Research Paper

Assessment of Marketable Surplus of Rice and Wheat in Rohatas District of Bihar

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ABSTRACT

With the increasing production levels, it is necessary to assess how much amount is really available to the non-farming community of the nation as this directly links to food security. Being Bihar one of the prominent rice and wheat growing state this paper tends to analyze the marketable surplus of these crop in Rohatas district commonly known as "Rice Bowl of Bihar". The survey findings highlights that marketable surplus directly escalates with increase in farm size. Factors such as family consumption, wages in kind and animal feed reduced the amount of surplus available for marketing. The disposal pattern clearly indicates that due to shortage of proper storage facilities, transportation and credit facilities a large number of farmers vend their produce to village traders immediately after the harvest. Proper technological developments are key to increase the marketable surplus in the area.

HIGHLIGHTS

⊙ The amount of retention decreases and marketable surplus increases respectively with the increase in landholding size.
⊙ Area under the crop is the positive factor influencing marketable surplus of both the cereals.
⊙ Majority of the produce are sold immediately after their harvest majorly to private traders.

Keywords: Marketable surplus, rice, wheat, disposal pattern, Bihar

In last few decades changing policies, diversification in dietary preferences, technological changes, urbanization, infrastructure expansion and population growth has transformed Indian agriculture into market-oriented system (Sharma, 2016). From the development viewpoint, study of marketable surplus and marketed surplus and factors influencing it are of significant importance to researchers and policy makers because they play key role in planning for agricultural development, designing appropriate procurement, storage, distribution and pricing policy (Sharma and Wardhan, 2015). Marketable surplus is the amount of produce left with the producer-farmer after meeting his necessities such as family consumption, farm needs for seeds and feed for cattle, kind-payment to labour as wage, payment to landlord as

rent etc. whereas marketed surplus is that amount of produce that farmers' sell in market irrespective of his requirements (Acharya and Agarwal, 2020; Dukpa & Ezung, 2021). Marketable surplus is the amount producer offers to non-farm population of a nation. It is measured to assess the farmers' real capacity to sell beyond his own consumption needs, irrespective of the fact whether he actually sells it or not (Jabbar, 2010). For economic development of a nation an increase in output must go together with by an increase in marketable surplus (Kumar *et al.* 2004; Dukpa & Ezung, 2021). In India, there

has been an upsurge in marketed proportion of agricultural production from 30-35 percent in 1950s to 70 percent in last decade (Sharma and Wardhan, 2017).

Rice and wheat in India are not only the staple food crops that feeds millions but are integral part of our culture. These crops are directly related to food security as well as sustainability (Singh *et al*, 2021). India is the second leading producer of both cereals. With the sky-rocketing production levels, the marketed surplus ratios (MSR) for rice and wheat augmented from 60 per cent and 55 percent in mid-nineties to 84 percent and 74 per cent in 2014-15, respectively (Government of India, 2015; Sharma, 2016) is mainly because of effective government procurement policy (Sharma and Wardhan, 2015).

Estimation of marketable/ marketed surplus of agricultural products especially food grains is tough at national level due to spatially scattered nature of production activity in a diverse country like India, but estimation at individual level is comparatively easy (Acharya and Agarwal, 2020). The district of Rohatas is popularly known as the "Rice Bowl of Bihar" stating paddy crop as one of the significant crop of the region playing a crucial role in the rural economy of the region. In *rabi* season the most grown crop of the region is wheat, making it second most significant crop. Bihar being primarily agriculture driven state, study of marketable surplus of rice and wheat crop in this region helps the authorities to get an idea about farmers' real capacity to sell in comparison to what he actually sells. This would directly signify the economic condition of the producers of the study area. Keeping in view the above facts, this paper attempts to study the marketable surplus of rice and wheat crop and factors affecting it in Rohatas district of Bihar.

