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ECONOMICS OF FISH PRODUCTION AND MARKETING SYSTEM IN WEST BENGAL

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ABSTRACT

The fisheries sector constitutes an important component of the regional rural economy of West Bengal. As the fishery resource can re-generate itself naturally on a time frame that is relevant for human exploitation, its commercial production and harvesting can provide enormous scope for regional economic development on a sustainable basis. The development of the fisheries economic activities in different directions can lead to income and employment generation for the rural population on a significant scale. Marketing of fish involves all the activities in the flow of fish or fish products from the farmers to the consumer. Furthermore, an ideal market situation also requires satisfying all groups of players who are involved in flow of the goods and service from the producers to consumer. A study was conducted here to assess the market efficiency indicators such as Gross Marketing Margin (GMM) and Percentage Share of Fishermen in the Consumer Rupee (PSFCR) among other indicators. The average price spread for different varieties of fish ranged from Rs. 12 for the Mahasir to Rs. 156 for dry fish in the year 2015-16 respectively. Varieties such as Rohu (Rs. 115 kg⁻¹), Catla (Rs. 117.5 kg⁻¹), Mrigel (Rs. 122.5 kg⁻¹), Pomphret (Rs. 126.5 kg⁻¹), Galda (Rs. 117.5 kg⁻¹) and dry fish (Rs. 156 kg⁻¹) recorded a comparatively higher average price spread. Varieties of fish which record higher PSFCR were Hilsa (91.26%) above 1kg, Mahasir (91.05%), Rohu (86.30%) below 500 grams, Kuncho Chingri (86.18%), Pomphret (85.97%) below 100 grams, Catla (84.67%) below 500grams, Bagda (84.47%) below 35 grams, and Kabasu (82.56%) respectively.

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1. Introduction

The fishery constitutes an important type of natural resource of a country and it is defined to be a renewable resource having the capacity of regeneration of stock on a time frame that is relevant for human exploitation. Hence its commercial production and harvesting can provide enormous scope for regional economic development on a sustainable basis. The development of the fisheries economic activities in different directions can lead to income, employment generation to the rural population on a significant scale. The production of inland fishery sector in West Bengal has increased from 340 metric tons in 1980-81 to 1534 metric tons in 2017-18 (Hand Book of the Fisheries Statistics). It is relevant to note here that the state is well known for inland fisheries being made up of fresh water as well as brackish water fisheries. Fisheries sector has been recognized as one of the powerful source of income and employment generator, as it stimulates growth of number of subsidiary industries. Fish being a source of cheap animal protein, is a crucial sourcing of diet of the large section of economically backward population of the country vis-à-vis the state. It is also a major contributor of foreign exchange earnings through export of fish and fish's product. The potential for forward and backward linkage through boat building, construction of fishing harbor has led to the strengthening of regional and national economy. As for example, a survey conducted by water resource institute in 2000 revealed that 89

percent of Philippine's low income small scale fisheries feed their families from the daily catches (World Bank, 2004). The fishing sector occupies an important place in West Bengal's economy as a source of cheap but nutritious food, means of livelihood for thousands of the poor, and an important source of foreign exchange earnings. In West Bengal, there are vested and other types of common pool fish ponds locally known as multi-ownership tanks catering to the need of a large pool of poor village dwellers. In the absence of appropriate fishery management practices, their productivity is much below their potential (The Bergram Hajhipara Common Pool fish pond- A Case Study).

The fisheries sector of West Bengal consists of two types of fishery resources- a) marine fisheries b) inland fisheries. The inland fisheries resources consist of two types of water: fresh water and brackish water. These fisheries are further divided into two parts- culture and capture fisheries. Capture fisheries consist of the catch of fish from rivers and their tributaries and estuaries, lakes etc. These fisheries are harvested without sowing the seeds. However, in case of culture fisheries, one has to sow the seeds, nurse it and bring it to a proper size to harvest. This type of fisheries is comprised of tank, ponds, warms, marshes etc. Also, there exists a third category of fishery which is the amalgamation of first two types of fisheries mentioned above. A glimpse of the inland fishery resources of West Bengal is as follows:-

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Table1. Fisheries resources of West Bengal


Marine	
Length of coast line (Km)	158
Continental Shelf ('000 sq km)	17
Number of Fish Landing Centers	59
No of Fishing villages	188
No of fishermen families	76,981
Fisher-folk population	3,80,138
Inland	
Total inland water bodies (lakh Ha)	5.45
Rivers & canals (Km)	2,526
Reservoirs (Lakh ha)	0.17
Tanks & ponds (lakh Ha)	2.76
Flood plain lakes/derelict waters (lakh Ha)	0.42
Brackish water (lakh Ha)	2.10

