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Economic analysis of rice production in Bilaspur district of Chhattisgarh

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Abstract
The present study is based on economic analysis of rice production in Bilaspur district of Chhattisgarh in the year of 2015-16. The primary data related to cost and returns of rice crop was collected from 30 rice farmers of five villages of Bilaspur district under three size of groups, each group containing 10 farmers in each class. The results showed that rice production on sample farm was 40214.59 Rs/ha which was increased as the farm size increased. The proportion of operational cost and fixed cost to total cost on sample farm was 58.46 and 41.53 per cent. The average net income over Cost C_3 was found 29417.1 Rs/ha and in case of small, medium and large farmer was 26168.23 Rs/ha, 27899.631 Rs/ha and 34183.45 Rs/ha respectively. Average input-output ratio was 1:1.66 per cent. Cost of production of rice varied from 838.56 Rs/qt to 770.65 Rs/qt with an average of 812.22 Rs/qt. It was observed that cost of production was found minimum in large farmers revealing to extra ordinary difference between the different size farms.

Keywords: Rice production, Cost concepts, Profitability, Benefit-cost ratio.

Introduction
Rice is one of the important cereal crops of the world and forms the staple food for more than 50 per cent of population and is known as king of cereals. In world, rice has occupied an area of 160.60 million hectares, with a total production of 738.20 million tones and productivity 3424.41 kg/ha (Anonymous (a), 2015). India is the second largest producer of rice after China, has production of 105.48 million tonnes with productivity 3020 kg/ha (Anonymous (b), 2015). India emerges as one of the major exporter of rice in international market. The state of Chhattisgarh popularly known as the "Rice bowl of India" occupies an area around 3.64 million hectares with production of 7.65 million tones and productivity 1517 kg/ha (Anonymous (c), 2015). Chhattisgarh is popularly known as the "Rice bowl of India". Chhattisgarh has a sizeable area under various varieties of rice variety i.e. Mahamaya, Rajeswari, HMT, Kalimooch, MTU-1010, Sawrna, IR-36 and IR-64 etc. These varieties are grown by the farmers in different agro climatic zones of Chhattisgarh state.

Methodology
The present study was undertaken in year 2015-16 in Bilaspur district. Takhatpur block is selected purposively because investigator is well acquainted with the area. The primary data were collected using multi stage sampling technique from five villages of Takhatpur block, district Bilaspur by interview schedule. The respondents were categorized into 3 groups viz. small (up to 2.0 ha), medium (>2 to 4 ha), and large farmers (above 4 ha). A number of two respondents of each category from each villages were selected randomly thereby a total of 30 rice growers were selected. The cost and returns were estimated using different cost concepts. The present study would be of great significance to the policy makers, Economists and extension workers in developing such policies that can enhance the profit of the farmers.

Cost Concepts
Cost A_1: All actual expenses incurred in the rice production.
Cost A_2: Cost A_1 + rent paid for leased in land.
Cost B_1: Cost A_2 + interest on value of owned fixed capital (excluding land).
Cost B_2: Cost B_1 + rental value of owned land.
Cost C_1: Cost B_1 + imputed value of family labour.
Cost C_2: Cost B_2 + imputed value of family labour.
Cost C_3: Cost C_2 + 10 % of cost C_2 to account for managerial cost of inputs of farmers.

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Cost of production (Rs. /quintal)

$$\text{Cost of production (Rs/qt)} = \frac{\text{Total cost} - \text{value of by product (Rs./ha)}}{\text{Yield (quintal/ha)}}$$

Profitability concepts

Total production: Main product and by product.
Gross income = Value of main product + value of by product
Farm business income = Gross income – Cost A_1
Family labour income = Gross income – Cost B_2
Net income = Gross income – Cost C_3