METHODOLOGY

Rohatas district in Bihar was purposively selected for this study because the district is known as the "Rice Bowl of Bihar". Out of 19 blocks, Kochas block was purposively selected for study because it is situated in plain areas of Rohatas and distinguished amount of cereals are grown in this area. There were 148 villages in Kochas block out of which 8 villages were selected randomly. From the selected village farmers were classified on the basis of landholding size and 25 farmers from each category were selected respectively. A total of 100 farmers cultivating both rice and wheat crop were taken as sample for the study. The study was based on primary data which was gathered through personal interview method with the help of well-designed and pre-tested schedule. The selected farmers were interviewed during 2019-20 for wheat and 2020-21 for rice.

Marketable Surplus

In this study, marketable surplus has been assessed by deducting total retention from total production. The retention consists of amount kept for self-consumption, for seed purpose, for animal feed, and disbursements in kind to labourers, gifts, and others.

$$MS = P - C$$

where,

MS = marketable surplus

P = total production

C = total requirement (seed requirements, family consumption, wages in kind, animal feeds and other requirements)

Role of various factors in influencing Marketable Surplus

To examine the role of various factors affecting marketable surplus multiple linear regression model was employed for functional analysis

$$Y = a + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + u_t$$

Table 1: Marketed surplus ratio (MSR) of rice and wheat at country level (1950-51 to 2014-15)

Crop	1950– 51	1999- 00	2008– 09	2009- 10	2010-11	2011–12	2012–13	2013–14	2014–15
Rice	30.0	61.7	66.8	79.7	80.7	77.2	81.51	82.0	84.3
Wheat	30.0	56.5	70.9	72.3	73.2	70.0	77.5	73.1	73.8

Sources: Agricultural Statistics at a Glance, 2007, 2010, 2012 & 2016, Ministry of Agriculture, Government of India.

where,

Y = Marketable surplus in quintals

X_1 = Seed requirements in quintals

X_2 = Family consumption in quintals

X_3 = Wages paid in kind in quintals

X_4 = Animal feed

X_5 = Area under crop (in hectares)

u_t = Error term

β_1, β_2, β_3, β_4 & β_5 = regression coefficients of respective factors

To avoid the multicollinearity problem the variable X_5 (area under crop) is purposely taken in place for total production of the crop.

Disposal Pattern

To determine disposal pattern of rice and wheat, crop sales for each category of farmers was examined, month-wise.

RESULTS AND DISCUSSION

Marketable Surplus

Rice and wheat are the staple food crops commonly cultivated in the district. Average marketable surplus of rice and wheat on diverse categories of farmers are shown in Table 2 and 3, respectively. It is evident from the findings that with increase in landholding size the amount of produce offered as marketable surplus also increased. The survey findings show that at an average 94 per cent and 75 per cent of total produce of rice and wheat are

available for sale in the market. The amount of produce retained is almost similar for all categories, the variation in marketable surplus quantity is due to higher production in medium and large farmer categories which may be attributed to larger landholding size. For both crops marginal and small farmers had lower marketable surplus than overall average marketable surplus because of lower productivity and lower land holding size. Medium and large farmers are comparatively more economically sound having better access to quality inputs such as seed, irrigation and fertilizer leading to higher yield.

It is clearly evident from Fig. 1 that for all categories, retention was more in case of wheat crop. For marginal and small farmers' retention is more, resulting in lesser quantity of marketable surplus which directly results in lower income levels in comparison to medium and large farmers. The total marketable surplus for rice (94.2%) is much higher than wheat (75.4%) because the region is more fertile for paddy crop in comparison to wheat crop resulting in higher production levels. With higher marketable surplus medium and large farmers have better income earnings improving their socio-economic status, whereas with low marketable surplus marginal and small farmers end up earning sufficient enough to meet their survival needs.

Role of various factors in influencing Marketable Surplus

Table 4 shows the calculated regression coefficients for the marketable surplus model for rice crop.

