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Analysis of Rice Value Chains- a Study of Bihar and Karnataka states in India

Pavithra, A.S; K.M.Singh; Nasim Ahmad; D.K. Sinha and R.R.Mishra
Dr. Rajendra Prasad Central Agricultural University,
Pusa-848125, Samastipur, Bihar (India)

Abstract

The present investigation was aimed for analyzing comparative value chain addition of rice production and marketing in Bihar and Karnataka States, based on primary data having 300 stakeholders selected using random sampling method from two purposively selected districts East Champaran and Davangere of Bihar and Karnataka, respectively, duly categorized into paddy growers, paddy wholesalers, millers, rice wholesalers, rice retailers and consumers. Farmers were the first value adding actors, and earned on an average of the gross return Rs 44,641.8/ha (East Champaran) and Rs 1, 32,117.26/ha (Davangere) by cultivating paddy. They added value of Rs 115.71 per quintal by drying, Rs 86.77 per quintal by selling in markets and Rs 127.27 per quintal by storing (speculation) of produce to sell in future in case of East Champaran district and in case of Davangere district. Paddy wholesalers, the second important key players, and added value of average Rs 65.8 per quintal and Rs 75.67 per quintal in case of both districts under study, respectively. Rice millers were important value adder in rice value chain and added value in three stages purchasing and milling of paddy and selling of rice. The value addition by rice millers estimated about 81.21 per cent and 26.55 per cent, and 60.63 per cent and 32.95 per cent by marketing and milling in East Champaran and Davangere district, respectively. Rice wholesalers were the fourth actor in value chain, value addition by them was about 10.69 per cent and 11.05 per cent in both districts, respectively. The profit earned from rice was Rs 2.38 per kg (East Champaran) and Rs 3.11 per kg (Davangere). Rice retailers, the final value chain actor received less value addition and the profit earned was estimated to be Rs 2.57 per kg and Rs 3.62 per kg in both the districts under study.

Keywords: Rice, value chain, value addition, wholesaler, producer, consumers

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Introduction

Rice is the most widely consumed staple food for a large part of the world's human population, especially in Asia. About four - fifths of the world's rice is produced by small - scale farmers and is consumed locally. India is the second largest producer of rice in the world after China, accounting for 20% of all world rice production. However, India is not only a largest producer of rice but also it is the biggest consumer of rice in the world. It occupies about 22 per cent (43.2 million ha) of the total cultivated area in the country. India also holds the largest agricultural land for paddy production in the world. Indian share in global rice production has been hovering in the range of 19.50 to 22.25 %. Consumption estimates of rice has also gone up steadily from about 80-85 million tons in the early 2000s to about 99 million tons in 2014-15.

The proportion of agricultural production that is, marketed by the farmers is an important indicator of commercialization of agriculture. The marketed surplus measured as a share of total production which is sold in the market is relatively higher in case of commercial crops than subsistence crops. In case of rice and wheat, increase in marketed surplus ratio has been mainly driven by effective government procurement policy, while in case of commercial crops like maize, vegetables, and oilseeds; it was due to the efforts of the private sector (Paul *et al.,* 2015). Rice marketed surplus, ratio has increased by 15.5 % points (from 61.7% in 1999-00 to 77.2% in TE-2011-12)

Among all the states, the two major rice growing states are Bihar and Karnataka in India. Rice is cultivated in almost all the districts of Bihar. Out of this, 16 districts fall under high productivity group. It has about 3.29 million ha which is under rice cultivation, with production of 6.64 million metric tons during 2013-14, the states average productivity is about 2595 kg/ha. The cost of cultivation of paddy was estimated 30647.28 Rs/ha during 2012-13(Directorate of Economics & Statistics). In Karnataka, rice is grown in 30 districts, out of which 14 are under high productivity group (yield more than 2,500 Kg/ha). Karnataka has 1.34 million ha area under rice cultivation; the production of rice was 3.95 million metric tonne during 2013-14. The state average Productivity was 3098 Kg/ha, while, the Cost of cultivation of rice in Karnataka has been 62730.62 Rs/ha in 2012-13.

Local rice production has not been able to meet the increase in demand triggered by population growth, rapid urbanization and change in consumer habits. The fast-growing demand for rice is driving interest in expanding India its own rice production. Past efforts that led to, increasing rice production alone has been found to be unsustainable unless strong linkages with existing market systems exist.

Farmers harvest paddy at right time, dry it under sun to get the moisture level to about 15-20%, if stored with moisture of more than 20%, the colour and quality of rice deteriorate; if dried to less than 15 % moisture, proportion of cut rice will be more in hulling; Moisture level of 15-20% is the optimum moisture level.

Paddy processing, thus, is the primary processing activity by which husk and bran are removed from paddy to transform it into polished rice. Hence, rice forms the basic primary processed product obtained from paddy. This provides ample opportunities for the development of rice-based value-added products. Apart from rice milling, processing of rice

bran for oil extraction, energy generation from husk etc., are important agro processing activities for value-addition, income and employment generation.

