chain management rather they are strongly managed and monopolized by giant traders, brokers, dealers, wholesaler and thereby profitability and preference of primary producer [5]. The specific objectives of the study are: i) to

determine the existing marketing system involved in dry fish value chain; ii) to identify the supply chain and estimate the value addition of small scale species by market actors; and iii) to identify the major problems and suggest some policy measures that facilitate the direct linkage between producer and consumer.

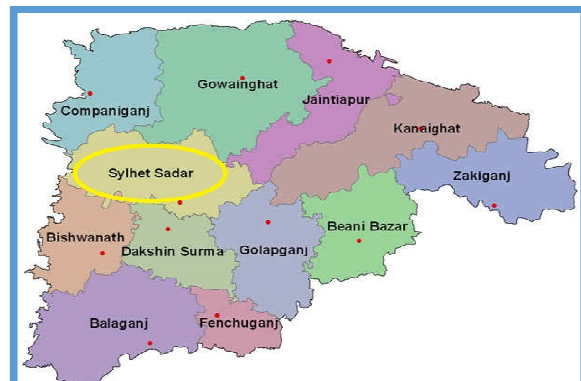
3. METHODS AND MATERIALS

3.1 Selection of study area and sample

The study was conducted at *Dakshin* (South) Sunamganj upazila and Sylhet Sadar under Sunamganj and Sylhet districts, respectively. Total 130 sample were interviewed Mid-November/2015 to Mid-March/2016, of which 80 are fishermen and 50 are intermediaries (i.e., 10 processor, 10 *aratdar*, 15 wholesalers, and 15 retailer



Map 2: Sunamganj District



3.2 Analytical techniques

Total cost (TC)

The total cost was estimated as follows:

$$TC = TPC + TMC$$

Where, TC = Total cost; TPC = Total production cost; and TMC = Total marketing cost;

Gross Marketing margin (GMM)

GMM has been estimated as follows:

$$GMM = SP - PP \text{ [6]}$$

Where, GMM = Marketing Margin (Tk./kg); PP = Purchase price (Tk./kg); and SP = Sales price (Tk./kg).

Marketing profit (MP)

MP has been estimated as follows:

$$MP = MM - MC$$

Where, MP = Marketing profit (Tk./kg); MC = Marketing cost (Tk./kg); and MM = Marketing Margin (Tk./kg).

Constraints facing index (CFI)

Constraints faced by intermediaries in the study areas were measured by using

4. RESULTS AND DISCUSSION

4.1 Production process of haordried fish

Fish drying takes place almost all villages in the *haor* areas. The fishermen as well as fisher women usually take part in fish drying. Drying of fish encompasses several stages. After harvesting/catching fish from *haor*, it is graded, shorted and cleaned up by the fisherwomen and it is very time consuming, the women sit hour and hours near the bank of *haor/dungary* (Where the fish is dried) for preparing it for drying on the roof of *dungaree* by the heat of sun. Once the fish is cleaned it is ready to be dried. Generally 8-10 types of fish were found to be used for commercially dry fish preparation where 3-5 kg of raw fish produce 1 kg of dry fish [8].

structured questionnaire. The fishermen and traders were asked to give their opinion on 6 selected constraints which were identified during data collection period. A four point rating scale were used for computing the constraint score of a respondent. For each constraint score of 3, 2, 1 and 0 was assigned to indicate the extent of constraint as high, medium, low and not at all, respectively. The total constraint scores were computed for each respondent by adding his scores for all the constraints. The Constraint Facing Index were computed using the following formula, [7].

$$CFI = (C_h \times 3) + (C_m \times 2) + (C_l \times 1) + (C_n \times 0)$$

Where, CFI = Constraints Facing Index; C_h = Number of respondents having high constraints; C_m = Number of respondents having medium constraints; C_l = Number of respondents having low constraints; and C_n = Number of respondents having no constraints.

4.2 Nature of the dry fish market

Selling of dry fish market happens at regular fish markets in Bangladesh. Compared to ordinary fish sale vendors the number of dry fish vendor was less in the market for a simple reason that it was preferred by a few customers. Fresh fish in the market has a lot of customers but dry fish was eaten by a specific group of people. Also dry fish if purchased once then can be stored for a longer time in normal conditions so generally there was no regular demand for this fish. Unlike fresh fish market dry fish market stocks remain with the vendors for months and so it was seen that the fluctuations in the prices of dry fish was generally less. Normally prices of dry fish increases before monsoon as many people prefer to

buy and store dry fish with them for the rainy season.

Looking at an increasing demand the vendors increase prices during this period. The fresh fish market was different from dry fish markets in many aspects; one of them was the competition for sale. It was seen that there were too many fish sellers in the market for the fresh compared to dry fish sellers also there were a number of *hawkers/vendors* who purchased fish from market/*haorbank* and sold door to door, this has been created competition for the fishing business and ultimately affecting its profitability. But the dry fish vendors were seen facing less or no competition;

this was due to lack of huge customer demand and price advantages.