West Bengal has a long coast line of 158 km and has a vast continental shelf of 1700 sq. km. It has total 59 number of landing centers and 76,981 numbers of families are residing in 188 villages. The total number of fishing population is around 3, 80,138. The inland fishery resources include total of 5.45 lakhs hectares of water bodies, out of which 0.17 lakhs hectare of reservoirs, 2.76 lakh hectares of pond and tanks, 0.42 lakhs hectares of flood plain lakes and 2.10 lakhs hectares of brackish water areas.

Fish is a highly perishable commodity and hence the time interval required to reach the consumer once it is landed, is of paramount importance (Getu, Misganaw & Bazezew, 2015). For this, an efficient fish marketing system has to be in place, which caters to the nutritional requirement of the general populace, as well as the demand

of the export market. An efficient fish marketing system reduces post-harvest losses, employs a substantial section of the workforce while generating revenue for the country (Akande & Diei-Ouadi, 2010; Kumar et al., 2008; Ali et al., 2014). In the present context of diminishing fish catch and increases in prices, it is imperative that an efficient fish marketing system has to be developed if we have to safeguard the interests of the fishermen as well as to ensure a steady supply of fresh fish to the consumers (Sathiadhas et al., 2012).

The growth of fish production and development of fishery sector is highly dependent on an efficient fish marketing system. Further, the survival and sustenance of different harvesting technique of capture fisheries solely depends on their profitability which is interlinked with the market demand and price of different varieties of

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fish. (R. Sathiadhas & R. Narayana Kumar, 1994). The harvesting and marketing of fish provides enormous employment opportunities. The post harvest operation of fish provides more employment to labour than the production sector (R. Sathiadhas & R. Narayana Kumar, 1994). An efficient price policy of fish aims at to ensure the service of middlemen at minimum cost. In other words, the pricing efficiency is concerned with improving the connectivity between the buyer and sellers and also to study other aspects of marketing channel so that it will remain highly responsive to the consumer behavior. Further, Modern Marketing Policy should focus on the tapping the potential demand of fish rather than meeting just the existing demand of it. Fisheries resources have its utmost important sector in West Bengal due to its implication for its production and marketing. The fish is wet and highly perishable. It is the common property resource, and the methods of estimation, capture and availability of different varieties of fish is of different nature as the resources are mostly migrating, invisible although renewable (R. Sathiadhas & R. Narayana Kumar, 1994). The raw materials are the living creature like fish which are also available in sea, river or a coast. We generally find monopsony and oligopsony characteristics in the fish marketing in West Bengal and hence fishermen could not take the advantage of the high price that prevails in the market. It is so because under imperfect competition, pure profit is expected to be positive in the long run equilibrium and it cannot be explained wholly in terms of the opportunity cost of the services provided by the middlemen.

2. Methodology


The data on fisheries price, marketing channels, intermediaries, margin costs and margins were collected from various aspects of fishery statistics mainly published in articles, journals and various Statistical handbooks of fisheries Statistics published by the government of West Bengal. Various statistical techniques like regression, CAGR and its trend line were fitted using MS Excel. Trend line with time series on fisheries production and its demand were fitted for model building and forecasting purposes. Information were collected on retail prices and whole sale price of selected fish's species to estimate price spread and Percentage Share of Fishermen in the consumer Rupee. The Price Spread is the difference between the price received by the producer and price paid by the consumer for any given commodity at a particular point of time in the market. Also, Gross Marketing Margin (GMM) and Percentage Share of Fishermen in Consumer Rupee (PSFCR) were used for studying the price behavior (Sathiadas et al., 2011). Hence, the Marketing Efficiency was analyzed using fishermen's share of consumer rupee. Symbolically,

$$\text{Gross Marketing Margin (GMM)} = \text{Retail Price (RP)} - \text{Wholesale (WS)}$$

(1)

$$\text{Percentage Share of Fishermen in the consumer Rupee (PSFCR)} = (\text{WS/RP}) * 100$$

(2)

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3. Results and Discussion


3.1 Production and Marketing Trends

West Bengal ranks as the second-largest fish producer state in the country after Andhra Pradesh (HFS-2018). The state also has the distinction of being a pioneer state in India in terms of fish seed production. However, the state is well known for inland fisheries being made up of fresh water as well as brackish water

fisheries. It is the pioneer state in India in terms of fish and fish seed production. It produced 17.42 metric tons of fish in the year 2017-18 and 20177 millions of fish seed production (Hand Book of Fisheries Statistics 2017-18). It's contributes 40% of total fish seed production of the country. Compared to the achievement in Fish production, the fish marketing's very poor and highly inefficient in India (Ganesh Kumar et. 2008). A total of 14081 fishers are involved in fish marketing, 96 % of which were women (Srikanth et al., 2015).