The value chain concept was developed and popularized in 1985 by Michael Porter, in "competitive advantage," a seminal work on the implementation of competitive strategy to achieve superior business performance. Subsequently, the term was adopted for agricultural development purposes and has now become very much in vogue among those working in this field, with an increasing number of bilateral and multilateral aid organizations using it to guide their development interventions.

Agricultural value chain concept is the idea of actors connected along a chain producing and delivering goods to consumers through a sequence of activities. However, this "vertical" chain cannot function in isolation and an important aspect of the value chain approach is that it also considers "horizontal" impacts on the chain, such as input and finance provision, extension support and the general enabling environment (Humphrey, 2005).

A broad definition of value addition is to economically add value to a product and form characteristics more preferred in the market place. There are two main types of value addition. The one is innovation and the other is co-ordination. Innovation focuses on improving existing process, procedures, products or services. The enhancement added to a product or services by a company before the product is offered to customers. World Bank's the term ''value chain'' describes the full range of value adding activities required to bring a product or service through the different phases of production, including procurement of raw materials and other inputs.

Rice value chain focus on various value adding opportunities to ensure better price as well as demand-supply equilibrium, various actors namely farmers, village trader, wholesaler, rice millers always concerned about their fair price besides improvement of rice quality. A series of value generating activities associated with product marketing from farm level to the ultimate consumer is referred to as value chain. Mainly the value chain activities of rice are carrying paddy from field after cutting, threshing, cleaning, bagging, storing, carrying to the markets, selling to the traders, selling to the millers then millers convert paddy into rice maintaining various quality and grading, rice millers are the starting actors in milling, bagging, transporting to different market, then rice traders do the job of selling to the ultimate consumer.

India's rice value chain initiative emphasizes on the creation and strengthening of both horizontal and vertical linkages of the chain. The government believes that the development of rice value chain will increase competitiveness, increase production, contribute to food security and address what past initiatives failed to acknowledge - end markets and private sector actors. Lots of benefits are documented in the literature to be associated with the development of rice value chain. In the broader context, rice value-chain development and upgrading have significant implications for food security, poverty alleviation and overall economic development (Demont and Rizzotto, 2012). The emergence of rice value chain development constitutes a fundamental change in the rice sector by organizing the sector into a sustainable and competitive one (Loosvelt and Defoer, 2010).The value chain development generates higher profits and creates mutually beneficial outcomes for all stakeholders involved, especially the rural population and entrepreneurs (Hobbs et al., 2000). Common actors in rice value chain in India are farmers, paddy traders, rice millers, rice wholesalers,

rice retailers. Different value chain actors have different activities but all of them add some values in every steps of marketing channel.

The paddy producers are mainly subsistence and semi subsistence in nature. Most farmers sell paddy immediately after harvest for fulfilling their cash requirement. But profit margins vary in the rice value chain due to market imperfections, unequal bargaining power among different actors, and unavailability of timely market information etc. If the actors know the benefit of participation in improved value chain, ensures the optimum quality of paddy and rice, thus in turn increase both actors as well as ultimate consumer's welfare. Value-chain development and upgrading have significant implications on food security, poverty alleviation and overall economic development.

In this study, an effort has been made to analyze the value addition of rice in various marketing segments.

Material and Methods

In order to conduct "value chain study of rice" as it is comparative approach, the present study was undertaken in East Champaran district of Bihar and Davangere district of Karnataka. The districts were purposively selected because these districts were leading producers of rice in state and also on account of existence of many rice mills in these localities. Data were collected for agricultural year, 2014-2015.

A list of rice producing blocks/taluks along with the status of rice production in concerned block were prepared and out of the total blocks/taluks two blocks were selected randomly in both the states. Again a list of rice producers/farmers, middlemen (paddy traders, processors, rice wholesalers, and rice retailers) & consumers of every selected block were prepared. From each selected block 50 producers and 5 from each level of 5 service providers were selected randomly. Thus, total 150 respondents were selected for detailed investigation in each state so that total sample size was 300 respondents for both states. On the basis of data cost of paddy production, input-output ratio and gross and net returns of farmers were calculated. Marketing cost of paddy was calculated by adding cost of transportation of produce, paddy drying charges, storing goods in warehouses or godowns, building rent, market fee, labour charges, weighing charges, loading and unloading charges, market toll, promoting the goods or services being sold and/or the distribution of product to point of sale etc. Marketing margin is calculated using the following formula:

1. Gross marketing margin (Rs/quintal) = Sale price (Rs/quintal) - Purchase price (Rs/quintal)

2. Net margin (Rs/quintal) =Gross margin (Rs/quintal) - Marketing cost (Rs/quintal)

3. $\text{Value addition (\%)} = \frac{\text{Marketing Margin}}{\text{Purchase Price}} \times 100$

Results and Discussion

Value addition activities are mainly concerned with the changes of utilities. In economics, the sum of the unit profit, the unit depreciation cost, and the unit labour cost is the unit value added.