Benefit cost ratio:

$$\text{B.C.R.} = \frac{\text{Gross income}}{\text{Total cost}}$$

Result and Discussion
Cost of Cultivation of Rice production
In the farm management studies costs are viewed from different angles for different purposes. Costs of cultivation are used by the commission on agriculture costs and prices for fixation of Minimum Support Price of agricultural commodities. Besides this, they are also useful in farm planning and policy making. Therefore, due consideration should be given to cover both operational and fixed costs to operate agriculture as a business and not as a way of life only. Cost of cultivation of rice is given in table 1. The results revealed that on an average the total cost was estimated to be 40214.60 Rs/ha. It was ranged from 38400.98 Rs/ha to 42332.14 Rs/ha on different categories of farmers. On an average 58.46 per cent of cost attributed to operational cost and remaining 41.53 per cent by the fixed cost. Total labour cost on an average was found 38.25 per cent to the total cost which varied from 41.45 per cent in small farm to 36.39 per cent in large farm. The variation in total labour requirements among different size of farms is due to difference in style of operational practices whereas, seed, fertilizer and manure cost was about 2.68, 10.13 per cent to total cost respectively.

Table1: Cost of Cultivation of Rice under different size of sample respondent

| S. No. | Particulars | Farm Size (Rs/ha) | | | Over all (Rs/ha) |
| | | Rice | | | |
		Small	Medium	Large	
A. Labour cost					
1.	Human labours	12332.65 (32.11)	11337.22 (28.40)	11717.76 (27.68)	11795.87 (29.33)
a)	Family	8520.22 (22.18)	2413.35 (6.04)	2642.53 (6.24)	4525.37 (11.25)
b)	Hired	3812.43 (9.92)	8923.87 (22.35)	9075.23 (21.43)	7270.51 (18.07)
2.	Bullock & Machinery labour	3587.33 (9.34)	3489.38 (8.74)	3689.12 (8.71)	3588.61 (8.92)
	Total labour cost	15919.98 (41.45)	14826.60 (37.14)	15406.88 (36.39)	15384.49 (38.25)
B. Material cost					
4.	Seed	985.34 (2.56)	1089.79 (2.73)	1169.11 (2.76)	1081.41 (2.68)
5.	Manures & Fertilizers	3797.13 (9.88)	4289.51 (10.74)	4145.90 (9.79)	4077.52 (10.13)
6.	Plant Protection	903.94 (2.35)	1033.89 (2.59)	1067.34 (2.52)	1001.73 (2.49)
7.	Irrigation charges	930.13 (2.42)	1589.37 (3.98)	1189.33 (2.80)	1236.28 (3.07)
	Total material cost	6616.54 (17.23)	8002.56 (20.05)	7571.68 (17.88)	7393.59 (18.38)
8.	Interest on working capital (4%)	560.65 (1.45)	816.63 (2.04)	813.44 (1.92)	730.24 (1.81)
	Total operational cost	23097.17 (60.10)	23645.79 (59.20)	23792.00 (56.20)	23511.66 (58.46)
C. Fixed Cost					
10.	Land Revenue & Taxes	25.00 (0.06)	25.00 (0.06)	25.00 (0.05)	25.00 (0.06)
11.	Rental Value of owned land (1/6)	11401.55 (29.69)	11966.90 (29.98)	13458.13 (31.79)	12275.53 (30.52)
12.	Depreciation	2486.00 (6.47)	2794.37 (7.00)	3371.54 (7.96)	2883.97 (7.17)
13.	Interest on Fixed Capital (10%)	1391.256 (3.62)	1478.63 (3.70)	1685.47 (3.98)	1518.45 (3.77)
	Total fixed cost	15303.81 (39.85)	16264.9 (40.75)	18540.14 (43.79)	16702.95 (41.53)
	Total Cost of cultivation	38400.98 (100.00)	39910.69 (100.00)	42332.14 (100.00)	40214.60 (100.00)

Cost of cultivation of rice according to cost concept
The scientific concept used in the farm management studies were used to work out the cost of cultivation per hectare of rice which has been presented in table 2.

Cost A_1: It include all actual expenses including depreciation on fixed capital, land revenue, cesses & taxes and interest on working cost. In rice cultivation was found to be 17087.95 Rs/ha for small farm size, 24051.81 Rs/ha for medium farm size and 24546.01 Rs/ha for large farm size. In overall, it was observed as 21895.26 Rs/ha. Cost A_1 for large farmer was found higher since they spend large amount of all kind.