Table2. Year-Wise Demand and Production of Fish in West Bengal


Year	Demand (DD)				Production (SS)				Deficit OR Surplu s	5-Year Moving Averag e Deficit or Surplus
	Total	Annual Growt h Rate (%)	5-Year Moving Avearg e DD	5-Year Moving Average Growth Rate (%)	Total	Annual Growt h Rate (%)	5-Year Moving Avearg e SS	5-Year Moving Averag e Growth Rate (%)		
1995-96	10.20	-			8.93	-			1.27	
1996-97	10.60	3.92			9.37	4.93			1.23	
1997-98	10.70	0.94			9.50	1.39			1.20	
1998-99	10.93	2.15			9.95	4.74			0.98	
1999-00	11.15	2.01	10.72		10.45	5.03	9.64		0.70	1.08

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2000-01	11.35	1.79	10.95	2.16	10.60	1.44	9.97	3.51	0.75	0.97
2001-02	11.58	2.03	11.14	1.78	11.00	3.77	10.30	3.27	0.58	0.84
2002-03	11.47	-0.95	11.30	1.41	11.20	1.82	10.64	3.36	0.27	0.66
2003-04	11.67	1.74	11.44	1.32	11.70	4.43	10.99	3.30	-0.03	0.45
2004-05	11.88	1.80	11.59	1.28	12.15	3.88	11.33	3.07	-0.27	0.26
2005-06	12.65	6.48	11.85	2.22	12.50	2.88	11.71	3.36	0.15	0.14
2006-07	13.70	8.30	12.27	3.47	13.59	8.72	12.23	4.35	0.11	0.05
2007-08	14.25	4.01	12.83	4.47	14.46	6.40	12.88	5.26	-0.21	-0.05
2008-09	14.90	4.56	13.48	5.03	14.84	2.63	13.51	4.90	0.06	-0.03
2009-10	15.25	2.35	14.15	5.14	15.17	2.22	14.11	4.57	0.08	0.04
2010-11	15.75	3.28	14.77	4.50	14.43	-4.88	14.50	3.02	1.32	0.27
2011-12	16.10	2.22	15.25	3.28	14.72	2.01	14.72	1.68	1.38	0.53
2012-13	16.29	1.18	15.66	2.72	14.90	1.22	14.81	0.64	1.39	0.85
2013-14	16.52	1.41	15.98	2.09	15.80	6.04	15.00	1.32	0.72	0.98
2014-15	16.72	1.21	16.28	1.86	16.17	2.34	15.20	1.35	0.55	1.07
2015-16	16.95	1.37	16.52	1.48	16.71	3.33	15.66	2.99	0.24	0.86
2016-17	17.19	1.42	16.73	1.32	17.01	1.80	16.12	2.95	0.18	0.62
2017-18	17.84	3.78	17.04	1.84	17.42	2.41	16.62	3.18	0.42	0.42