Marketing channel involved in marketing of rice:
The study identified various marketing channel of paddy, rice and its associated by-products in respective study area. Two different marketing channels were found most common in study area. First, paddy marketing channel which was producers to miller and second, rice marketing channel was millers to ultimate consumers. Various types of marketing channels identified in East Champaran and Davangere districts were discussed and reported in Table 1 with reference to corresponding respondent preference. The National Commission on Agriculture (1976) had emphasized that it is not enough to produce only; it must be satisfactorily marketed. Channel-III and IV were found common marketing channel in East Champaran district (Bihar), channel-I was found most common in Davangere district (Karnataka) due to large number of mills existing in its surrounding/vicinity, millers were directly purchasing produce from farmers.

Table 1: Rice marketing channel in respective study area

Sl.No	Market channel	No. of respondent	
		East Champaran	Davangere
I.	Producer - Miller-Wholesaler - -Retailer-Consumer.	18	46
II.	Producer-Commission Agent-Miller-Wholesaler - Retailer – Consumer.	-	18
III.	Producer - Itinerant Merchant - Miller - Wholesaler - Retailer –Consumer.	28	-
IV.	Producer - Wholesaler (Paddy) - Miller - Wholesaler (Rice) Retailer – Consumer.	28	22
V.	Producer - Miller - Retailer – Consumer	26	10
VI.	Producer - Miller –Consumer	-	4
Total		**100**	**100**

Cost, returns and value addition:

The costs, returns and value addition by different value adding actors were analyzed separately. The main cost items were production cost, marketing cost, processing cost, etc. Returns were calculated by multiplying the total output with per unit price of products and byproducts. Value addition was the difference between the prices of two conjugating value adding steps. The cost of production of paddy was worked out separately for East Champaran and Davangere district. Per hectare total cost (cost C) for paddy cultivation was worked out to be Rs 33538.76 per hectare for East Champaran and Rs 54,492.52 per hectare for Davangere district.

Productivity of rice and its by-product was computed as 35.08 quintals per hectare in East Champaran district, and the productivity of by-product was found to be 20.20 quintals per hectare, but in case of Davangere district, it was found that the overall productivity of paddy was 73.18 quintal per hectare and the productivity of by-product was found 73.06 quintal per hectare. Paddy productivity was more in case of Davangere district of Karnataka state as compared to East Champaran district of Bihar; it might be due to the usage of improved seeds, proper use of fertilizer and assured irrigation in Davangere district. Adoptions of new technologies of cultivation were also noticed in Karnataka. This might be another reason for high productivity.

Gross returns from paddy were calculated at the market rate of Rs 1157.03 per quintal, Rs 1660.50 per quintal, by-product at Rs 200 and Rs 145 in East Champaran and Davangere districts respectively. Gross income from paddy including its by–product was observed to be Rs 44,641.8 and Rs 1, 32,117.26 in East Champaran and Davangere districts.

Value addition to paddy by farmers:

It was found that most of the farmers did not know the value chain activity and their benefits, and majority of the farmers had lack of market information. However they were following some traditional methods like drying, cleaning and storing etc. without knowing they were adding value in this methods, most of the farmers were not aware and not able to adopt modern value chain activities. Due to poor economic condition some of the farmers sold the produce in farm gate itself on the economic price. Therefore, paddy marketing by the farmers was expensive and in some cases it was not beneficial at all when the farmers sold the produce in small amount. The Most practiced value chain activities by producers in respective study area have been shown in the Table 2 with value addition to paddy in different forms.

Table 2: Value addition to paddy by farmer in different forms in East Champaran (Bihar) and Davangere (Karnataka)

Value addition activity	Price	East Champaran (Bihar)		Davangere (Karnataka)	
		Value addition (Rs /quintal)	Value addition (%)	Value addition (Rs /quintal)	Value addition (%)
Value addition due to drying	Wet paddy Price	1157.03		1660.50	
	Dry paddy price	1272.74		1793.35	
	Drying cost	8.62		13.22	
	Marketing margin **(value addition)**	115.71	10.00	132.85	8.0
	Net marketing margin	107.09		119.63	
Value addition due to marketing	Farm gate price of paddy	1157.03		1661.10	
	Market price of paddy	1243.80		1785	
	Marketing cost	14.89		20.49	
	Marketing margin **(value addition)**	86.77	7.49	123.9	7.45
	Net marketing margin	71.88		103.41	
Value addition due to storing Paddy	Price before storing paddy	1157.03		1661.10	
	Price after storing (average 3 months)	1284.30		1827	
	Storing and marketing Cost	18.13		50.49	
	Marketing margin **(value addition)**	127.27	10.99	165.9	9.98
	Net marketing margin	109.14		115.41	

