The Pharma Innovation

Pujalipta Behera
Ph.D. Scholar, Department of
Agricultural Economics, College
of Agriculture, OUAT,
Bhubaneswar, Odisha, India

Sarba N Mishra
Professor and HOD, Department
of Agricultural Economics,
College of Agriculture, OUAT,
Bhubaneswar, Odisha, India

RK Mishra
Retd. Professor, Department of
Agricultural Economics, College
of Agriculture, OUAT,
Bhubaneswar, Odisha, India

BP Mishra
Professor, Department of
Agricultural Extension, College
of Agriculture, OUAT,
Bhubaneswar, Odisha, India

PN Pradhan
Retd. Associate Professor,
Department of Agricultural
Statistics, College of Agriculture,
OUAT, Bhubaneswar, Odisha,
India

Corresponding Author
Pujalipta Behera
Ph.D. Scholar, Department of
Agricultural Economics, College
of Agriculture, OUAT,
Bhubaneswar, Odisha, India

A study on value chain analysis of paddy in Bargarh district of Odisha

Pujalipta Behera, Sarba N Mishra, RK Mishra, BP Mishra and PN Pradhan

Abstract
The present study entitled "A Study on value chain analysis of paddy in Bargarh District of Odisha" was undertaken with the following objectives, viz. to study the existing supply-chain along with the marketing channels of paddy and its allied products before and after harvesting; to study the internal and external factor influencing the supply chain of paddy and to find out the constraints in achieving the full potential of value added products and suggest policy recommendations for an improved rice value chain management. The present study was carried out in Bargarh district. A multistage random sampling method was followed to select the rice growers from two blocks from each district. Under each block two villages were selected randomly. 80 farmers were selected from the two villages randomly. Relevant analytical techniques were used for the study. Probit analysis was used for market participation of the farmer. Garrett ranking technique was used for ranking the constraints. Marketing efficiency of Paddy/Rice in Channel-I, II and III is 1.82, 1.80 and 1.71 respectively. This shows that the marketing efficiency increased with decrease in market intermediaries. Estimated coefficients of the Probit regression revealed that the explanatory variables– 'level of education', 'farm size', 'household labour' and 'farm income' positively and significantly influence the farmers' decision to participate in the market with crop sales. Efficiency of Rice bran oil in channel I & II is 2.26 & 2.16 respectively. In view of lower coverage of farmers under MSP Program and more occurrence of distress sale by majority farmers of Odisha, value addition opportunities of rice should be promoted through SHGs, FPOs and MSME units in organized manner. More number of modern rice mills should be promoted for making this industry more profitable and qualitative. Recent R & D efforts by IITs & other research institutes should be promoted through various policy initiatives of State & Central Government. The present study on the value chain analysis thus provides deeper insights regarding the various actors involved in each stage of marketing channels and the value appreciation involved in the subsequent stages till it reaches the consumer.

Keywords: Value chain, marketing efficiency, paddy/rice, probit analysis

Introduction
The value chain is a concept which can simply described as the entire series of activities required to bring a product from the initial input supply stage, through various phases of production, to its final market destination. As opposed to the traditional exclusive focus on production, the concept stresses the importance of value addition at each stage, there by treating production as just one of several value adding components of the chain. Value chain analysis includes the identification and mapping of the relationships of activities, inputs-outputs, spatial relationships and structure of the economic agents. It is helpful in understanding several problems of market access, acquisition of production capabilities, distribution of gains along the chain and leverage points for policy and organizing activities.
Odisha stands 4th in production (7.58 million tonnes) and the area under coverage (4.18 million hectares, 2013-14) of paddy in India. In Odisha, many varieties of paddy (Hybrid/HYV / Indigenous) are cultivated in almost all districts due to the suitability of agro climatic conditions. Out of 4.18 million hectares of Paddy acreage, the area under HYV is 3.71 million ha (88.8%) while 0.47 million ha (11.2%) is covered under local varieties. In view of decline in the share of Agriculture and Allied Sector to the state GDP (15.4%), agrarian distress, non-remunerative paddy farming, higher food grain prices and lower MSP, it would be reasonable to analyze value chain of paddy to know share of paddy farmer in the value chain for corrective action to strengthen the share. The value chain describes the range of activities required to move a commodity from the first point of production to the last point of consumption.