4.3 Steps involved in processing of dry fish

4.3.1 Collection and pricing of fresh fish

Processors bought fresh fish from *Ghator* local market of Santiganj *bazar* by lot. They also bought fresh fish from their contact fishermen or boat owners. The total quantities of buying fresh fish depend on the supply of fish by the fishermen. On an average, a processor bought 10 metric ton fresh fish in each season. The average buying prices of fresh fish per Kg, mound (Equivalent to 40 kg) and ton are given below:

Table1: Average price of small scale fish species purchased by processor

Species	Size	Price(Tk./kg)	Price(Tk./Mond)	Price(Tk./Ton)
Veda	Small	301.5	12060.0	301500.0
	Large	588.0	23520.0	588000.0
Puti	Small	154.5	6180.0	154500.0
	Medium	375.0	15000.0	375000.0
	Large	460.0	18400.0	460000.0
Tengra	Small	352.5	14100.0	352500.0
	Large	732.5	29300.0	732500.0
Taki	Medium	542.5	21700.0	542500.0
Baim	Small	370.5	14820.0	370500.0
	Large	648.0	25920.0	648000.0
Escha	Small	238.5	9540.0	238500.0
	Large	639.0	25560.0	639000.0
Chela	Small	343.5	17400.0	343500.0
	Large	450.0	18000.0	450000.0

Source: Author's estimation based on the field survey, 2016.

4.3.2 Grading

Unlike mammals, fish are cold-blooded. This means that they do not maintain a constant internal body temperature; instead, their temperature is greatly influenced by their environment. The quality of fish deteriorates very rapidly. So grading is very important on the basis of quality. In the study area after collection of fresh fish the processors separated the fishes according to their species and size such as: small, medium and large.

4.3.3 Evisceration

Evisceration is the removal of guts (internal organs, especially those in the abdominal cavity) of a fish. Because of highly perishable nature and maintaining the quality of *haordry* fish, evisceration is very important. After collection of fresh fish, processors hired labor and their family members eviscerated the fresh fishes. Their family members with the women did the job and sometimes particularly in the peak period hired-labors

were needed. In study area the poor women evisceration fishes in their own interest and collets guts and make a special oil from it and sell this oil on an average Tk. 70/liter. For the evisceration work, about 1 labors were needed for 5-7kg fish.

4.3.4 Washing, cleaning and salting

Salting must be done only after cleaning of fish without gills, gut, etc. After evisceration work they washed and cleaned the fresh fishes in the water. They also used salt and different types of medicines to protect the fishes from insects or fungus infestation after washing and cleaning. The rate of mixing of salt in the study area was found as 1 kg salt for 40 kg of fishes. Salt was usually not used in case of small fishes.

4.3.5 Drying

It is the most important part of small scale dry fish processing system. The quality and taste of *haordry* fish mainly depends on the extent of drying. For availability of sunlight, the processors used their *dungary* (roof made by bamboo) for drying fish. Usually it takes 4-5 days to produce

Putidry fish whereas 2-3 days for *Chanda*, *EscahBaim*, *Chapila* and *Kascidry* fish.

4.3.6 Use of medicine and preservatives

In drying period, processors used some kinds of medicine, chemicals, and powder to protect their products from insect and fungus contamination. Oil and artificial color used for making their products fresh and good looking, which might be harmful for human health.

4.3.7 Packing

After drying, processors used polythene and poor jute cloth for packaging. They packed dried fishes in a fixed weight (on an average 50 kg in a sack) for selling in the market. To analyze the marketing cost it was very essential for the researcher to know the conversion rate of fresh fish into dry fishes by different species.

4.4 Conversion rate of dry fishes

After the processing activities the fresh fish lost their primary weight and converted into dry fishes. Conversion rates of the dry fish according to species are shown in Table2.

Table2: Different conversion rate of dry fish by species

Species (Name)	Weight at dry level per 40 kg fresh fish
Veda(<i>NundusNundus</i>)	13.33
Puti (<i>Putiusticto</i>)	13.33
Tengra (<i>Mystusvittatus</i>)	14.55
Taki (<i>Channa punctate</i>)	12.31
Baim (<i>Macrognathusaral</i>)	13.33
Escha (<i>Macrobrachiumindella</i>)	14.04
Chela (<i>Chela bacaila</i>)	12.70
Average	13.37

Source: Authors calculation, 2016.

4.5 Marketing channel of *haordry* fish

In dry fish marketing system, intermediaries perform useful commercial functions in a chain from producers to the final consumers. Four functionaries were found to be involved in marketing of small species dry fish in the study area. They were processors, *aratdar*, wholesalers and retailers (Fig. 1). A marketing channel is a set of practices or activities necessary to

transfer the ownership of goods from the point of production to the point of consumption. In other word, it is the sequence of intermediaries or middle, and the marketers through which goods passes from producers to consumers [9]. Marketing channels are important in evaluating marketing system because they indicate how the various market participants are organized to accomplish

the movement of a product from the producer to the final consumers [10]