The table revealed that the paddy price was comparatively low in East Champaran than in Davangere district. Farmers of East Champaran district sold their produce below the minimum support price. But in Davangere district farmers sold their produce at various competitive market prices. The farmers were adding value through drying paddy, marketing

and storing of produce. The value addition done in these method was calculated and which was found to be 10.00 per cent accounting to Rs 115.71 in case of value addition due to drying, and in case of value addition due to marketing of produce farmers were possibly added 7.49 per cent accounting to Rs 86.77 and 10.99 per cent accounting to Rs 127.7 in case of storing of produce, with respect to East Champaran district. It was found that value addition done by farmer through storing of paddy was high and more profitable (market margin 127.27 Rs/quintal) than to drying and marketing of produce, and it was similar in case of Davangere district. The farmers were following same method and added value at 8.0 per cent accounting to Rs 132.85, 7.45 per cent accounting to Rs 123.9 and 9.98 per cent accounting to Rs 165.9 in case of drying, marketing and storing of produce respectively, and here also value addition was done through storing of paddy and it was more profitable.

Value addition to paddy by paddy wholesalers:

Paddy wholesalers are the second important value chain actors in the rice value chain system. In East Champaran and Davangere district, there were different types of intermediaries such as commission agent, village trader or itinerant merchant. Paddy wholesalers were the main and important channel between farmers and processors. So taking it as consideration the present work perceived to survey the paddy wholesalers in respective study area, and the findings are presented in Table 3.

Marketing cost of paddy wholesalers:

Marketing costs are the actual expenses incurred in bringing goods and services from the producer to the consumers. The marketing costs of paddy wholesalers normally include; transportation, loading and unloading, packing etc. Different marketing costs items along with share of paddy wholesalers are shown in the table 3. Average cost was calculated for paddy wholesalers of East Champaran districts and Davangere district.

Table 3: Average marketing costs of paddy wholesalers

Cost item	East Champaran		Davangere	
	Rs /quintal	Per cent of total cost	Rs /quintal	Per cent of total cost
Transportation	14.05	25.27	14.71	24.91
Loading and unloading	6.61	11.89	6.09	10.31
Packing	2.41	4.33	3	5.08
Weighing fees	1.36	2.45	3	5.08
Storage charges	5.32	9.57	7.71	13.05
Commission	2	3.60	2	3.38
Market fee	-	-	1.5	2.54
Market toll	6.25	11.24	7.78	13.05
Rent for shop	5.10	9.17	8.95	15.15
Interest on borrowed fund	12.5	22.48	4.3	7.28
Total Marketing Cost	**55.6**	**100**	**59.04**	**100**

Table 3 depicted that transportation cost was found high in both the study area and it was 25.27 per cent (Rs 14.05/quintal) and 24.91 per cent (Rs. 14.71/quintal) in East Champaran district (Bihar) and Davangere district (Karnataka) respectively, followed by interest on

borrowed fund 22.48 per cent accounting to Rs 12.5 /quintal and loading and unloading charges 11.89 per cent (Rs 6.61 /quintal) of total marketing cost these were the cost items which were having more importance and constituting more share in total marketing cost of paddy wholesalers in East Champaran District (Bihar). But in case of Davangere district (Karnataka) it was identified that more share in total cost were found in cost items like, rent for shop (15.15 per cent constitutes to Rs 8.95 /quintal), storage charges and market toll cost item shares were found to be 13.05 per cent each and accounting toRs7.71 /quintal and Rs. 7.78 /quintal respectively. Even though there were wide differences in share of cost items in total marketing cost of both the study areas, but on transportation paddy wholesaler spent more money in both the district, the difference between other cost items in reference to respective study area might be due to locality, rate of production, competition, labour availability, food habit etc.

Average value addition by the paddy wholesalers was Rs 65.8 per quintal which was 5.52 per cent of total cost in case of East Champaran district. The price of paddy was very less in East Champaran district it might be due to farmers were selling produce on MSP or below MSP, and many of the government procuring centers were not in function. The centre persons were also purchasing below MSP only, and most important reason was absence of regulated markets in Bihar that is why farmers were not getting remunerative price for their produce. These all reasons were helpful for paddy wholesalers to get good profit. In Davangere district (Karnataka). It was found that average purchasing price was Rs 1748.66 per quintal and average selling price was Rs 1824.33 per quintal and average value addition was Rs 75.67 per quintal which was 4.3 per cent. The total marketing cost of paddy was Rs 56.6 /quintal and Rs 59.04 /quintal which were about 86.01 per cent as compared to 78.0 per cent in East Champaran district. Total marketing cost included variable cost Rs. 38 /quintal and Rs 45.79 /quintal, and fixed cost accounts for Rs 17.6 /quintal and Rs 13.25 /quintal, respectively in East Champaran and Davangere district. The present study pointed that value addition by paddy wholesalers in East Champaran District was more than Davangere district.