Materials and Methods

For this study, multi stage random sampling procedure was followed for selection of samples. Firstly, on the basis of highest area and production of cultivation of paddy Bargarh District was selected from the four Physiographic zones of Odisha. Secondly, from the district, two blocks were selected randomly. Thirdly, from each block two villages were selected randomly. From each village 20 numbers of farmers were selected at random in the ratio of 2:2:1 (marginal, small and large).Thus a total of 80 farmers were selected for the present study. Data were collected through personal interview approach. Primary data are collected from Farmers, Traders, Processors, Wholesalers and Retailers. Keeping in view the objectives of the study, appropriate statistical methods were employed to analyse the data. Price spread analysis was used to determine the Producer's share in consumer's rupee. The marketing efficiency of different marketing channels for paddy was estimated Calkin's index. Probit model is used to identify the various socio-economic and farm characteristics influencing the farmer's decision to take part in the markert. To identify the constraints faced by farmers, traders and processor during production and marketing in the study area Garrett's ranking technique was used.
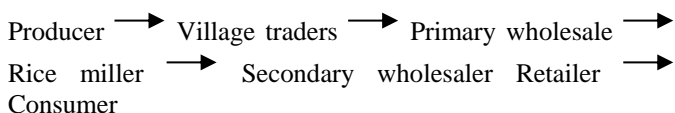
Results and Discussion

Before proceeding to the objective-wise analysis, the general characteristics of the sample farmers are analysed for understanding and interpretation of the result. In Bargarh district 12.5% of the respondents have received primary education. 62.5% of them have completed matric, 7.5% have received +2 and 17.5% of the respondents have completed their graduation. There are 22.5% of the respondents in the age group of 36-51 years, 15% in the age group upto 35years and 62.5% of them are in the age group of above 50years in Bargarh district. It is seen that in the district 57.5% of respondents have family size less than 4 which means that they have nuclear family. 35% of respondents have family members of 5-7 and only 7.5% of respondents have family members more than 8.
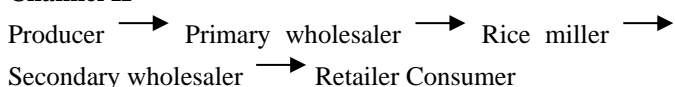
Marketing channels are the routes through which produce moves from producers to final consumer. The marketing channels were identified in the marketing of paddy based on diversified value addition to paddy before it reached the final consumer. There are three marketing channels found in all the study areas.

The prevailing three marketing channels mainly identified in the study area are
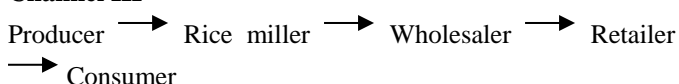
Channel I

Producer → Village traders → Primary wholesale →
Rice miller → Secondary wholesaler Retailer →
Consumer

Channel II

Producer → Primary wholesaler → Rice miller →
Secondary wholesaler → Retailer Consumer

Channel III

Producer → Rice miller → Wholesaler → Retailer →
Consumer

Price spread analysis

It is the difference between the price paid by the consumer and the price received by the producer. It mainly consists of marketing cost and marketing margin. It refers to the distribution of price paid by the consumer for the rice among different market functionaries. The price spread analysis is done in each channel and presented in the Table 1. It is clear from the table that the net price received by the consumer in channel I, II and III is Rs.1600.00, Rs.1630.00 and Rs.1630.00 per quintal respectively. The total marketing margin in channel I, II and III is Rs.332.46, Rs.380.20 and Rs.307.60 per quintal respectively.

Table 1: Price-spread in marketing of Paddy/Rice under different channel

Sl. No.	Particulars	Marketing channels		
		I	II	III
A.	**Producer**			
1.	Sale price	1600.00	1720.00	1715.00
2.	Marketing charges	-	90.00	85.50
3.	Net price received	1600.00	1630.00	1630.00
B.	**Trader**			
1.	Purchase price	1600.00	-	-
2.	Marketing charges	70.00	-	-
3.	Marketing margin	80.00	-	-
4.	Sale price	1750.00	-	-
C.	**Primary wholesaler**			
1.	Purchase price	1750.00	1720.00	-
2.	Marketing charges	61.00	60.00	-
3.	Marketing margin	57.00	80.00	-
4.	Sale price	1868.00	1860.00	-
D.	**Miller**			
1.	Purchase price	1868.00	1860.00	1715.50
2.	Marketing charges	180.00	170.00	200.00
3.	Marketing margin	95.46	115.20	122.60
4.	Sale price	2143.46	2145.20	2038.10
E.	**Secondary wholesaler**			
1.	Purchase price	2143.46	2145.20	2038.10
2.	Marketing charges	60.00	70.00	73.00
3.	Marketing margin	80.00	90.00	95.00
4.	Sale price	2283.46	2305.20	2206.10
F.	**Retailer**			
1.	Purchase price	2283.46	2305.20	2206.10
2.	Marketing charges	70.00	80.00	70.00
3.	Marketing margin	100.00	95.00	90.00
4.	Sale price or consumer's purchase price	2453.46	2480.20	2366.10
	Total charges borne by different agencies	441.00	470.00	428.50