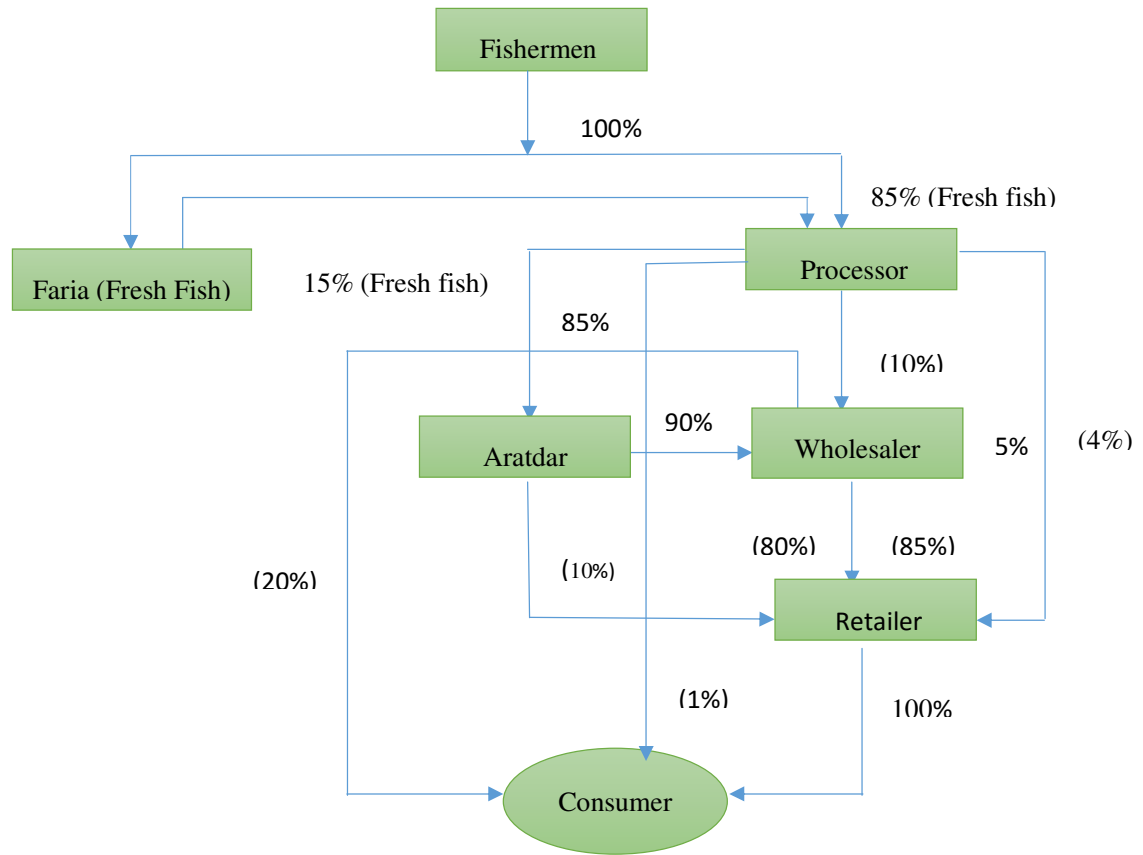


Fig. 1: Marketing channel of dry fish in Sunamganj district

The activities involved in the transfer of goods are completed through buying and selling functions. *Aratdar* do the functions of negotiation between buyers and sellers of dry fish and help them at their own business premises on receipt of commission. They do not take the ownership of the products. Fisherman sells 25% of their fresh fish to processor, 15% to *faria* (fresh fish), 20% to retailer and 40% directly to consumer. Processor buys 85% fresh fishes from fisherman directly and 15% from *faria*.

After drying fresh fish processor sells most of their product to wholesaler through *aratdar* and it was about 85% of their total

dried fish with the payment of 6% commission to *aratdar*. Processors also sell directly dry fish to wholesaler, retailer and consumer also and it was 10% and 4%, respectively. Wholesaler buys a big portion 90% from processor through *aratdar* and the *aratdar* charge 6% for this buying and selling function. Wholesaler also buys 10% of their buying from processor. Wholesalers sell their product to retailer and consumer and it was 80% and 20% respectively. Retailers sell the entire dry fish to ultimate consumers and buy 5% from processor 10% from processor through *aratdar* and 85% from wholesaler (Table 3).

Table: 3: Percent of dry fish transected by marketing channel actors

Value chain actors	Purchase from (%)					Sold to (%)					
	Fishermen	<i>Faria</i>	Processor	Processor via <i>Aratdar</i>	Wholesaler via <i>aratdar</i>	Processor	Wholesaler via <i>aratdar</i>	Wholesalers	<i>Faria</i>	Retailer	Consumer
Fishermen	-	-	-	-		25 (Fresh fish)			15 (Fresh fish)	20 (Fresh fish)	40 (Fresh fish)
Processor	85 (Fresh fish)	15 (Fresh fish)	-	-	-	-	85	10	-	4	1
<i>Aratdar</i>	<i>Aratdars</i> negotiate between buyers and sellers of fish and help them at their own business premises on receipt of <i>Aratdar</i> commission.										
Wholesaler	-	-	10	90	-	-	-	-	-	80	20
Retailer	-	-	5	10	85	-	-	-	-	-	100

Source: Field survey, 2016.

4.6 Marketing functions

Marketing functions are the steps followed by market actors to make successful marketing of a product. In the study areas, the whole marketing functions of small scale *haordry* fish has been broken down into various functions such as buying and selling, pricing, grading, weighing, storage, transportation, financing and market information etc.

4.6.1 Buying and selling

In the study area of Sylhetsadar, processor carried their products by road transport to the *aratdar* of Masimpur bazar in Sylhet. *Aratdar* was selling products to the wholesaler or retailer on the basis of commission. Retailers of Sylhet in *Bondorbazar*, *Lamabazar*, *Lama Gazi*, *Eidgah bazar*, *Majortilabazar* and *Tilagorbazar* purchased dry fish from wholesalers of *Masimpurbazar* and *Bondorbazar* respectively and were selling their products to the ultimate consumers.

4.6.2 Grading

Grading is the process of dividing the products into lots which are similar characteristics in shape and size, type, weight, quality and performance etc. Dry fish of particular quality at one point of marketing channels did not remain always the same at another point of the marketing channels, in case of small dry fish marketing little grading was done. In the study area processor did grade on the basis of size mainly small, medium and large, quality and the species found very common.

4.6.3 Weighing

Weighing is the means of expressing quantity, as of length, area, volume capacity and mass (or weight), in terms of standard units of division. Local weight mainly mound (1 mound is equivalent to 40 kg) and kilogram were used in the Sunamganj and *Masimpurbazar*, wholesale and retail markets and all over the Sylhet district. But in buying of fresh fish by the processors standard weights were not used exactly. Fresh fishes were

mostly sold on the basis of lot in eye

4.6.4 Packaging

Packaging is the technology of enclosing the products for distribution, storage, sale, and use to protect them from wastage or deterioration of quality during time of transportation, handling, etc. During the process of transportation it was found that, in *haor* area processor use sack made by jute or polythene for transportation and on an average it contains 50 kg in a sack.