Source: Hand Book of Fisheries Statistics 2014-15 to 2017-18, West Bengal

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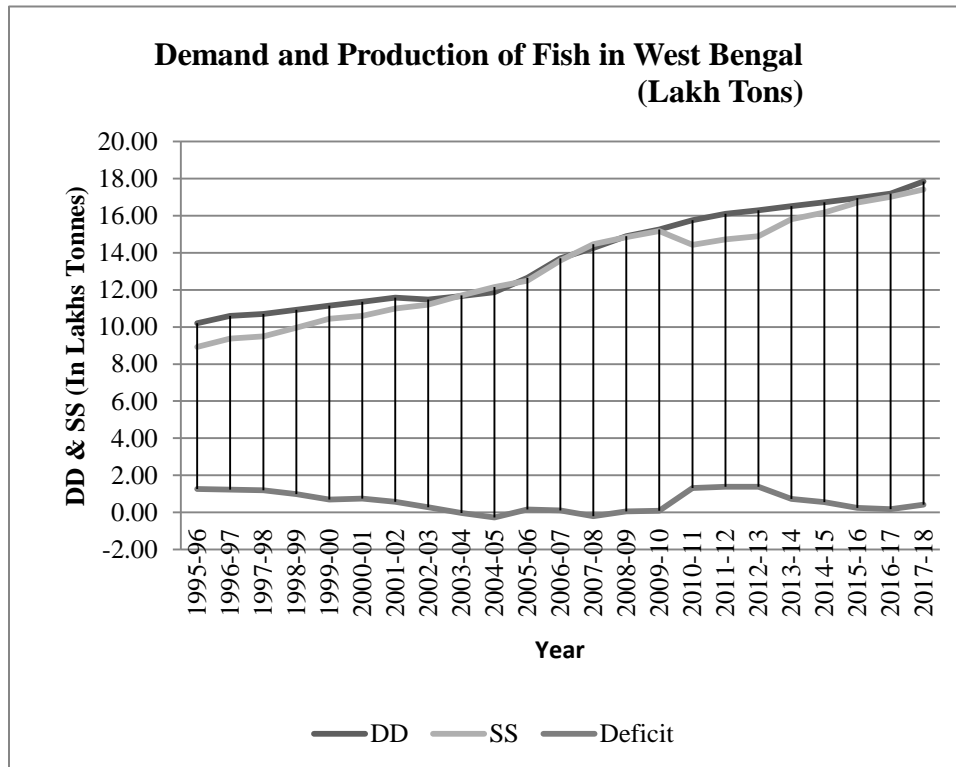



Figure 1

From the above table, we will try to portray the demand and supply of fish in West Bengal. Total demand for fish has augmented from 10.20 lakhs tonnes in 1995-96 to 17.84 lakhs tonnes in 2017-18 respectively. In corresponding to it, total supply for fish has enlarged from 9.64 lakhs tonnes in 1995-96 to 17.42 lakhs tonnes in 2017-18 respectively. Demand for 5-Year moving

average has increased from 10.72 lakhs tonnes in 1999-00 to 17.04 lakhs tonnes in 2017-18 respectively. But, the growth rate for demand has remained stagnant over the year. Whereas supply for 5-Year moving average have amplified over the year from 9.64 lakhs tonnes in 1999-00 to 16.62 lakhs tonnes in 2017-18 respectively. But, the growth rate for supply has decreased over the year from 4.93 % in 1996-97

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to 2.41 % in 2017-18 respectively. So, it is noticed that there is huge disparity between demand and supply in this sector. So; researcher should focus mostly on agricultural allied activities like fisheries. We have used simple

moving average that helps researcher to forecasts goods with constant demand, where there is a slight trend or seasonality. It is also useful for separating out random variations.

Table3. Total Import of fish from other States and other Countries (Units: In Lakh Tonnes)

Supply of Fish (Imported) from other States						
Name of the State	2013-14	2014-15	2015-16	2016-17	2017-18	4 Year CAGR
Andhra Pradesh	0.77	0.8	0.83	0.98	0.97	5.94
Orissa	0.49	0.5	0.58	0.54	0.51	1.01
Madhya Pradesh	0.09	0.1	0.11	0.11	0.1	2.67
Bihar	0.06	0.06	0.08	0.14	0.13	21.32
Other State	0.02	0.03	0.04	0.02	0.02	0.00
Total	1.42	1.49	1.64	1.79	1.73	5.06
Fish Imported from Other Country						
Fish's Species	2013-14	2014-15	2015-16	2016-17	2017-18	3- Year CAGR
Hilsa	-	0.01	0.01	0.02	0.02	31.52
Other than Hilsa *	-	0.02	0.03	0.05	0.00	-73.56
Total	-	0.03	0.03	0.07	0.02	-14.88
Total Import	-	1.52	1.67	1.86	1.75	4.78

Source: HandBook of Fisheries Statistics 2017*- Bhetki, Parsay, Tangra, Tilapia, Sol, Sa, etc