Table 4: Marketing costs, margins and value addition of paddy wholesalers

Items		East Champaran			Davangere		
		Rs/qntl	**Value addition**	**Marketing margin (%)**	**Rs/qntl**	**Value addition**	**Marketing margin (%)**
Purchase price of paddy		1191.82			1748.66		
Selling price of paddy		1257.62			1824.33		
Marketing cost	Variable cost	38		57.75	45.79		60.51
	Fixed cost	17.6		31.09	13.25		17.65
	Total	56.6		86.01	59.04		78.02
Value addition (marketing margin)		65.8	5.52	100	75.67	4.32	100
Gross Margin		27.8		42.24	29.88		39.48
Net Margin		9.2		13.98	16.63		21.97

Value addition to paddy by rice miller (processor):

Rice millers are the third important player in rice value chain. They are the more value adder in the rice value chain. The main part of the rice value chain work takes place in rice mills only by converting paddy into rice. In present study it was observed that rice millers were adding value to rice in three different forms i.e. in purchasing of paddy, milling of paddy, and selling of rice. Under the two different study areas rice milling system was not developed. Most of the rice mills were of traditional huller in East Champaran district (Bihar) and only few were modern large rice mills and most of the rice millers were not economically sound to realize the full benefit of value chain. But in Davangere district (Karnataka) it was found that more number of modern large scale mills as well as traditional huller was operating. The presence of large number of rice mills was due to the high production of rice in the state and it is grown in two seasons due to this there was no shortage of inputs for rice millers.

Table 5 showed that products obtain from one quintal of paddy and price of produce, were found different in main product production in respective study area. The fine rice obtained from one quintal of paddy was 66.1 kg and 69.5kg and per unit price of fine rice was Rs 29.86 and Rs 34.7 per unit in East Champaran and Davangere district, respectively and including other by-products price total income from one quintal of paddy was Rs 2343.81 in East Champaran and Rs 2843.97 in Davangere, respectively.

Table 6 showed that rice millers added value of total Rs 1042.73 and Rs 1068.12 by purchasing paddy, converting paddy in rice and rice marketing in East Champaran and Davangere district. They added 81.21 per cent and 60.63 per cent extra value for their whole activities in respective study area. Value addition was calculated based on per quintal paddy and final selling price calculated and summing up the selling price of products produced from conversion of 1 quintal paddy i.e. rice, bran, husk and broken rice**.**

Table 5: Products obtained from one quintal paddy in respective study area

Products	**Amount(Kg)**	**% of total**	**Per unit price**	**Total value**
East Champaran				
Rice	66.1	66.1	29.86	1973.74
Broken rice	6.35	5.95	15.24	96.77
Bran	5.25	5.25	11.12	58.38
Husk	21.6	18.7	9.95	214.92
Weight loss	0.7	0.7	-	17.19
Total	100	100		2343.81
Davangere				
Rice	69.5	69.5	34.7	2411.65
Broken rice	6.8	6.8	18.05	122.74
Bran	5.4	5.4	12.37	66.79
Husk	17.8	17.8	13.64	242.79
Weight loss	0.5	0.5	-	14.20
Total	100	100		2843.97

Gross cost of rice miller:

The various cost items, returns and value addition have been shown in table 6. The gross cost of rice millers has been classified into three broad categories i.e. purchasing cost of paddy, milling cost of paddy and selling cost of rice. Among these three, milling costs of paddy was the largest as compared to other cost items in both the study area and were about Rs 183.5

and Rs 234.41 per quintal of paddy which were 17.59 per cent and 21.94 per cent of total cost. Total marketing cost of paddy was Rs 57.03 /quintal (total variable cost Rs 44.53 and Rs 12.5 per quintal) and Rs 74.02 /quintal (total variable costs were Rs 59.72 and Rs 14.3 per quintal) and which were 5.46 per cent and 6.92 per cent of total cost. Total selling cost was found Rs.36.39 /quintal and Rs 43.58 /quintal which were 3.48 per cent and 4.08 per cent of total costs in both the districts East Champaran and Davangere, respectively.

Value addition by rice miller:

Rice millers are the highest value adding actors in the rice value chain. On an average rice millers added value of about Rs 1042.73 and Rs 1068.12 per quintal paddy in East Champaran and Davangere district respectively. Value addition started from purchase of paddy from the paddy traders for selling rice to rice traders. The value adding items and the amounts of value additions are shown in Table 6.

To obtain one quintal rice, millers have to use about 1.51quintal and 1.43 quintal of paddy which added value of about Rs 1045.08 and Rs 935.34 in East Champaran and Davangere district respectively (Table 7).

Table 6: Costs and Margins, Value Addition of Rice Millers

Item		East Champaran			Davangere		
		Rs/quintal		Per cent of total value addition (%)	Rs/quintal		Per cent of total value addition (%)
Purchasing cost of paddy (i)	Variable cost	44.53	57.03	5.46	59.72	74.02	6.92
	Fixed cost	12.5			14.3		
Milling cost of paddy (ii)		183.5		17.59	234.41		21.94
Selling cost of rice (iii)		36.39		3.48	43.58		4.08
Gross cost (iv)=(i)+(ii)+(iii)		276.92		26.55	352.01		32.95
Purchase price of paddy (v)	Farmers	1217.86		1283.89	1759.82		1761.65
	Paddy wholesalers	1386.12			1765.31		
Return from paddy (vi) (rice and by – product price)		2343.81			2843.97		
Weight loss (vii)		17.19			14.20		
Total return excluding losses (viii)=(vi) - (vii)		2326.62			2829.77		
Marketing margin (value addition) (ix) = (viii) -(v)		1042.73		81.21	1068.12		60.63
Net marketing margin ((x)		765.81		2.28	716.11		1.98

(* Here return from one quintal paddy was calculated by adding all the selling of main product and bi-products obtained from paddy i.e. rice, bran, husk and broken rice. Here weight loss was deducted from total return.)