4.6.5 Storage

Storage is an important marketing function, which involves holding and preserving goods from the time they are produced until they are needed for consumption. The processor did not store dry fishes. Wholesaler in Sylhetsadar store their products for two to three months for marketing. Wholesaler was usually store the unsold dry fishes in their storerooms for very short period of time. Retailers were also store dry fishes in their storerooms. Due to lack of proper storage facilities in Sunamganj and Sylhet a considerable portion; about 5 percent dry fish got wasted in the process of marketing.

4.6.6 Pricing

Demand, supply and quality of dry fish influence the price. Factors on rising demand were seriously considered by the traders to determine the price. It may be noted here that there was no actual pricing system in case of dry fish marketing. In the study area all intermediaries who were involved in the buying and selling of dry fish followed the open bargaining for fixing the prices of their products. It means that dry fish price was determined by the number of buyers attending the market and the volume of produce offered for sale. The price of dry fish was determined by the interaction of the forces demand and

estimation or in a lot.

supply in a more or less competitive market situation. Prices also varied 20% to 40% between peak period and lean period.

4.6.7 Transportation

Transportation provides the physical means of carrying goods and persons from one place to another. Transportation creates place utility and regularizes supply from one place to another. In the study areas, fishermen and intermediaries used various modes of transports such as truck, van, rickshaw, passenger bus, pickup, head load etc. to transfer dry fish from the producing areas to different levels of market.

4.6.8 Financing

Financing is the act of providing funds for business activities, making purchase or investing. The source of finance for the processors, *aratdar*, wholesalers and retailers in the study area are shown in Table 4. In the study area, the average operating capital per season for processors, *aratdar*, wholesalers and retailers were Tk. 80,000.00, Tk. 2,00,000.00, Tk. 1,50,000.00 and Tk. 40,000.00, respectively. It was found that most of the processor (100%) were debt financed and they took the credit from *aratdar* in terms that they sold whole amount of dry fishes to *aratdar*. Source of finance of *aratdar* were (30%) from credits, 20% and 50% from relatives and self-financed, respectively. Around 12.5% fishermen were self-financed where 28.5%, 50% and 8.8% were financed by own, relatives, debt and others respectively. Around (46.7%) wholesaler was self-financed where 20% and 3.33% were financed by relatives and debt respectively. In case of retailer 60% were financed by own and 20% were financed by relatives and credits respectively.

Table4: Source of finance of fishermen and traders

Source of finance	Fishermen		Processor		Aratdar		Wholesaler		Retailer	
	No	%	No	%	No	%	No	%	No	%
Personal	10.0	12.5	0.0	0.0	5.0	50.0	7.0	46.7	9.0	60.0
Relatives	23.0	28.7	0.0	0.0	2.0	20.0	3.0	20.0	3.0	20.0
Credits/Loan	40.0	50.0	10.0	100.0	3.0	30.0	5.0	33.33	3.0	20.0
Others	7.0	8.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	80.0	100	10.0	100	10.0	100	15.0	100	15	100

Source: Field survey, 2016.

4.6.9 Market information

Market information is a facilitative function required for efficiently operating marketing system. Timely and sufficiently market information is required for efficiently operating marketing system. In the study area, visiting the markets and use

of telephone/mobile phones were the most common sources of collecting market information for all value chain actors. Table 5 shows that fellow traders are also a common source of market information for all types of value chain actors.

Table5: Source of market information of fishermen and traders

Sources of market information	Market participants (%)				
	Fishermen	Processor	Aratdar	Wholesaler	Retailer
Collecting information from the market	63.7	40.0	20.0	33.33	53.33
Fellow traders	31.3	30.0	20.0	20.0	26.66
Telephone/ Mobile	5.0	30.0	60.0	46.67	20.01
Total	100.0	100.0	100.0	100.0	100.0

Source: Field survey, 2016.

4.7 Processing cost of haor dry fish

Dry fish production was the highest in November but less in January. Processors of *Dekharhaor* purchased fresh fish from fishermen directly or landing centers and brought fresh fish to their own processing plants. In peak drying season (December to February) on an average a processor processed 30000 kg (30mt) of dry fish such as Veda Puti, Tengra, Baim, Escha and Chela etc. They performed different activities on processing and marketing to make ready to sell the dried fish. The costs of processing and marketing in performing various services included transportation,

evisceration, salting, medicine, polythene, bamboo, bamboo basket, jute sack, market toll, wages & salaries, and cost of wastage.

Table 7 illustrates that highest cost was incurred in Tengra (large) Tk. 768.08/kg followed by medium size of Baim (Large) dry fish Tk. 608.08/kg and lowest cost was found Puti small size Tk. 190.05/kg) followed by the Escha small size Tk. 274.16/kg). Table 9 appearances that average cost of processing of dry fish was Tk. 478.38/kg, selling price was Tk. 526.58/kg and profit was Tk. 48.20/kg.

Table 9 shows that highest profit earned in Puti large size Tk.64.45/kg followed by the Chela large size Tk.64.34/kg.