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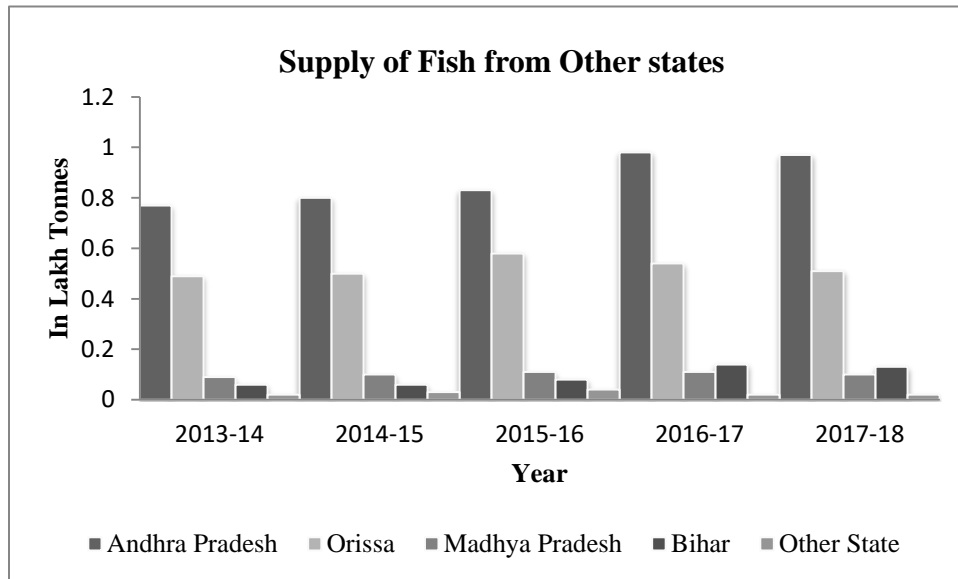



Figure 2

In case of Andhra Pradesh, import has increased from 0.77 lakhs tonnes to 0.97 lakhs tonnes in 2017-18. So, the 4 year CAGR is around 5.94%. Andhra Pradesh alone contributes around 56.07% of the total import from other states in the year 2017-18. Import has augmented from 0.49 lakhs tonnes to 0.51 lakhs tonnes in case of Orissa from 2013-14 to 2017-18. The CAGR for these years is around 1.01% and it contributes around 29.48% of the total imported from the other states in the year 2017-18. In case of Bihar, the total import has improved drastically from 0.06 lakhs tonnes in 2013-14 to 0.13 lakhs tonnes in the year 2017-18 and 4-year

CAGR has reached to around 21.31% and it contributes around 7.51% of total import from other states. Overall, the total import from other states have augmented from 1.42 lakhs tonnes in the year 2013-14 to 1.73 lakhs tonnes in the year 2017-18 respectively. So, the total import from others states is around 5.06%. Hilsa, which is regarded as “the king of fish” and which is imported from other countries has enlarged from 0.01 lakhs tonnes in 2013-14 to 0.02 lakhs tonnes in 2017-18 and so on. The CAGR has increased drastically to 31.52% for these years. But the CAGR for “fish other than Hilsa” such as Bhetki, Parsay, Tangra, Tilapia, Sol, Sa etc. have decreased drastically to 73.56%. Overall,

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the total import (import from other states + import from other countries) have improved from 1.52 lakhs tonnes in the year 2013-14 to 1.75 lakhs tonnes to 2017-18 and 4-year CAGR is around 4.78 %.

3.2 Marketing Status

The State currently has 477 wholesale markets and 3157 retail markets. ¹Nearly, 3717 wholesalers and 44349 retailers are doing their trades in those markets. Fish marketing in West Bengal was found to be largely controlled by the private dealers. An efficient marketing mechanism was required to transfer the excess fish production to outside the district for the benefit of fishers (Ray, 2008). The market had three main sets of players: buyers who purchased on behalf of retail stores and markets, whole sellers or dealers at the market and suppliers who caught the fish from the common-property water bodies. The fishermen who caught the fish did not normally sell them in the retail market. Three or four intermediaries were found to operate between the producer and the final consumers. No opening bidding existed at the landing point. So, the poor fishermen have to face exploitation due to limited intermediaries. Prices are found to be lower as compare to the urban market prices. In the villages, a fish farmer has to face one or two middlemen who buy fishes at the cheaper rate and take them to urban markets for better profit margins. This practice creates a situation for the marginal farmers where there is possibility of being exploited, especially if they are tied with the

middlemen for any type of financial obligation. In general, the retail marketing was not satisfactory in this area. The government does not have any regulatory mechanism over the market. Also, eye estimation was still common practice for the price fixation. The consumer does not have any option to judge the quality of the product to find if it is contain mated or it is disease affected or caught from the polluted water resource. No grading, sorting standardization, certifications etc were found either in rural market or in the urban market in the state.

