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Analysis on marketing of freshwater fish rohu (*Labeo rohita)* in Cuttack district, Odisha

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Abstract
The study was conducted in Cuttack district of Odisha. A two stage stratified multi-stage sampling technique was used for the selection of blocks, villages and proportionate random sampling for selection of growers. From the list, 98 fish farmers were selected using proportionate sampling method i.e. 47 small, 35 medium and 16 large farmers respectively. The primary data were collected from the respondents by using interview schedule, while secondary data were collected from the official records, published data, magazines etc. The marketable surplus for Rohu (*Labeo rohita*) in the study area was found to be 20.14, 21.05 and 21.1 quintals per hectare farm which constituting (95.36%), (94.95%) and (94.03%) to their total Rohu production. Channel-I, Marketing cost when producers sold their produce to consumer in the market was Rs.293/quintal. Net price received by the producer is 11971/quintal. Producer share in consumer price was 97.6 per cent. Price spread is Rs 293/quintal. Marketing efficiency was 41.9 per cent. Channel-II, Marketing cost when producers sold their produce to wholesalers was Rs. 12144/quintal, further wholesaler sold it to retailer was Rs.12344/quintal. Producer share in consumer price was 91.7 per cent. Price spread is Rs.1003/quintal. Marketing efficiency was 10.40 per cent. Channel-III, This is identified as the longest channel. The producer sells his produce to the trader, who in turn sell it to wholesaler, further wholesaler sell it to retailer in the market. Producer share in consumer price was 84.1 per cent. Price spread is Rs 2228/quintal. Marketing efficiency was 6.3 per cent. Finally, the produce reaches to the consumer after collecting margin.

Keywords: Freshwater fish, Rohu (*Labeo rohita*), price spread, marketing channels, producer's share, marketing efficiency

Introduction
Fish is a highly perishable commodity and hence the time interval required to reach the consumer once it is landed, is of paramount importance. For this, an efficient fish marketing system has to be in place, which caters to the nutritional requirements of the general populace, as well as the demands of the export market.Fish production and marketing make significant contributions to economic growth, livelihood support and poverty alleviation in the country. So, farmer friendly fish culture is an economic activity of the rural people for augmenting their income, generating employment and ensuring food and nutritional security (Randhir, 1984). It also adds to the foreign exchange earnings of the country (Anjani, 2004) [6].

Unlike many agricultural and industrial products, fresh fish is not treated as a well-defined commodity. Fish is highly perishable with unpredictable supply and individual fishes are heterogeneous products. Product differentiation may lead to imperfect competition and a segmented market. To make the fish available to consumers at reasonable prices, right time and place require an effective marketing system. Therefore, fish marketing is a vital aspect for sellers, consumers and other facilitating agencies, including the government.

Fishery, like many other farming practices, relies heavily on natural resources, such as water, land, seed and feed. Therefore, environmental interactions play a vital role in determining the aquaculture production (Jhingran, 1991) [4]. The need to address environmental interactions and various issues for the benefit of sustainable fishery development, has been reiterated in several global inter-governmental conferences. Of late, technology-rich farming operations responsible for hazardous and seepage of toxic materials into aquatic environment, pressure of population leading to urbanization and threat to eco-system, awareness for quality of food in the event of WTO agreement, lack of environmental consciousness among the fishers, variations in choices of products and prices, competition in world and domestic trade, etc. have made fish marketing more vulnerable. Thus, quantity and quality of fish products, in general, face a threat and, accordingly, demand and supply may show variations (Dastagiri, 2003) [3].

Domestic and international fish markets are liable to be influenced in respect of production, import, export and prices, which, in turn, may affect the micro and macro level economic perspectives, including the livelihood of millions of fishermen. So, environmental awareness and, thereby, appropriate actions on the part of fishers assume significant importance.