Table 2: Producer's share in consumer's rupee

Sl. No.	Particulars	Marketing channels (in percent)		
		I	II	III
1.	Consumer's price	100.00	100.00	100.00
2.	Marketing charges	17.97	18.95	18.10
3.	Marketing margin	14.75	15.32	13.00
4.	Producer's share	65.21	69.34	72.48
5.	Marketing Efficiency	1.82	1.80	1.71

The share of different market functionaries in price paid by the consumer is presented in the Table 2. The producer's share in consumer's rupee is 65.21, 69.34 and 72.48 percent in channel I, II and III respectively. The marketing efficiency is calculated using the Calkin's index and the result is presented in the table. Lower the index more is the marketing efficiency. The movement of goods from producers to the ultimate consumers at the lowest possible cost consistent with the provision of service desired by the consumers is termed as efficient marketing. The marketing efficiency of channel I, II and III is 1.82, 1.80 and 1.71 respectively. This indicates that among all the channels, the channel III is more efficient.

Table 3: Probit Analysis for the decision of market participation by the farmers of Bargarh district

Variables	Coefficient	Std. Err.	Z-value	P >|z|
Sex	0.65	1.38	0.64	0.342
Age	-0.07	0.03	-0.61	0.323
Level of education	1.03***	0.07	-0.51	0.404
Farm size	0.98***	0.29	3.31	0.001
Household labour	-0.06	0.65	2.17	0.050
Non-farm activities	-0.49	0.69	-0.41	0.471
Use of credit	-0.78	0.60	-0.57	0.467
Market information	-0.88	0.43	-0.83	0.631
Non-farm income	-0.0000090	0.0000084	-0.53	0.334
Farm income	0.0000076*	0.0000073	1.38	0.071
Constant	-5.56	3.40	-1.68	
Log likelihood= -28.098735 LR chi2(11) = 83.03 Prob.>chi2= 0.0000 Pseudo R2= 0.69970				

Note: ***, ** and * indicates 1%, 5% and 10% significance level

Table 4: Marginal effects of the explanatory variables used to estimate probit regression

Variables	dy/dx	Std. Err.	Z-value	P >|z|	x-bar
Sex	0.092	0.07	0.64	0.342	0.98
Age	-0.003	0.01	-0.61	0.323	44.08
Level of education	-0.197***	0.01	-0.52	0.404	5.40
Farm size	0.138***	0.05	3.31	0.001	4.07
Household labour	0.198	0.09	2.17	0.050	1.17
Non-farm activities	-0.107	0.12	-0.91	0.471	0.58
Use of credit	-0.061	0.10	-0.57	0.467	0.43
Market information	-0.080	0.14	-0.63	0.631	0.66
Non-farm income	-0.000001	0.0000014	-0.73	0.334	37252
Farm income	-0.000001*	0.0000007	1.76	0.071	10411
Observed probability	0.3				
Predicted probability	0.1066888 (at x-bar)				
Log likelihood= -21.072235 Number of obs.= 100 LR chi2(11)= 80.03 Prob.>chi2= 0.0000 Pseudo R2= 0.6950					

The result of probit analysis is presented in the Table 3. From the table, it can be observed that the likelihood ratio statistics as indicated by chi-square statistics are highly significant (P <0.0000), suggesting the model has a strong explanatory power. The Pseudo R^2 is 0.6950, indicating the specification fits the data well the variables included in the model explain 69% of the variation in the decision of market participation of farmers. It also indicates that the estimated coefficients of the Probit regression revealed that the explanatory variables– 'farm size', 'level of income' and 'farm income' positively and significantly influence the farmers' decision to participate in the market with crop sales.
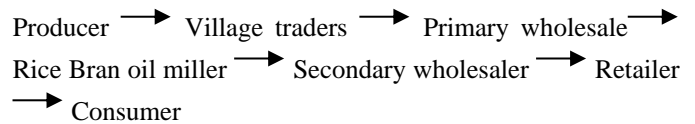
To facilitate interpretation of the estimation results presented in Table 4, the marginal effects of each variable on the predicted probability of households' market participation, evaluated at the means of the explanatory variables, are reported in table. The marginal effects report of the Probit regression provides the probability that a farm household will participate in output markets. The table provides the probability estimation for the likelihood of market participation of a farm household given the statistically significant variables: 'farm size', 'household labor', 'income from livestock', and 'farm income'. The marginal effect report of the Probit regression indicates that there is a probability of 14% that a farmer participates in the output

market if his farm size increases. The marginal effect shows that there is a probability of approximately 20% that a smallholder participates in the outputmarket if there is increase in education level of the household heads. This enables access to more information and new opportunities in various markets for their product.
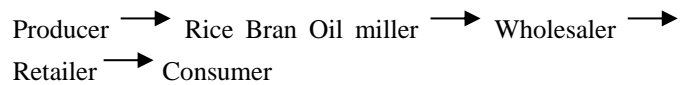
Marketing channels for Rice Bran Oil
There are two marketing channel mainly identified in the study area.