Hand Book of Fisheries Statistics 2017-18

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Table4. Market Information


Sl. No.	District	Total No. of wholesale Market	Total No. of Wholesellerss	Total No. of Retail Market	Total No. of Retailers
1	Darjeeling	1	190	30	975
2	Jalpaiguri	5	48	167	2620
3	Coochbehar	58	73	155	2640
4	Uttar Dinajpur	16	105	31	800
5	Dakshin Dinajpur	8	50	51	680
6	Maldah	16	117	95	2766
7	Murshidabad	49	377	198	2731
8	Nadia	63	466	146	3135
9	Birbhum	6	80	126	1945
10	Barddhaman	20	73	96	1120
11	North 24 parganas	65	513	275	4649
12	South 24 Parganas	5	51	597	7695
13	Hooghly	10	162	68	1280
14	Howrah	28	512	151	2828
15	Purulia	5	30	29	280
16	Bankura	33	62	156	1086
17	Purba Medinipur	49	420	394	4436
18	Paschim Medinipur	36	137	254	1401
19	Kolkata	6	254	145	1450
Total		479	3720	3164	44517

Source: Hand Book of Fisheries Statistics 2017-18

In the above table, we have tried to illustrate the total number of whole sellers along with their whole sale markets and also, total number of retailers along with their retail markets in West

Bengal. As we seen from the above table that Darjeeling along contributes 190 whole sellers from the single whole sale market and 975 retailers were trading under 30 retail markets. In case of Kolkata, 254 whole sellers were trading

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under 6 whole sale markets and 1450 retailers were trading under 1450 retail markets. 117 whole sellers and 2766 retailers were trading under 16 whole sale markets and 95 retail markets in maldah districts. In case of Uttar Dinajpur, 800 retailers were trading under 31 whole sale markets and 105 whole sellers were trading under 16 whole sale markets.

3.3 Marketing channels

Marketing channels play a notable role in quality and price of the fresh fish in West Bengal and its

reach the consumer through four marketing channels. Marketing channel of fish starts with the fish farmers passes through a number of intermediaries and ends at the ultimate consumer. Major intermediaries in the fish marketing channels were: Beopari/ Paikars, Aratdars and Retailers. Fish farmers do not sell fish directly to the consumer in the urban markets, except in the few cases in the rural areas. The following marketing channels, which exists in West Bengal were-

Table5. Different Marketing Channels in fish Market of West Bengal

Channels I: Fishermen-Consumers

Channels II: Fisher-Beopari-Aratdar-Paikar/Retailer-Consumers


Channel III: Fishermen-Aratdar-Retailer-Consumers

Channel IV: Fishermen-Beopari-Paikar/Retailers-Consumers

Beoparies (a trading intermediary who collects products directly from producers or primary markets for further transfer of products /commodities) handle a large volume of fish. They sell their purchases to Aratdars (big wholesaler) and some portion to paikars (a small-scale wholesaler who may be involved in

retailing also). They can be local or non-local traders having no licenses. It was revealed that the length of marketing channels for fresh fish was relatively small due to non-existence of value addition/processing, which lead to have more shares in the hand of farmers.

3.4 Market Efficiency Indicators-The marketing efficiency across different fish markets is depicted in the below table.


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Table6. Market Efficiency Indicators in Fish Marketing in West Bengal


Sl. No.	Species Name	2015-16				2016-17				2017-18			
		WS ^{*2} (Rs/kg)	RS [*] (Rs/kg)	GM M [*]	PSF CR [*]	WS [*] (Rs/kg)	RS [*] (Rs/kg)	GM M [*]	PSF CR [*]	WS [*] (Rs/kg)	RS [*] (Rs/kg)	GM M [*]	PSF CR [*]
1	Rohu upto to 500g	114	133	19	85.71	117	142	25	82.39	126	146	20	86.30
	From 500 g to 1 kg	136	162	26	83.95	143	171	28	83.63	147	171	24	85.96
	From 1 kg to 2.5 kg (Local)	184	219	35	84.02	189	230	41	82.17	194	235	41	82.55
	From 1 kg to 2.5 kg (Imported)	128	170	42	75.29	144	180	36	80.00	152	198	46	76.77
	cut Fish of Rohu up to 2.5 kg	0	266	266	0.00	0	274	274	0.00	0	244	244	0.00
	From 2.5 kg to 5 kg	0	302	302	0.00	0	292	292	0.00	0	211	211	0.00
2	Catla upto 500 g	119	144	25	82.64	124	150	26	82.67	127	150	23	84.67
	From 500 g to 1 kg	148	179	31	82.68	155	188	33	82.45	153	185	32	82.70
	From 1 kg to 2.5 kg (Local)	190	227	37	83.70	199	249	50	79.92	202	253	51	79.84
	From 1 kg to 2.5 kg (Imported)	152	199	47	76.38	176	209	33	84.21	157	201	44	78.11
	Cut Fish of Catla upto 2.5 kg	0	251	251	0.00	0	300	300	0.00	0	292	292	0.00
	From 2.5 kg to 5 kg	0	314	314	0.00	0	328	328	0.00	0	292	292	0.00