Table 7: Processing and marketing cost of processors

Processing and Marketing Cost of processor	Veda		Puti			Tengra		Taki	Baim		Escha		Chela	
	Small	Large	Small	Medium	Large	Small	Large	Medium	Small	Large	Small	Large	Small	Large
FreshFish purchasing	301.5	588.0	154.5	375.0	460.0	352.5	732.0	542.5	370.5	648.0	238.5	639.0	343.5	450.0
Evisceration	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Salting	2.0	2.0	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
Chemical	0.15	0.15	0.12	0.12	0.12	0.15	0.15	0.15	0.15	0.15	0.12	0.12	0.12	0.12
Jute sack	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.43	1.54	1.54	1.54	1.54
Transportation	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Commission	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Wages and salaries	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Wastages	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Total cost	337.58	624.08	190.05	410.55	495.55	388.58	768.08	578.58	406.58	684.08	274.16	674.66	379.16	485.66

Source: Author's estimation based on field survey, 2016.

Table8: Total cost and return and profit by dry fish processor

Particulars of marketing	Veda		Puti			Tengra		Taki	Baim		Escha		Chela	
	Small	Large	Small	Medium	Large	Small	Large	Medium	Small	Large	Small	Large	Small	Large
Purchase price(PP)	301.5	588.0	154.5	375.0	460.0	352.5	732.0	542.5	370.5	648.0	238.5	639.0	343.5	450.0
Marketing cost(MC)	33.93	33.93	33.93	33.93	33.93	33.93	33.93	33.93	33.93	33.93	34.04	34.04	34.04	34.04
Selling price(SP)	386.0	666.0	215.0	444.0	560.0	428.0	815.0	617.16	470.0	743.0	324.0	722.0	432.0	550.0
Total cost	337.58	624.08	190.05	410.55	495.55	388.58	768.08	578.58	406.58	684.08	274.16	674.66	379.16	485.66
Profit	48.42	41.92	24.95	33.45	64.45	39.42	46.92	38.58	63.42	58.92	49.84	47.34	52.84	64.34

Source: Author's calculation based on field survey, 2016.

Table9: Total cost and return, profit and value addition of dry fish by processor

Species	Size	Cost	Selling price	Profit
Veda	Small	337.58	386.0	48.42
	Large	624.08	666.0	41.92
Puti	Small	190.05	215.0	24.95
	Medium	410.55	444.0	33.45
	Large	495.55	560.0	64.45
Tengra	Small	388.58	428.0	39.42
	Large	768.08	815.0	46.92
Taki	Medium	578.58	617.16	38.58
Baim	Small	406.58	470.0	63.42
	Large	684.08	743.0	58.92
Escha	Small	274.16	324.0	49.84
	Large	674.66	722.0	47.34
Chela	Small	379.16	432.0	52.84
	Large	485.66	550.0	64.34
Average cost		478.38	526.58	48.20

Source: Author's estimation, 2016.

4.8 Value addition by different market actors in dry fish marketed

Value addition activities are mainly concerned with the changes of utilities. When product passes through distribution channel, it creates place, time and possession utility. These cost and returns at different levels that were incurred and obtained by *aratdar*, wholesaler, and retailer creates value addition at different levels. However, marketing cost and marketing margin of respective categories of intermediaries were the main determinants of the profitability in marketing of dry fish. Secondly, marketing margin of a particular level of market is greatly influenced by the supply of and demand for dry fish marketed. At each level of market, most of the intermediaries act as buyers and as well as sellers. Accordingly, their market margins depended on market condition in time of buying and selling.

4.9 Marketing cost

Total marketing cost of fish includes all costs incurred by different intermediaries like processor, *aratdar*, wholesaler, retailers and fishermen who perform some marketing functions in the study areas. Products get value added during their movement across items. Share of *aratdar* cost was the highest 23.92% followed by wages and salaries 20.54% house rent 13.77% personal expenses 9.19% and electricity 6.98% for small scale dry fish marketing (Table10). Total value added cost per kg is Tk. 87.79/kg from production point to consumption point. Amongst them, local *processor* value added cost was the highest (42.11%) while *aratdar*'s value added cost was the lowest (4.03%). *Aratdar* negotiate between buyers and sellers of fish and assist them in buying and selling at their own business premises on receipt of commission.

Table10: Total marketing cost of intermediaries involved in major species of dry fish in the market

Cost items	Processor	Aratdar	Wholesaler	Retailer	Total	% of total
Transportation	5.0	0.0	0.0	2.20	7.20	8.20
Salting	1.75	0.0	0.0	0.0	1.75	1.99
Packaging with polythene/paper	1.5	0.0	0.58	1.17	3.25	3.70
Wages and salaries	10.0	0.72	7.31	0.0	18.03	20.54
Aratdar commission	15.0	0.0	6.0	0.0	21.0	23.92
House rent	0.0	0.89	4.76	6.44	12.09	13.77
Security	0.0	0.23	0.0	0.0	0.23	0.26
Electricity	0.0	0.15	1.40	4.58	6.13	6.98
Market toll/Subscription	0.0	0.08	1.25	0.0	1.33	1.51
Telephone bill	0.32	0.19	0.68	0.37	1.56	1.78
Personal expenses	0.90	0.55	1.56	5.06	8.07	9.19
Tips and donation	0.0	0.46	0.0	0.0	0.46	0.53
Wastages	2.5	0.0	0.0	0.0	2.50	2.85
Miscellaneous	0.0	0.27	0.81	3.11	4.19	4.77
Total	36.97 (42.11)	3.54 (4.03)	24.35 (27.74)	22.93 (26.12)	87.79 (100)	100.00

Source: Author's calculation, 2016.