Channel I
Producer → Village traders → Primary wholesale → Rice Bran oil miller → Secondary wholesaler → Retailer → Consumer

Channel II
Producer → Rice Bran Oil miller → Wholesaler → Retailer → Consumer

Price spread analysis
The price spread analysis is done in each channel and presented in the Table 5. It is clear from the table that the net price received by the consumer in channel I and II is Rs.1630.00 and Rs.1700.00 per quintal respectively. The total marketing margin in channel I and II is Rs.1370.00 and Rs.830.46 per quintal respectively.

Table 5: Price-spread in marketing of RBO different channels

Sl. No.	Particulars	Marketing channels for Rice Bran Oil	
		I	II
A.	**Producer**		
1.	Sale price	1630.00	1700.00
B.	**Trader**		
1.	Purchase price	1630.00	-
2.	Marketing charges	180.00	-
3.	Marketing margin	280.00	-
4.	Sale price	2090.00	-
C.	**Primary wholesaler**		
1.	Purchase price	2090.00	-
2.	Marketing charges	235.00	-
3.	Marketing margin	300.00	-
4.	Sale price	2625.00	-
D.	**Rice miller**		
1.	Purchase price	2625.00	1700.00
2.	Marketing charges	250.00	260.00
3.	Total returns to miller	3500.00	3700.04
4.	Marketing margin	350.00	360.46
6.	Sale price	3225.00	2320.46
E.	**Secondary wholesaler (Rice bran oil manufacturer)**		
1.	Purchase price	3255.00	2320.46
2.	Marketing charges	200.00	200.00
3.	Marketing margin	210.00	220.00
4.	Sale price	3635.00	2740.46
F.	**Retailer**		
1.	Purchase price	3635.00	2740.46
2.	Marketing charges	220.00	250.00
3.	Marketing margin	230.00	250.00
4.	Sale price or consumer's purchase price	4085.00	3240.46
	Total charges borne by different agencies	1085.00	710.00

Table 6: Producer's share in consumer's rupee

Sl. No.	Particulars	Marketing channels (in percent)	
		I	II
1.	Consumer's price	100.00	100.00
2.	Marketing charges	26.56	21.91
3.	Marketing margin	33.53	25.62
4.	Producer's share	39.90	52.46
5.	Marketing Efficiency	2.26	2.16

The share of different market functionaries in price paid by the consumer is presented in the Table 6. The producer's share in consumer's rupee is 39.90 and 52.46 percent in channel I and II respectively. The marketing efficiency is calculated using the Calkin's index and the result is presented in the table. Lower the index more is the marketing efficiency. The marketing efficiency of channel I and II is 2.26 and 2.16 respectively. This indicates that between the two channels, the channel II is more efficient.

Table 7: Constraints in rice value chain (Farmers)

Sl. No.	Constraints	Garrett ranking score	Rank
1.	Shortage of human labour (skilled & unskilled)	65.17	3
2.	Seasonal incidence of disease & pest	80.23	1
3.	Natural calamities	70.59	2
4.	Storage facilities	47.43	7
5.	Selling below MSP	60.05	4
6.	Poor extension services	51.21	6
7.	Irrigation facilities	27.44	8
8.	Market information	29.22	9
9.	Inadequate credit facilities	53.70	5
10.	Post harvest loses	20.67	10

It was observed from the Table 7 that seasonal incidence of disease and pest was the major constraints in the cultivation of paddy as reported by 80.23 per cent cultivators followed by natural calamities (70.59 per cent), shortage of human labour (skilled & unskilled) (65.17 per cent), selling below MSP (60.05 per cent) and inadequate credit facilities (53.70 per cent). Other important constraints were poor extension services, storage facilities, irrigation facilities, market information and post harvest loses.

Conclusion
The marketing efficiency of paddy channel I, II and III is found to be 1.82, 1.80 and 1.71 respectively. This indicates that among all the channels, the channel III is more efficient. In Bargarh district, the marginal effect report of the probit regression indicates that there is a probability of 14% farmer participating in the output market if their farm sizes increase. The marketing efficiency of rice bran oil in channel I and II is 2.26 and 2.16 respectively. This indicates that between the two channels, the channel II is more efficient due to less number of intermediaries. The major constraints observed are seasonal incidence of disease and pest followed by natural calamities, shortage of human labour (skilled & unskilled), selling paddy below MSP and inadequate credit facilities. Other important constraints are poor extension services, storage facilities, irrigation facilities, market information and post harvest loses.

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