* Where, WS= Wholesale Price, RS= Retail Price, GMM= Gross Marketing Margin, PSFCR= Percentage Share of Fishermen in the consumer Rupee.

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3	Mrigel upto 500 g	108	125	17	86.4 0	114	137	23	83.2 1	108	131	23	82.4 4
	Frpm 500 g to 1 kg	135	157	22	85.9 9	139	168	29	82.7 4	143	165	22	86.6 7
	From 1 kg to 2.5 kg (Local)	157	169	12	92.9 0	176	206	30	85.4 4	176	203	27	86.7 0
4	Hilsa From 500g to 1 kg	566	750	184	75.4 7	635	840	205	75.6 0	660	777	117	84.9 4
	Above 1 kg (Local)	600	900	300	66.6 7	729	895	166	81.4 5	794	870	76	91.2 6
	Above 1 kg (Imported)	550	750	200	73.3 3	778	932	154	83.4 8	910	960	50	94.7 9
5	Bhetki From 500g to 1 kg	249	290	41	85.8 6	231	283	52	81.6 3	268	315	47	85.0 8
	Above 1 kg	280	385	105	72.7 3	292	381	89	76.6 4	303	344	41	88.0 8
6	Tilapia upto 100 g	91	114	23	79.8 2	98	127	29	77.1 7	99	125	26	79.2 0
	Above 100 g	113	144	31	78.4 7	122	152	30	80.2 6	122	153	31	79.7 4
7	Persia	188	246	58	76.4 2	181	246	65	73.5 8	209	243	34	86.0 1
8	Koi	295	377	82	78.2 5	301	383	82	78.5 9	326	408	82	79.9 0
9	Singhi	354	422	68	83.8 9	348	413	65	84.2 6	350	419	69	83.5 3
10	Magur	377	460	83	81.9 6	399	477	78	83.6 5	460	454	-6	101. 32
11	Silver Carp from 500 g to 1 kg	95	118	23	80.5 1	96	120	24	80.0 0	108	136	28	79.4 1
	Above 1 kg	113	141	28	80.1 4	116	147	31	78.9 1	116	151	35	76.8 2
12	Cyprinus Carp	105	129	24	81.4 0	111	141	30	78.7 2	123	154	31	79.8 7
13	Grass Carp	95	125	30	76.0 0	127	167	40	76.0 5	133	164	31	81.1 0
14	Tangra	264	320	56	82.5 0	251	324	73	77.4 7	272	346	74	78.6 1

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1 5	Pabda	331	402	71	82.3 4	317	422	105	75.1 2	321	418	97	76.7 9
1 6	Bhola Big	105	150	45	70.0 0	124	155	31	80.0 0	122	187	65	65.2 4
	Small	60	96	36	62.5 0	98	120	22	81.6 7	100	145	45	68.9 7
1 7	Pomphret upto 100 g	261	353	92	73.9 4	232	333	101	69.6 7	298	365	67	81.6 4
	Above 100 g	264	425	161	62.1 2	271	411	140	65.9 4	337	392	55	85.9 7
1 8	Bombay Duck (Lotea)	49	83	34	59.0 4	29	40	11	72.5 0	40	79	39	50.6 3
1 9	Rebon	0	0	0	0.00	163	180	17	90.5 6	0	0	0	0.00
2 0	Kuncho Chingri	169	225	56	75.1 1	190	243	53	78.1 9	393	456	63	86.1 8
2 1	Bagda From 25- 35 g	378	407	29	92.8 7	332	398	66	83.4 2	435	515	80	84.4 7
	From 35-50 g	410	478	68	85.7 7	338	482	144	70.1 2	463	540	77	85.7 4
2 2	Galda From 50- 100 g	390	460	70	84.7 8	462	559	97	82.6 5	425	607	182	70.0 2
	Above 100 g	460	625	165	73.6 0	433	576	143	75.1 7	98	140	42	70.0 0
2 3	Other-Punti	119	160	41	74.3 8	138	170	32	81.1 8	114	150	36	76.0 0
2 4	Ayar	229	281	52	81.4 9	212	276	64	76.8 1	215	283	68	75.9 7
2 5	Bata	133	164	31	81.1 0	127	165	38	76.9 7	149	191	42	78.0 1
2 6	Boal	172	233	61	73.8 2	170	230	60	73.9 1	126	168	42	75.0 0
2 7	Chital	262	350	88	74.8 6	347	431	84	80.5 1	349	448	99	77.9 0
2 8	Falui	371	447	76	83.0 0	156	195	39	80.0 0	157	228	71	68.8 6
2 9	Kalbasu	147	204	57	72.0 6	154	202	48	76.2 4	161	195	34	82.5 6