4.9.1 Cost incurred by processor

In dry fish marketing, processor purchase fresh fish from fish landing centers or suppliers and processing they brought dry fish to *aratdar*. They had to perform different activities in processing plants to make ready for sell. Item wise costs of drying includes transportation, wage and salaries of staff and use of processing materials. The total processing cost incurred by processor were found about Tk. 36.97/kg. (Table10). Their main cost items were wage and salaries paid to laborers Tk. 10/kg; transportation Tk. 5.0/kg, using salt Tk. 1.75/kg; paying telephone bills, personal expenses and wastages Tk. 0.32/kg, Tk. 0.90/kg and Tk. 2.5/kg respectively (Table10).

4.9.2 Cost incurred by *aratdar*

In the present study, estimated cost per kg of dried fish by *aratdar* were found Tk.3.54/kg (Table10). The highest cost were found for house rent and it was estimated about Tk. 0.89/kg and lowest cost incurred for market toll and it was Tk.

0.08/kg. The cost incurred by *aratdar* were found Tk. 0.72/kg, Tk. 0.23/kg, Tk. 0.15/kg, Tk. 0.19/kg, Tk. 0.55/kg, and Tk.0.46/kg for wages and salaries, security, electricity, telephone bill, personal expenses and tips and donation respectively (Table10).

4.9.3 Cost incurred by wholesaler

In the present study, Table10 describes that estimated cost per kg of dried fish for wholesaler were calculated Tk. 24.35/kg. The highest cost were found for wages and salaries and it was estimated about Tk. 7.31/kg and lowest cost incurred for packaging and it was Tk. 0.58/kg. The cost incurred by wholesaler were found Tk. 6.0/kg, Tk. 4.736/kg, Tk.1.40/kg, Tk. 1.25/kg, Tk. 0.68/kg, and Tk. 1.56/kg in *aratdar* commission, house rent, electricity, market toll, telephone bill, personal expenses and tips respectively (Table10).

4.9.4 Cost incurred by retailer

In the present study, estimated cost per kg of dried fish of retailer were found Tk. 22.93/kg (Table10). The highest cost were found for house rent and it was estimated about Tk. 6.44/kg and lowest cost incurred for telephone bill and it was Tk. 0.37/kg. The cost incurred by retailer were found Tk. 2.20/kg, Tk. 1.17/kg, Tk. 4.58/kg, Tk. 5.06/kg, for transportation, packaging, electricity, personal expenses, respectively.

4.10 Marketing margin and value addition by different actors

The margin must cover the costs involved in transferring produce from one stage to the next and provide a reasonable return to those doing the marketing activities [11]. Gross marketing margin of each type of intermediaries is calculated by deducting the purchase price of dry fish from their sale prices while net margin or profit component is calculated by deducting the marketing cost from gross marketing margins. Marketing margin is the price for adding activities and functions performed by intermediaries [12].

4.10.1 Marketing margin and value addition by species transected by processor

The marketing profit of processor were found highest for Puti large size and it was calculated Tk. 64.45/kg followed by the small size of Chela Tk. 64.34/kg and lowest were found in case of Puti small size Tk. 24.95/kg followed by Taki medium Tk. 38.58/kg. The marketing profit for Veda dry fish were found Tk.48.42/kg and Tk.41.92/kg for small and large sized dry fish, respectively (Table8). In case of Tengra dry fish the marketing profit were calculated Tk.39.42/kg and Tk.46.92/kg for small and large size respectively. The marketing profit for Baim dry fish were found Tk.63.42/kg and Tk. 58.92/kg for small and large sized dry fish respectively. The marketing profit for Escha dry fish were found Tk. 49.84/kg and Tk.47.34/kg for small and large sized dry fish, respectively (Table8).

4.10.2 Marketing margin and value addition by species transected by wholesaler

The value addition by wholesaler shown in the Table11. From the table it shows that the marketing margin is highest in large size of Baim Tk. 147.0/kg followed by the small size of Escha Tk.124.2/kg and found lowest medium size of Puti Tk. 36/kg followed by Chela large size Tk. 50.0/kg.

Table11: Gross marketing margin and value addition by species transected by wholesaler

Species	Size	Purchase Price (Tk./kg)	Marketing Cost (Tk./kg)	Selling Price (Tk./kg)	Marketing Margin (Tk./kg)	Value Addition (Tk./kg)
Veda	Small	386.0	24.35	445.35	59.35	35
	Large	666.0	24.35	733.0	67	42.65
Puti	Small	215.0	24.35	273.0	58	33.65
	Medium	444.0	24.35	480.0	36	11.65
	Large	560.0	24.35	658.67	98.67	74.32
Tengra	Small	428.0	24.35	485.0	57	32.65
	Large	815.0	24.35	870.0	55	30.65
Taki	Medium	440.0	24.35	550.0	110	85.65
Baim	Small	470.0	24.35	545.0	75	50.65
	Large	743.0	24.35	890.0	147	122.65
Escha	Small	324.0	24.35	448.2	124.2	99.85
	Large	722.0	24.35	804.0	82	57.65
Chela	Small	432.0	24.35	495.0	63	38.65

	Large	550.0	24.35	600.0	50	25.65
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Source: Author's estimation, 2016.

The highest amount of value added by wholesaler were found in case of Baim large Tk. 122.65/kg and it was lowest in case of Puti medium Tk. 11.65/kg. In case of Tengra dry fish the marketing profit were calculated Tk. 57.0/kg and Tk. 55.0/kg for small and large size respectively. The marketing profit for Veda dry fish were found Tk. 59.35/kg and Tk. 67.0/kg for small and large sized dry fish respectively. The marketing profit for Taki dry fish were found Tk.110/kg (Table 11).