Odisha (formerly Orissa), an eastern Indian state on the coast of Bay of Bengal is one of the major fish producing maritime states and currently ranks 4th in total fish production after Andhra Pradesh, West Bengal and Gujarat. The state Odisha in India has almost 11% of water area of the country which contributes 4.75% of inland fish production. Odisha has an abundance of fisheries resources, both inland and marine, and is home to the largest brackish water lagoon (Chilika lake) in Asia and the second largest coastal lagoon in the world. The coastal plains are rich in fertile silt, which are deposited by the seven major rivers flowing into the Bay of Bengal. These are Subarnarekha, Budhabalanga, Baitarani, Brahmani, Mahanadi Rushikulya and Vasandhara. The river systems besides, useful for agriculture, power generation and capture fisheries. the state has 0.683 million ha of freshwater resources, 0.418 million ha of brackish water resources and 480 Kms. of coastline and continental shelf area of 24,000 Km2, which provides excellent scope for fisheries development. The amount of fish produced totally in Odisha both from marine and inland with 8.18 lakh tonnes in 2019-20. (Source-District Fishery Office, Cuttack)

Research Methodology

Methodology was used for the study under following heads:

1. Locale of the study
2. Research design
3. Sampling procedure
4. Statistical analysis of the data
5. Period of enquiry
6. Methods of data collection

Locale of the study

Cuttack district is located in the eastern part of Odisha state. It is bounded by latitude 200 03’ to 200 40’ N and longitude 840 5’ - 860 20’E. It covers an area of 3628 sq. km. Cuttack District is well developed in Fisheries with Resources of Fishery wealth in Brackish Water, Freshwater Reservoir and Inland Fisheries. Blue Revolution is well expressed in this district through a multi-pronged approach which includes the introduction of fast-growing, high-yielding species. For the year 2020-21 (up to Nov) this district, achieved 14163.34 tons of Fish production. (Source-District Fishery Office, Cuttack)

Research design

Ex post facto study or after-the-fact research

Sampling procedure

A two stage stratified multi-stage sampling technique was used for the sampling of present study.

Selection of district

Cuttack district has higher concentration of area under freshwater fish production, thus district was selected purposively for the study.

Selection of block

Out of all 14 blocks present in the Cuttack district Nischintakoili block has been selected purposively for present study as the selected species i.e. Rohu is extensively grown in this specific area.

Selection of villages

A list of all villages of the selected block was prepared along with area under Rohu Cultivation. Then, list of the villages was arranged in descending order according to area under Cultivation. Thereafter, 10% villages were selected randomly.

Selection of farmers/ respondents

A complete list of all the fish farmers was prepared. Therefore, the fish farmers were arranged in ascending order of area under Rohu production and then growers were classified into three groups on the basis of area under Rohu cultivation in all the selected villages *viz*., First farms group (Small Farmer, 0-1 hectare), Second farms group (Medium Farmer 1- 2 hectare), and Third farms group (Large Farmer 2ha or more than 2ha). Out of this list 98 growers were selected randomly.

Table 1: Number of sample households under different categories in the study area

Sl. No	Villages	Total no. of respondents				Selected no. of respondents			
		Small	Medium	large	total	Small	Medium	Large	total
1	Bandhakatia	112	94	41	247	11	9	4	24
2	Bandhupur	103	52	43	198	10	5	4	19
3	Isaniberhampur	193	164	62	419	19	16	6	41
4	Nagaspur	74	53	21	148	7	5	2	14
	Total	482	363	167	1012	47	35	16	98

Selection of market

The data related to prices and arrivals of Rohu was collected from Jobra market in of Cuttack district.

Selection of market functionaries

A list of all market functionaries of both primary and secondary market has been prepared with the help of market head out of total market functionaries 10% market functionaries selected randomly from both market for present study this market functionary was considered for data collection regarding different marketing costs and other charges in different marketing channels. The selected respondents for the present study all together totals 4 Traders, 11 wholesaler, 23 retailers were selected randomly for the study.

Table 2: Details of market functionaries

Sl.no	Market(primary & secondary)	Market functionaries no.	Total samples	Selected sample
1	Surya Vihar (Jobra Road)	Traders	37	4
		Wholesalers	88	11
		Retailers	175	23
		Total	300	38

Period of enquiry
The study has been conducted in agriculture year 2021-2022.

Methods of data collection
The enquiry was conducted by survey method. The primary data were collected for a period of one year by personal interview with the selected Rohu growers on well prepared schedule and secondary data was collected from the records available at district head quarter, Block level fishery officers and Gram-panchayat office.

Tools of Analysis
Suitable tabular as well as functional analysis as per need was applied to analyses the data and presentation of the results.

Marketing tools used in marketing channels
1. Marketing cost
The total cost incurred on marketing by various intermediaries involved in the sale and purchase of the commodity till it reaches the ultimate consumer was computed as follow:

$M = Cf+Cm1+Cm2+Cm3+\ldots \quad +Cmn$

Where
M = Total cost of marketing
Cf = Cost borne by the producer farmer from the produce leaves the farm till the sale of the produce
Cmn = Cost incurred by the i^{th} middlemen in the process of buying and selling.