Table 2: Production, Retention and Marketable surplus of rice (Quantity in quintal)

Particulars	Marginal farmers (<1 ha)	Small farmers (1-2 ha)	Medium farmers (2-4 ha)	Large farmers (>10 ha)	All farmers
Total production (in Quintals)	39.21	90.68	341.65	827.00	324.64
Retentions					
(i) Seed	0	0.15	0.09	0.35	0.15
(ii) Family consumption	11.58	10.72	12.6	17.5	13.10
(iii) Wages in kind	0.09	1.72	3.53	7.09	3.11
(iv) Animal feed	0.13	0.76	1.1	1.0	0.75
(v) Other retentions	0.31	0.96	1.5	3.02	1.45
Total Retention	12.11	14.31	18.82	28.96	18.56
Marketable Surplus (in Quintals)	27.17	76.37	322.83	798.04	306.08
Marketable Surplus (in %)	69.30	84.22	94.49	96.50	94.28

Table 3: Production, Retention and Marketable surplus of wheat (Quantity in quintal)

Particulars	Marginal farmers (<1 ha)	Small farmers (1-2 ha)	Medium farmers (2-4 ha)	Large farmers (>10 ha)	All farmers
Total production (in Quintals)	20.79	48.02	171.15	385.82	156.45
Retentions					
(i) Seed	0.74	2.59	9.25	21.35	8.88
(ii) Family consumption	8.89	8.56	9.65	15.11	10.55
(iii) Wages in kind	0.01	0.1	0.95	1.52	0.65
(iv) Animal feed	0.78	1.52	3.30	4.29	2.47
(v) Other retentions	0.26	0.8	1.50	3.02	1.40
Total Retention	10.68	13.57	24.65	45.29	23.55
Marketable Surplus (in Quintals)	10.11	34.45	146.50	340.53	132.90
Marketable Surplus (in %)	48.63	71.74	85.60	88.26	75.41
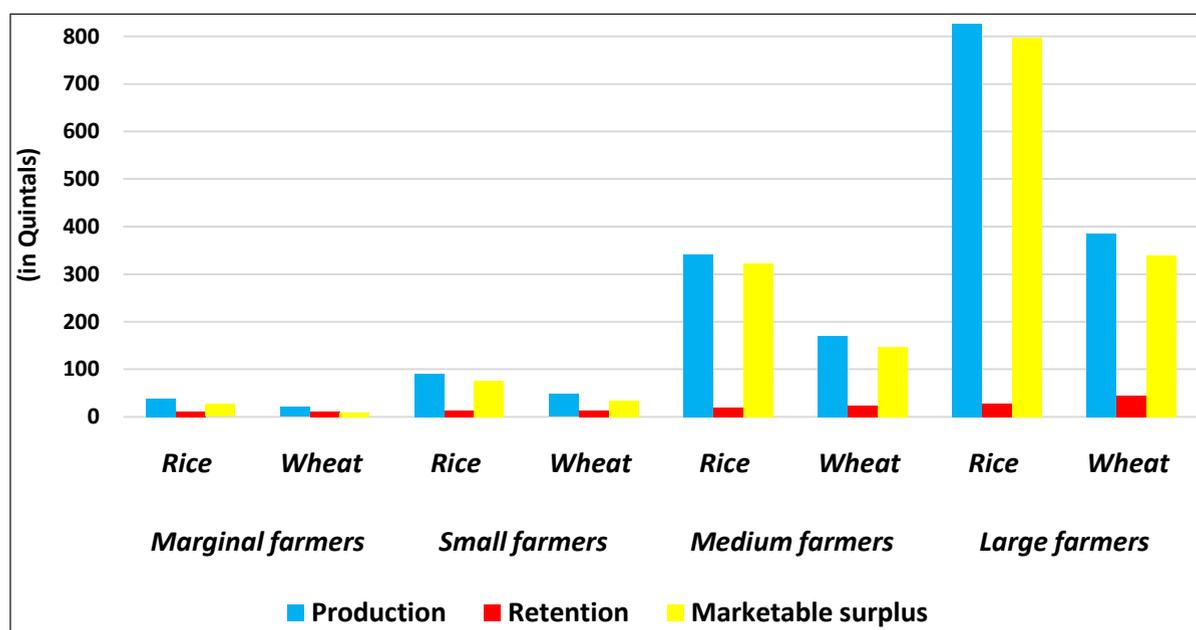
Fig. 1: Production, retention and marketable surplus of rice and wheat