4.10.3 Marketing margin and value addition by species transected by retailer

The value added by retailer were found highest for Baim large size and it was calculated Tk. 200.4/kg followed by the small size of it was Tk. 144.07/kg and lowest were found in case of Chela large size Tk. 37.74/kg followed of its large Tk. 45.07/kg (Table12). The marketing profit for Taki dry fish were found Tk. 82.84/kg (Table12).In case of Tengra dry fish the marketing profit were calculated Tk. 117.67/kg and Tk. 73.0/kg for small and large size, respectively (Table12)

Table12: Marketing margin and value addition by species transected by retailer

Species	Size	Purchase price	Marketing cost	Selling price	Marketing margin	Value addition
Veda	Small	445.35	22.93	570.0	124.65	101.72
	Large	733.0	22.93	808.0	75.0	52.07
Puti	Small	273.0	22.93	369.0	96.0	73.07
	Medium	480.0	22.93	597.0	117.0	94.07
	Large	658.67	22.93	761.0	102.33	79.4
Tengra	Small	485.0	22.93	602.67	117.67	94.74
	Large	870.0	22.93	943.0	73.0	50.07
Taki	Medium	617.16	22.93	700.0	82.84	59.91
Baim	Small	545.0	22.93	712.0	167.0	144.07
	Large	890.0	22.93	1113.33	223.33	200.4
Escha	Small	448.2	22.93	612.67	164.47	141.54
	Large	804.0	22.93	913.33	109.33	86.4
Chela	Small	495.0	22.93	555.67	60.67	37.74
	Large	600.0	22.93	668.0	68.0	45.07

Source Author's Estimation, 2016.

4.11 Value addition of Dry Fishes by All Intermediaries

Table 12 shows the overall value addition of dry fish species from processor to the ultimate consumer. Table13 point out that, the highest value added in case of Baim large size which were accounted for Tk. 381.97/kg followed by small sized of Escha Tk.291.23/kg. The value chain

actors gain maximum profit by selling of these species due to the highest demand of two species by the local consumer as well the people migrated from Sylhet area to the different country (Table13).

The lowest value added by intermediaries in case of medium sized Tengra which were calculated Tk.127.64/kg followed by

Chela small size Tk.129.23/kg. The value addition of other species like Veda small and large were calculated Tk.185.14/kg and Tk. 136.64/kg respectively. Puti small, medium and large were calculated Tk.131/kg, Tk.139.17/kg and Tk. 218/kg respectively

(Table13).In case of Tengra small, value addition were calculated Tk. 166.81/kg. Baim small, Escha large and Chela large sized value added by value chain actors were calculated Tk. 258.14/kg, Tk. 191.39/kg, and Tk. 135.06/kg (Table13).

Table13: Value addition of dry fishes by all intermediaries

Species	Size	Processor	Wholesaler	Retailer	Total Value Addition (Tk./kg)
Veda	Small	48.42	35.00	101.72	185.14
	Large	41.92	42.65	52.07	136.64
Puti	Small	24.95	33.65	73.07	131.67
	Medium	33.45	11.65	94.07	139.17
	Large	64.45	74.32	79.4	218.17
Tengra	Small	39.42	32.65	94.74	166.81
	Large	46.92	30.65	50.07	127.64
Taki	Medium	38.58	85.65	59.91	184.14
Baim	Small	63.42	50.65	144.07	258.14
	Large	58.92	122.65	200.4	381.97
Escha	Small	49.84	99.85	141.54	291.23
	Large	47.34	57.65	86.4	191.39
Chela	Small	52.84	38.65	37.74	129.23
	Large	64.34	25.65	45.07	135.06

Source: Author's estimation, 2016.

4.12 Constraints faced by traders

The intermediaries were asked to mention the problems they faced in dried fish business. The problems reported by them are discussed below:

4.12.1 Lack of capital

Capital is the main problem for the traders. Wholesaling require considerable investment due to buying, storage and marketing of dry fish.Cash capital is a very necessary item for dry fish trading.When a

trader starts trading, he needs sufficient cash capital. Again for intermediaries out of 50 sampled 26 faced these constraint at high extent, 10 intermediaries faced at medium extent, 11 intermediaries faced at low extent and about 3 intermediaries did not faced these constraint In this case, the computed value of CFI was 109 [(26*3) + (10*2) + (11*1) + (3*0)] against a possible range from 0 to 240 for each (Table: 14).

Table14: Constraints faced by the traders

Constraints	Intermediaries				CFI	Rank
	High	Medium	Low	Not at all		

	(3)	(2)	(1)	(0)		
Inadequate capital	26	10	11	3	109	2
Lack of transportation and communication facilities	18	15	12	5	108	3
Lack of storage facilities	29	10	5	6	112	1
Political stability	21	19	5	5	106	4
Lack of marketing facilities	12	20	10	8	86	6
Lack of scientific and technological knowledge	20	12	6	12	90	5

Sources: Field survey, 2016.

4.12.2 Lack of transportation and communication facilities

Communication facilities plays important role for efficient dry fish trading. But the conditions roads and bridges are not satisfactory in the study areas. **Transportation cost was high** because of unconstructed roads and bridges. Out of 50 intermediaries in Sylhetsadar, 18 faced these constraint at high extent, 15 actors faced at medium extent, 12 intermediaries faced at low extent and about 5 intermediaries did not faced these constraint. In this case, the computed value of CFI was 108 against a possible range 0 to 240 for each (Table14).

4.12.3 Lack of storage facilities

Storage of dry fish is not possible under ordinary condition. Some processor and wholesaler stored dried fish for some time though not scientifically. Due to lack of adequate storage facilities, the reporting fisherman did not get fair price for their product. Out of 50 intermediaries in Sylhetsadar, 29 faced these constraint at high extent, 10 actors faced at medium extent, 5 intermediaries faced at low extent and about 6 intermediaries did not faced these constraint. In this case, the computed value of CFI was 112 against a possible range from 0 to 240 for each (Table: 14).