Table 7: Value addition to per unit rice by rice miller

Item	East Champaran		Davangere	
	Amount (kg)	Total value (Rs)	Amount (kg)	Total value (Rs)
Required amount of paddy (i)	151.28	1940.92	143.88	2534.66

Obtained rice (ii)	100	2986	100	3470
Value addition (Rs) (iii)= (ii) -(i)	1045.08		935.34	
Value addition (%)	53.84		36.90	

Value addition to rice by rice wholesaler:

After the conversion of paddy into rice the next important activity is marketing of processed produce successfully. The present study identified rice trader in the study area they were mainly rice wholesalers and rice retailers. In this section different roles played by wholesalers in value addition of rice are discussed. During survey it was observed that sometimes rice wholesalers worked as rice retailers and most importantly some of the rice millers also worked as rice wholesalers in both the study areas.

Total cost of rice wholesalers:

Total marketing cost for rice wholesaler was worked out it was of Rs 85.5 per quintal and Rs 100.81 per quintal respectively in case of East Champaran and Davangere district. It constituted of total variable cost were Rs 65.03/quintal and Rs 85.15 / quintal, and total fixed cost Rs 20.47/quintal and Rs 15.66/quintal in East Champaran and Davangere district respectively. Marketing cost included cost items like transportation, loading and unloading, bagging etc. among all these costs transportation cost was found high in both the study area, accounting to Rs 20.90 /quintal and Rs 32.66 /quintal, respectively.

Table 8: Cost, return, margin and value addition of rice by rice wholesalers

Activity	**Item**	**East Champaran**	**Davangere**
		Rs / Quintals	**Rs / Quintals**
Marketing cost	Transportation	20.90	32.66
	Loading and unloading	12.16	13.27
	Bagging	3.01	3.57
	Market toll	16.98	20.82
	Weighing	1.6	2.00
	Commission	2.41	2.83
	Market fee	-	1.5
	Storage charge	7.97	8.5
	Interest on borrowed fund	12.5	13.57
	Rent for shop	1.78	2.09
Total cost	Total variable cost (i)	65.03	85.15
	Total fixed cost (ii)	20.47	15.66
	Total marketing cost (iii)	85.5	100.81
Margin	Purchasing price of rice (iv)	3027.48	3734.33
	Selling price (v)	3351.40	4147.12
	Marketing margin (vi) = (v) – (iv)	323.92	412.79
	Value addition % (vii) = $\frac{(vi)}{(iv)}$ X 100	10.69	11.05
	Gross margin (viii) = (vi) - (i)	258.89	327.64
	Net marketing margin (ix) = (vi) - (iii)	238.42	311.98

Value addition by rice wholesalers:

Rice wholesalers have limited opportunity to add value among all other value adding actors. The value addition by rice wholesalers is presented in the Table 5.19 which showed that purchasing price of rice was Rs 3027.48 / quintal and Rs 3734.33 /quintal; selling price was Rs 3351.40 / quintal and Rs 4147.12 / quintal in East Champaran and Davangere district. The value addition was found to be 10.69 per cent (Rs323.92 / quintal) and 11.05 per cent (Rs412.79 / quintal) of rice in both the states respectively. Net margin or profit of rice wholesalers was found to be Rs 238.42 /quintal and Rs 311.98/quintal and the profits were Rs 2.38/ kg and Rs3.11/ kg of rice respectively in East Champaran district of Bihar and Davangere district of Karnataka

Value addition to rice by rice retailers:

Rice retailers were the final actor in the rice value chain and they were the important source for rice to common people in the society. The cost, return, margin and value addition of rice retailers in East Champaran district and Davangere district were shown in the Table 9.

Table 9: Cost, return, margin and value addition of rice by rice retailers

Activity	Item	East Champaran (D) in Bihar	Davangere (D) in Karnataka
		Rs / Quintals	Rs / Quintals
Marketing cost	Transportation	17.31	20.09
	Loading and unloading	11.83	12.42
	Bagging	2.10	2.31
	Weighing	1.8	2.15
	Storage	4.59	4.55
	Interest on borrowed fund	12.5	6.7
	Rent for shop	0.84	0.77
Total cost	Total variable cost	37.63	41.52
	Total fixed cost	13.34	7.47
	Total marketing cost	50.97	48.99
Margin	Purchasing price of rice	3353.39	3747.39
	Selling price	3661.74	4158.49
	Marketing margin (value addition)	308.15	411.1
	Value addition %	9.18	10.97
	Gross margin	270.52	369.58
	Net marketing margin	257.18	362.11