The coefficient of determination value indicates that in marginal farmers 93.8 percent of the entire variations in marketable surplus is linked to the selected variables, followed by 97.3 percent in small farmers, 89.9 percent in medium farmers and 93.8 percent in large farmers respectively. The regression coefficients were significant at 1 per cent level for area under crop (X_5) variable for marginal, small and medium farmers *i.e.* increase in area under rice crop would significantly increase the total produce available for sell. The variables that had negative effect on marketable surplus for all categories of farmers were family consumption (X_2), wages in kind (X_3) and animal feed (X_4) This is simply evident from the fact that as we increase the quantity for family consumption, animal feed and wages in kind the quantity left with the producer to sell decreases.. The variable seed (X_1) has positive impact on marketable surplus of small, medium and large farmers.

Table 5 shows that the calculated regression parameters for the marketable surplus model in wheat crop. The variation in marketable surplus is due to selected variables by 96 percent in marginal farmers, 90.5 percent in small, 91.3 percent in medium and 97 percent in large farmers

Table 4: Estimates of multiple linear regressions fitted for rice crop

Variables		Marginal farmers	Small farmers	Medium farmers	Large farmers
	R^2	0.938	0.973	0.899	0.938
	a	5.787	-11.867	55.686	169.418
Seed (X_1)	b(i)	NA	0.003	0.088	0.129
	SE	NA	16.38	30.919	78.102
	't' value	NA	0.063	1.064	0.558
Family consumption (X_2)	b(i)	-0.483	-0.075	-0.307	-0.134
	SE	0.234	0.423	0.709	2.713
	't' value	-6.911***	-1.57	-3.373	-0.974
Wages in kind (X_3)	b(i)	-0.025	-0.062	-0.085	-0.371
	SE	12.259	3.791	7.348	28.95
	't' value	-0.411	-1.032	-0.618	-0.786
Animal feed (X_4)	b(i)	-0.081	-0.007	-0.183	-0.021
	SE	4.227	4.414	4.266	65.187
Area under crop (X_5)	't' value	-1.153	-0.17	-1.717	-0.151
	b(i)	0.857	0.920	0.864	0.52
	SE	5.035	5.043	7.975	45.54
	't' value	13.063***	11.39***	6.341***	0.90

*N = 25 for each category of farmers; **Significant at 5 percent level of probability; ** *Significant at 1 percent level of probability.*

Table 5: Estimates of multiple linear regressions fitted for wheat crop

Variables		Marginal farmers (<1 ha)	Small farmers (1-2 ha)	Medium farmers (2-4 ha)	Large farmers (>10 ha)
	R^2	0.969	0.905	0.913	0.970
	a	-1.732	-5.081	-49.289**	-61.377
Seed (X_1)	b(i)	-0.256	-0.129	0.251	-0.343
	SE	1.4	2.629	1.668	3.015
	't' value	-2.924	-0.818	2.206	-2.468
Family consumption (X_2)	b(i)	-0.623	-0.08	-0.113	-0.312
	SE	0.093	0.428	1.166	0.778
	't' value	-13.488***	-1.038	-1.311	-3.373**
Wages in kind (X_3)	b(i)	NA	-0.062	-0.063	-0.441
	SE	NA	3.791	4.767	14.927
	't' value	NA	-1.032	-0.67	-4.310***
Animal feed (X_4)	b(i)	-0.048	-0.015	-0.016	-0.213
	SE	0.422	1.043	0.89	1.987
	't' value	-0.831	-0.205	-0.157	-4.571***
Area under crop (X_5)	b(i)	1.166	0.997	0.862	1.564
	SE	4.185	4.831	4.217	5.136
	't' value	9.954***	6.544***	8.864***	12.148***

*N = 25 for each category of farmers; **Significant at 5 percent level of probability; *** Significant at 1 percent level of probability.*

respectively. The regression model indicates that the only factor that has positive effect on marketable surplus for all categories of farmers is area under crop (X_5). Similar to rice crop increase in area under wheat crop would significantly increase the total produce available for sale The seed (X_1) was positive factor only in case of medium farmers. The variables that had negative impact on marketable surplus for categories of farmers were family consumption (X_2), wages in kind (X_3) and animal feed (X_4). Akin to rice crop, an increase in quantities of wheat crop used for family consumption, wages in kind and animal feed results in decrease in quantity of marketable surplus left with farmer for sell.