2. Marketable surplus

$MS = P - C$

Where
MS = Marketable surplus P = Total production
C = Total requirements (Family and farm)

3. Marketing margin of middlemen
a. Absolute margin = PRi – (Pp i+ Cmi)

b. Percent margin = $\frac{P_{Ri} - (P_{pi} + C_{mi})}{P_{Ri}} * 100$

4. Producer's share in consumer's rupee

$P = \frac{(C - M)}{M} X\ 100$

Where,
P = Producer's share in Consumer's Rupee C = Consumers' rupee
M = Marketing cost

5. Price Spread = Total Marketing Cost + Total Marketing Margin.

6. Marketing efficiency

$MME = \frac{FP}{MC+MM}$

Where,
MME is modified measure of marketing efficiency
FP = Price received by farmers
MC = Marketing cost
MM = Marketing margin

Objective of the Study
To identify different existing marketing channels, price spread and their marketing efficiency in the study area.

Results and Discussion
The result obtained from analysis are presented and discussed below

Disposal Pattern of Rohu per hectare in different Size of Farms Group in Cuttack district (Qtl. /ha)

Particular	Size of farm groups			Sample Average
	Small	Medium	Large	
Total yield	21.12	22.17	22.44	21.91
Home consumption	0.42	0.44	0.67	0.51
Kind payments as wages	0.03	0.06	0.11	0.067
Relatives and religious person	0.53	0.62	0.56	0.57
Total retention	0.98	1.12	1.34	1.14
Marketable surplus	20.14	21.05	21.1	20.76

The above table reveals the disposable pattern of freshwater fish that Total production of Rohu (*Labeo rohita)* was highest in large size farms (22.44 quintals) as compared to medium size farms (22.17 quintals) and small size farms (21.12 quintals). Home consumption is mostly in small size farms as compared to medium and large size farms. Kind payment as wages is highest in large size farms as compared to small and medium size farms. Quantity used as gift for religious purpose is highest in large size farms. The highest percent of produce was retained by large size farms (1.34 quintals) followed by medium (1.12 quintals) and small size farms (0.98 quintals) respectively. This also indicated that highest percentage marketable surplus was found in small size farm group i.e. 95.35 percent followed by medium farm group with 94.94 percent and large size farm group with 94.02 percent. This makes the sample average for marketable surplus of 20.76 quintals with 94.75 percent.

Existing marketing channels in the study area of Rohu (*Labeo rohita*)
In the study area, three different types of marketing channels prevailed through which Rohu (*Labeo rohita*) production was distributed from the producer to the ultimate consumer, are given below:
Marketing channels
There are three marketing channels for the marketing in district given below

- Channel-I: Producer-Consumer
- Channel-II: Producer- Wholesaler-Retailer-Consumer
- Channel-III: Producer-Trader-Wholesaler-Retailer Consumer

Table 3: Marketing Cost, Marketing Margin and Price Spread in different Size of Farm Groups (Rs/qtls) Channel 1 - (Producer-Consumer)

C1. Producer-Consumer	Rs/Qtl
Producer Sale price to Consumer	12264.28
1.Cost incurred by producer	
Transportation Cost	113
Packing cost & Weighing cost	70
Storing & Icing	110
2.Total Marketing Cost	293
3.Net price received by producer	11971
4.Price Spread	293
5.Consumer paid price	12264
6.Producer Share In Consumer Rupee (%)	97.6
7.Marketing Efficiency(%)	41.9

The above table reveals the marketing channel 1, in which there are no intermediaries involved. It shows total marketing cost incurred for a producer which involves packing, weighing, transportation of the fish which is Rs 293/quintal in fingerling size and marketing efficiency recorded 41.9 in a fingerling size of Rohu (*Labeo rohita)* respectively.