Total cost of rice retailers:

The table 9 indicated that total marketing cost of rice retailers in the respective study area constituted Rs 50.97/quintal and Rs 48.99 /quintal, which included total variable cost of Rs 37.63/quintal Rs 41.52/quintal and total fixed cost Rs 13.34 /quintal and Rs 7.47 /quintal in East Champaran and Davangere districts respectively. Rice retailers were also paying more

money for transportation of rice and accounting to Rs 17.31 /quintal in East Champaran district and Rs 20.09 /quintal in Davangere district. The study pointed out that in case of East Champaran district, retailer's expenditure in marketing of rice was more than that of Davangere district, it might be due to the existence of very few rice mills in this particular study area, because of this reason retailer's in East Champaran district were incurring more expenses for procurement and other marketing activities. The existence of more rice mills in Davangere retailers obtained less cost as compared to East Champaran rice retailers.

Value addition by rice retailers:

Like rice wholesalers even rice retailers were also least value adder in the rice value chain activity. Retailers in the study area were purchasing rice from corresponding source at a price of Rs 3353.39 per quintal (East Champaran) and Rs 3747.39 per quintal (Davangere), and selling prices were Rs 3661.74 per quintal (East Champaran) and Rs 4158.49 per quintal (Davangere).They were adding value only about 9.18 per cent and 10.97 percent to rice which accounted to Rs 308.15 per quintal and Rs 411.1 per quintal in East Champaran and Davangere district, respectively. Net margin or profit of rice retailers was calculated to Rs 257.18 per quintal and Rs 362.11per quintal and the profit realized was Rs 2.57 per kg and Rs 3.62 per kg of rice, respectively in East Champaran and Davangere district.

An overview of estimation of value creation in rice chain:

Table 10 and 11 presents the purchase price, selling price, marketing margin and value addition of different stakeholders at each step. The table indicated that possession of paddy in various hands along marketing chains which gave more income to farmers and where value addition was more in respective study area. Table 10 and 11 reflected the stakeholders involved in rice value marketing chains i.e. commission agents, paddy wholesalers, millers, rice wholesalers and rice retailers. It was observed that the selling of paddy from farmers to rice millers, farmers were fetching better price and millers were also getting produce on economic price as it was better option to purchase directly from producer than from paddy traders. Hence, the millers were getting opportunity to add more value in this chain. In this study, it was felt that this was the efficient and effective shorter value chain of rice in both the study areas.

Table 10: Value chain analysis of rice in East Champaran district

Product	From	To	Purchase price	Selling price	Marketing margin	Value addition
Paddy at farm	Farmer	Commission agent	1157.03	1197.52	-	-
Paddy	Commission agent	Paddy wholesaler	1197.52	1257.62	60.1	5.01
Paddy at farm	Farmer	Paddy wholesaler	1191.82	1257.62	65.80	5.52
Paddy	Paddy wholesaler	Miller	1386.12	2343.81	957.69	69.09
Paddy at farm	Farmer	Miller	1217.86	2343.81	1125.95	92.45
Rice	Miller	Rice wholesaler	3027.48	3351.40	323.92	10.69
Rice	Rice wholesaler	Rice retailer	3353.39	3661.74	308.35	9.19
Rice	Miller	Rice retailer	3027.48	3661.74	634.26	20.95

Table 11: Value chain analysis of rice in Davangere district

Product	From	To	Purchase price	Selling price	Marketing margin	Value addition
Paddy at farm	Farmer	Commission agent	1661.10	1759.34	-	-
Paddy	Commission agent	Paddy wholesaler	1759.34	1824.33	64.99	3.69
Paddy at farm	Farmer	Paddy wholesaler	1748.66	1824.33	75.67	4.32
Paddy	Paddy wholesaler	Miller	1765.31	2843.97	1078.66	61.10
Paddy at farm	Farmer	Miller	1759.82	2843.97	1084.15	61.60
Rice	Miller	Rice wholesaler	3734.33	4147.12	412.79	11.05
Rice	Rice wholesaler	Rice retailer	3747.39	4158.49	411.1	10.97
Rice	Miller	Rice retailer	3734.33	4158.49	411.16	11.01