Table 6: Marketing channels used by respondents to sell surplus produce

Crops	Particulars	Marginal farmers (<1 ha) (%)	Small farmers (1-2 ha) (%)	Medium farmers (2-4 ha) (%)	Large farmers (>10 ha) (%)	Total (%)
Rice	Private Traders	60	52	48	36	49
	PACS	20	48	44	52	41
	Miller	0	0	8	12	5
	Retailers	20	0	0	0	5
Wheat	Private Traders	80	96	88	92	89
	PACS	0	4	12	8	6
	Miller	0	0	0	0	0
	Retailers	20	0	0	0	5

Table 7: Monthly disposal pattern of rice and wheat

	Feb- Mar		Apr- June		July - Oct		Nov- Jan	
	Rice	Wheat	Rice	Wheat	Rice	Wheat	Rice	Wheat
Marginal (%)	5.04%	—	2.46	94.36	—	5.64	92.50	—
Small (%)	13.46	—	5.36	82.73	—	17.27	81.18	—
Medium (%)	15.19	3.14	7.52	72.30	4.16	16.36	70.12	8.21
Large (%)	21.49	6.33	8.62	66.30	6.88	18.16	64.01	8.35
Average	13.79	2.37	5.99	78.92	2.76	14.36	76.95	4.14

Note: Data represent percentage to total.

Disposal pattern of rice and wheat

The marketing channels adopted by various categories of farmers of the study area is represented in Table 6. It is well indicated from the table that for both the cereal crops marginal farmers sold more than half of their produce to private traders mostly due to lack of timely availability of transportation as well their high costs. In case of wheat crop all categories of farmers preferred to sell their produce to private dealers, whereas in rice large farmers sold their produce to PACS. Selling to PACS results in better price realization for large farmers leading to higher income as compared to marginal and small farmers. Preference for selling through government agencies was less among the farmers of the area, this may be due to complicated procedure at government *mandis* as compared to that with private traders. For both the crops the marketing channel involving retailers was only chosen by the marginal farmers.

The seasonal sales pattern of paddy and wheat for different farm sizes is shown in Table 7. For both the cereals the maximum sales were observed in the months pertained to their harvesting season, this is common in marginal and small farmers due to lack of proper storage facilities and their immediate need to fulfill their urgent financial needs. It is clear from the table that medium and large farmers only sell a part (nearly three-fourth) of the produce immediately after harvesting, and sell the rest when the market prices are high leading to higher income. A substantial portion of rice is sold between the periods of November to March while wheat is majorly sold between April to October.

CONCLUSION

Rice and wheat are the staple food grains of Bihar. Rohatas district being the 'Dhan ka Katora' of the state, rice and wheat holds a significant position among other crops grown in the district. This paper is inclined to study the marketing position of both the cereals in the district. The analysis demonstrates that the amount of retention decreases and marketable surplus increases respectively with the increase in landholding size. For both crops marginal and small farmers had lower marketable surplus than overall average marketable surplus because of lower productivity and lower land holding size. The survey findings show that the positive factor

influencing marketable surplus was area under the crop, whereas the factors that unanimously had negative effect on marketable surplus for both crop were family consumption (X_2), wages in kind (X_3) and animal feed (X_4). The disposal pattern clearly indicates all categories of farmers' preference to private traders as prime option to sell their produce. Majority of the produce are sold immediately after their harvest. Technological advancements such as better storage facilities, low cost timely availability of transportation facilities, timely availability of credit for marketing *etc*. can lead to better price realization especially for marginal and small farmers resulting in increased income levels. Government should focus on timely procurement at fixed MSP to save farmers from distress sale situation.

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