Table 4: Marketing Cost, Marketing Margin and Price Spread in different Size of Farm Groups (Rs/qtls) Channel 2 - (Producer-Wholesaler-Retailer-Consumer)

C2.Producer-Wholesaler-Retailer-Consumer	Rs/Qtl
Producer Sale price to Wholesaler	12144
1. Cost incurred by producer	
Transportation Cost	52
Packing cost	35
Total marketing cost	87
Net price received by producer	12057
producers selling price	12144
2. Cost incurred by wholesaler	
Wholesalers buying price	12144
Transportation	137
loading &unloading	12
market fee	25
Wholesaler's marketing cost	174
Net price receive by Wholesaler	11970
Wholesaler's marketing margin	200
Wholesaler's selling price	12344
3. Cost incurred by Retailer	
Retailers paid price	12344
loading &unloading charge	14
storing and icing	112
Cleaning & cutting	350
containers	30
miscellaneous	51
Retailer's marketing cost	557
Retailer's marketing margin	245
Retailer's selling price	13146
4. Total marketing cost	818
5. Total marketing margin	445
6. Consumer's paid price	13146
7. Price spread	1003
8. Marketing efficiency	10.40
9. Producer Share In Consumer Rupee (%)	91.7

Above table reveals the marketing cost, price spread and marketing margin of channel 2, two intermediaries were identified in this marketing channel. Producer sells his produce to wholesaler and the wholesaler turn sells it to the retailers in the market. Finally the produce reaches customer after collecting commissions. Marketing cost when producers sold the produce is Rs.87/quintal which is packaging and transportation. The purchased produce is transported in containers and supplied to retailers by wholesaler at various levels which costs about an average of Rs. 174/qtls in, after adding margin to it i.e. Rs 200/quintal. Similarly retailers marketing cost and marketing margin i.e.Rs.557/quintal and Rs.245/quintal respectively. In total the average total marketing cost from the collected samples 818/quintal, marketing margin is recorded as Rs.445/quintal. Price spread is recorded as Rs.1003/quintal. Marketing efficiency is calculated at 10.40.

Table 5: Marketing Cost, Marketing Margin and Price Spread in different Size of Farm Groups (Rs/qtls) Channel 3 - (Producer-Trader-Wholesaler-Retailer-Consumer)

C3.Producer-Trader-Wholesaler-Retailer-Consumer	Rs/Qtl
Producer Sale price to Trader	12144
1. Cost incurred by producer	
Packaging Cost	35
Miscellaneous	23
Total marketing cost	58
Net price received by producer	12086
producers selling price	12144
2. Cost incured by Trader	
Trader buying Price	12144
transportation	110
loading &unloading	12
containers	28
market fee	28
total marketing cost of trader	178
marketing margin of trader	450
Traders selling price	12772
3. Cost incurred by Wholesaler	
Wholesalers buying price	12772
Transportation	80
loading &unloading	14
maket fee	25
Wholesaler's marketing cost	119
Wholesaler's marketing margin	370
Wholesaler's selling price	13261
4. Cost incurred by Retailer	
Retailers paid price	13261
loading &unloading	12
market fee	27
Storage & iceing	312
cleaning & cutting	350
containers	30
Retailer's marketing cost	731
Retailer's marketing margin	380
Retailer's selling price	14372
Total marketing cost	1086
4. Total marketing margin	1200
5. Consumer's paid price	14372
6. Price spread	2228
7. Producer Share In Consumer Rupee (%)	84.1
8. Marketing efficiency	6.3

Above table reveals the marketing cost, price spread and marketing margin of channel 3, three intermediaries were identified in this marketing channel. Producer sells his produce to trader. The traders buy the produce from farmer and transports to various markets to distribute among wholesalers adding his marketing cost and marketing margin i.e. 178/quintal and 450/quintal. Then wholesalers distribute the produce to local retailers with certain margin. Finally the produce reaches customer after collecting commissions.

Marketing cost when producers sold the produce to trader is Rs.58/quintal. The purchased produce is transported in containers and supplied to retailers by wholesaler at various levels which costs about an average of Rs.119/quintal, after adding margin to it i.e. Rs 370/quintal. Similarly retailers marketing cost and marketing margin i.e. Rs.731/quintal and Rs.380/quintal. In total the average total marketing cost and marketing margin is recorded as Rs.1086/quintal and Rs.1200/quintal. Price spread is recorded as Rs.2228/quintal. Marketing efficiency is calculated at 6.3.

Conclusion

The present study reveals that the large farmers practicing fisheries tend to gain more profit when compared to medium and small farmers. There are about three middle men involved in the process of marketing of freshwater fish Rohu (*Labeo rohita*) i.e. Trader, Wholesaler, Retailer. The study reveals three existing marketing channel i.e. channel I (Producer to Consumer), channel II (Producer-Wholesaler - Retailer - Consumer), channel III (Producer-Trader - Wholesaler – Retailer - Consumer). The producer's share in consumer's rupee happens to higher in channel I followed by channel II and channel III because of no market intermediaries present in the particular channel.

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