Conclusions

From the analysis above it can be concluded that farmers are the first value adding actors, and earned on an average of the gross return Rs 44,641.8/ha (East Champaran) and Rs 1, 32,117.26/ha (Davangere) by cultivating paddy. The farmers sell produce after meeting their family consumption and a little quantity was left with them as marketable surplus. They added value of Rs 115.71 per quintal by drying, Rs 86.77 per quintal by selling in markets and Rs 127.27 per quintal by storing (speculation) of produce to sell in future in case of East Champaran district and in case of Davangere district, the value addition was comparatively larger than East Champaran, indicating thoroughly Rs 132.85 per quintal, Rs 123.9 per quintal and Rs 165.9 per quintal of paddy, respectively. Farmers were not aware of value chain system theoretically, but practically some of them were following these methods. Wholesalers, the second important key players in rice value chain were used to collect paddy from local farmers in both districts and supplied to the rice millers in the same areas. They added value of average Rs 65.8 per quintal and Rs 75.67 per quintal in case of both districts under study, respectively. Rice millers were the highest and important value adder in rice value chain, rice millers' added value in three stages purchasing of paddy, milling of paddy and selling of rice. Total selling cost was found Rs 36.39 per quintal and Rs 43.58 per quintal in East Champaran (Bihar) and Davangere (Karnataka) districts, respectively. The value addition by rice millers in East Champaran district was estimated about 81.21 per cent and 26.55 per cent, shared by marketing and milling, while it was 60.63 per cent and 32.95 per cent in Davangere district, respectively. Rice wholesalers were observed as the fourth actor in value chain; they gained less value addition, showing about 10.69 per cent (323.92 Rs/ quintal) and 11.05 per cent (412.79 Rs / quintal) with respect to rice purchase price, in both of East Champaran and Davangere districts, respectively. The profit earned from rice was Rs 2.38 per kg (East Champaran) and Rs 3.11 per kg (Davangere). Rice retailers were found to

be final value chain actor in the rice value chain and they received less value addition among all actors. The profit earned by marketing of rice was estimated to be Rs 2.57 per kg and Rs 3.62 per kg of rice in both the districts under study. Consumers were the ultimate person who had designated position in value chain, even though they were not main actor in value chain.

The farmers were the first actor in rice value chain, but they did not receive fair price. They have limited scope of value addition. The priority attention by the government should be given to the farmers so that they can contribute largely in the value chain.

References

Demont and Rizzotto. 2012. Policy Sequencing and the Development of Rice Value chains in Sengal. *Development Policy Review.* 30(4):451-472

Hobbs, Cooney, A and Fulto M. 2000. Value chains in the agri-food sector. College of Agriculture, University of Saskatchewan, Saskatoon, Canada.

Humphrey, J. 2005. Shaping Value Chains for Development: Global Value Chains in Agribusiness. Trade Programme, *Div. 41 Economic Development and Employment. Eschborn 2005.*

Kumar, Abhay; Singh, RKP; Singh, KM and Kumar, Anjani. 2015. Labour out migration from rice based cropping system: A case study of Bihar, India. *Journal of AgriSearch*, 2(1): 57-61

Kumar, Abhay; Singh, RKP; Singh, K.M. and Kumar, Anjani. 2014. Labour out migration from rice based cropping system: A case of Bihar, India, Paper presented in *8th International Conference of Asian Society of Agricultural Economists (ASAE),* At BRAC, Savar, Bangladesh, on 15th to 17th October, 2014 http://dx.doi.org/10.13140/2.1.4915.2961

Kumar, Anjani; Singh, RKP.; Kumar, Abhay; Betne, Rajeev; and Singh, KM. 2016. Adoption of modern rice cultivation practices in Bihar, India: Micro-level evidences from village-level studies. *Agricultural Research*, 5(4):433 - 439. http://dx.doi.org/10.1007/s40003-016-0234-6

Kumar,A.; Sinha, DK; Mishra, RR; Ahmad, Nasim and Singh, KM. 2015. Yield Gap Analysis of Hybrid Rice: A Case Study in Kalyanpur Block of Samastipur District (Bihar). Journal of AgriSearch, 2(4): 273-276.

Loosvelt and Defoer, 2010. The rice agri0business cluster in the upper East region in Ghana. *The outcomes of the capitalization workshop of agribusiness cluster development*; 27-30 September 2010

Paul Sharma, V and Wardhan, Harsh. 2015. Assessment of marketed and marketable surplus of major food grains in India. Report submitted to, *Centre for Management in Agriculture, Indian Institute of Management (IIM),* Ahmedabad.

Singh, K.M. and Shekhar, D. 2015. Extension Strategies for Extending Rice Exports from Eastern States of India-The Case of Bihar http://dx.doi.org/10.13140/RG.2.1.3074.8889

Singh, KM; Singh, RKP; Kumar, Anjani; Kumar, Abhay; Meena, MS, and Chahal, VP. 2015. Implications of labour migration for rice production and household economy: Evidences from eastern India. *Indian Journal of Agricultural Sciences*, 85 (6): 768–772.

Singh, K.M. 2015. Regulatory Environment and Subsidies and Its Impact on Rice Sub-sector in India. *SSRN Electronic Journal* · April 2015, Available at: http://dx.doi.org/10.2139/ssrn.2588522

Singh, K. M., Jha, A. K., Meena, M. S. and Singh, R. K. P. 2012. *Constraints of Rainfed Rice Production in India: An Overview. Innovations in Rice Production*, Ed: PK Shetty, MR Hegde and M Mahadevappa, National Institute of Advance Studies, Indian Institute of Science Campus, Bangalore, pp. 71-84. Available at http://dx.doi.org/10.2139/ssrn.2210401