4.12.4 Political instability

Now a days Bangladesh gone through some political crisis. This crisis held for some parties and the government. Sometimes traders had to face these types of problems. Out of 50 intermediaries in Sylhetsadar, 21 faced these constraint at

high extent, 19 actors faced at medium extent, 5 intermediaries faced at low extent and about 5 intermediaries did not faced these constraint. In this case, the computed value of CFI was 106 against a possible range 0 to 240 for each (Table14).

4.12.5 Lack of marketing facilities

The various marketed problems reported by the traders. Marketing problems are related to transportation, price, and organized market. Traders complained that instability of dry fish price is a serious obstacle for their profit. Traders claim that organized market was limited in the study area. Out of 50 intermediaries in Sylhetsadar, 12 faced these constraint at high extent, 20 actors faced at medium extent, 10 intermediaries faced at low extent and about 8 intermediaries did not faced these constraint. In this case, the computed value of CFI was 86 against a possible range 0 to 240 for each (Table14).

4.12.6 Lack of market information

Market information played an important role in dry fish trading. Lack of adequate market information exists in the study areas. Out of 50 intermediaries in Sylhetsadar, 20 faced these constraint at high extent, 12 actors faced at medium extent, 6 intermediaries faced at low extent and about 12 intermediaries did not faced these constraint. In this case, the computed value of CFI was 90 against a possible range 0 to 240 for each (Table14).Table14 represented an overall situation of the constraints faced by the traders in the study areas. It revealed that, Lack of storage facilities with CFI 112 was

ranked as 1st, whereas, inadequate capital with CFI 109, poor communication and transport facilities with CFI 108, political instability CFI 106, lack of market information with CFI 90, and lack of marketing facilities with CFI 86 were ranked as 2nd, 3rd, 4th, 5th, and 6th, respectively.

5. CONCLUSION

Bangladesh has a countless chance to become one of the dominant dry fish producer all over the world. Because it has a biggest delta landscape many small, medium and large rivers, a lots of *haor*, efficient fishermen, competent dry fish producer and good business climate. The present study reveals that foremost supplier of dry fish are *haor* dry fish

processor (85%) facing transportation problem in high extent in dry fish supply and also added ultimate value. The highest value added in case of Baim large size which were accounted for Tk. 381.97/kg followed by small sized of Escha Tk. 291.23/kg where lowest value added by intermediaries in case of medium sized Tengra which were calculated Tk. 127.64/kg followed by Chela small size Tk. 129.23/kg. Hence it is necessary to reduce number of intermediaries in value chain activities as well as quick transportation system both water and road should be developed for fresh fish collection and surrounding value chain activities

6. LIMITATIONS OF THE STUDY

The limitation we faced for this study were limitation of time, necessary funding for conducting the study. We also faced difficulties from the processors and intermediaries because they thought that the investigator could be an agent of the government authority. So the

intermediaries were afraid of losing their income through imposition of income tax. For that reason, they hesitated to answer the questions and it was very difficult to record the prices of dry fish. The absence of written records among the intermediaries left the researcher to rely upon the memory of the respondents

7. COMPETING INTEREST

The authors have declared that no competing interest exist.

8. REFERENCES

1. BBS. (Bangladesh Bureau of Statistics) Statistics and informatics division. Ministry of planning. Government of the people's republic of Bangladesh; 2015
2. BBS. (Bangladesh Bureau of Statistics) Statistics and informatics division. Ministry of planning. Government of the people's republic of Bangladesh; 2014
3. Amin M A, Islam M R, and Hossain M B. Marketing channel of dried marine fish in the southeastern coastal belt of Bangladesh. Middle-East Journal of Scientific Research. 2012; 12(3): 301-306.
4. Faruque M O, Nazrul M S, Tonny U S, Islam K R, and Dey S C. Status of an ideal dry fish market of Bangladesh: A Study on Asadganj dry fish market, Chittagong. International Journal

- of Life Science Biotechnology & Pharma Research. 2012; 1(3): 102-108.
5. Hossain M S, Masud A A. Value stream analysis of dried fish's supply chain in Bangladesh. Journal of Economics and Sustainable Development. 2012; 3(9):11-15.
 6. Acharya S S, Agarwal N L. Agricultural Marketing in India. Third edition. New Delhi. Oxford and IBN Publishing Co. Pvt. Ltd. 2004.
 7. Afrad M S I. Farmer's attitude towards vegetable cultivation in Dumki Upazila of Patuakhali District. M.S Thesis, Submitted to Department of Agricultural Economics. Bangladesh
 11. Crawford I M. Agricultural and food marketing management. Food and Agricultural Organization of the United Nations. Rome. 1997; 261-262.
 - Agricultural University. Mymensingh. 2002.
 8. BFRF. (Bangladesh Fisheries Research Forum) Report. Value chain and marketing assessment of costal and marine aquatic resource of Bangladesh. Bangladesh Fisheries Research Forum. 2010.
 9. Olukosi J O, Isitor S U, Ode M O. Introduction to agricultural marketing and Prices. Principles and Applications. G. U. Publication Abuja, Nigeria. 2005.
 10. Thomas A S, Taylor D A, Donald J B. Managerial introduction to marketing. Third Edition. Englewood Cliffs. Prentice-Hall. 2000.
 12. Kohls and Uhl. Marketing of agricultural products. Mac Millan Publishing Company International. New York. USA. 1980.