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30	khoira	148	189	41	78.31	161	191	30	84.29	169	222	53	76.13
31	Mahasir	154	166	12	92.77	168	189	21	88.89	173	190	17	91.05
32	Maurala	170	230	60	73.91	0	0	0	0.00	169	225	56	75.11
33	Dry Fish	230	386	156	59.59	200	250	50	80.00	200	260	60	76.92


Source: Hand Book of Fisheries Statistics 2015-16 & 2017-18

We will try to analyses above table through the market efficiency indicator such as price spread and PSFCR, which are discussed below-

a) **Price Spread-** It is the difference between the price paid by the ultimate consumer and the price received by the ultimate producers. Narayanakumar and Sathiadas (2006) have studied the marketing efficiency in terms of price Spread or Gross Marketing Margin. According to them, the market can be graded as efficient only if the price spreads is minimum. For the present study, the marketing efficiency was studied in terms of the price spread and Producers share of the Consumer Rupee (PSFCR), which is presented in Table6. The average price spread for different varieties of fish ranged from Rs. 12 for the Mahasir fish to Rs. 156 for dry fish in the year 2015-16 respectively. Varieties such as Rohu (Rs. 115 kg⁻¹), Catla (Rs. 117.5 kg⁻¹), Mrigel (Rs. 122.5 kg⁻¹), Pomphret (Rs. 126.5 kg⁻¹), Galda (Rs. 117.5 kg⁻¹) and Dry fish (Rs. 156 kg⁻¹) recorded a comparatively higher average price spread. Solanke et al. (2013)

in their studies on the price spread analysis of farmed shrimp in Thane district of Maharashtra said that, in the situation of higher price spread, higher marketing cost and, margin are covered by intermediaries in the marketing channel. So, the market efficiency tends to fall with the increase in the intermediaries.

b) **Percentage Share of Fishermen in the consumer Rupee (PSFCR)-** As could be observed from Table6, the Percentage share of the consumer Rupee ranged from 50.63 % in case of Bombay fish to 101.32 in case of Magur fish in the year 2017-18. Varieties of fish which record higher PSFCR were Hilsa (91.26%) above 1kg, Mahasir (91.05%), Rohu (86.30%) below 500 grams, Kuncho Chingri (86.18%), Pomphret (85.97%) below 100 grams, Catla (84.67%) below 500grams, Bagda (84.47%) below 35 grams, and Kabasu (82.56%). In a similar study conducted by Kaygisiz and Eken (2018), the PSFCR of fish varieties ranged from 39.95 to 66.67. Sathiadhas et al. (2011) in a similar study observed that varieties such as Sharks, Seerfish and Mackerel recorded a comparatively higher PSFCR of 77.12,

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75.22, and 71.29% respectively. They attribute the higher share of fisherman in the consumer's rupee due to absence of middlemen in the marketing channel which denotes a higher degree of market efficiency (Das et al., 2013). In a study conducted by Upadhyay, Jagpal, and Roy (2016), it was observed that, higher marketing margins were claimed by the intermediaries, further reducing the market efficiency.

4. Conclusion

A fish marketing system is considered efficient only when the fish in its fresh state is made available to the consumers, distributed across the length and breadth of the country in the minimum time gap. Though market extension, integration and expansion has registered a fillip when compared to earlier times, gross marketing margin and the percentage share of fisherman in consumers rupee is high only for a few high value fishes on which fishermen depend for a lion's share of their income. Dominance of middle men and intermediaries in the marketing chain result in low market efficiency. Institutional mechanisms and proper ice, storage facilities both at landing centers, markets and during transit will go a long way in reducing post-harvest losses and ensuring a remunerative price for the producers and fishermen at large.

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