Cost A_2: The land of respondents was owned and not any farmer was leased-in any land from others. Therefore, no rent was paid for leased-in-land.

Cost B_1: In rice cultivation it was worked out to be 18479.21 Rs/ha for small size, 25530.44 Rs/ha for medium farm size and 26231.48 Rs/ha for large farm size. In overall, it was observed as 23413.71 Rs/ha. The interest on fixed capital was worked out at the rate 10 percent per annum. Cost B_1 showed positive relation with size of land holding.

Cost B_2: It include Cost B_1 and rental value of owned land by different categories. Thus Cost B_2 in rice cultivation was worked out to be 29880.76 Rs/ha, 37497.34 Rs/ha, 39689.61 Rs/ha, 35689.24 Rs/ha for small, medium, large farmers and overall respectively.

Cost C_1: It include Cost B_1 and imputed value of family labour in rice cultivation which was 26999.43 Rs/ha for small farmers, 27943.79 Rs/ha for medium farmers and 28874.00 Rs/ha for large farmers respectively. Overall an average Cost C_1 was worked out as 27939.08 Rs/ha.

Cost C_2: It include Cost B_2 and imputed value of family labour in rice cultivation which was 38400.98 Rs/ha for small farmers, 39910.69 Rs/ha for medium farmers and 42332.14 Rs/ha for large farmers and overall cost was 40214.59 Rs/ha.

Cost C_3: It include 10 percent of Cost C_2 as a managerial cost. In rice cultivation it was worked out for small, medium and large farmers and found to be 42241.08 Rs/ha, 43901.76 Rs/ha and 46565.36 Rs/ha respectively and it was 44236.06 Rs/ha for overall.

Table.2 Cost of Cultivation of rice according to cost concept

Sr No.	Cost	Size group (Rs/ha)			
		Small	Medium	Large	Average (Rs/ha)
1	Cost A_1 (A_2)	17087.95	24051.81	24546.01	21895.26
2	Cost B_1	18479.21	25530.44	26231.48	23413.71
3	Cost B_2	29880.76	37497.34	39689.61	35689.24
4	Cost C_1	26999.43	27943.79	28874.00	27939.08
5	Cost C_2	38400.98	39910.69	42332.14	40214.59
6	Cost C_3	42241.08	43901.76	46565.36	44236.06

Cost and returns of rice production

The important data on return per hectare of rice is presented in the table 3 which includes gross returns per hectare, cost of cultivation per hectare and cost of production per quintal at different cost level. It was observed that the highest gross income per hectare in rice was obtained by large size group Rs. 80748.80/ha followed by medium size 71801.39 Rs/ha and small size group 68409.30 Rs/ha. It was observed that cost of cultivation at Cost C_3 level small farmer allocate 42241.08 Rs/ha and medium size farmer at 43901.76 Rs/ha but large farmer allocate 46565.36 Rs/ha which was higher. It is also seen that cost of production at Cost C_3 level, it was worked out as 838.56 Rs/qt. for small farmer, 827.45 Rs/qt. for medium farmer and 770.65 Rs/qt. for large farmers and at overall average level, it was found 812.22 Rs/qt. It was observed that cost of production was found minimum in large farmers.

Table 3: Cost and returns of rice crop for different size of sample respondent

Particulars	Size group (Rs/ha)			
	Small	Medium	Large	Average (Rs/ha)
Yield (grain) (q/ha)	40.17	42.11	47.52	43.267
Price per quintal (Rs.)	1490.00	1490.00	1490.00	1490.00
Value of main product(Rs./ha)	59853.30	62743.39	70804.80	64467.16
Quantity of By product (q/ha)	42.78	45.29	49.72	45.69
Price per quintal (Rs.)	200.00	200.00	200.00	200.00
Value of By product (Rs./ha)	8556.00	9058.00	9944.00	9132.67
Gross income (Rs/ha)	68409.30	71801.39	80748.80	73653.16
Cost of production (Rs./q) at Cost C_2	742.97	732.67	681.57	719.07
Cost of production (Rs./q) at Cost C_3	838.56	827.45	770.65	812.22

Profitability measures of rice production

In any field of business activity profit is the prime consideration. Thus how much a farmer earns as net income and family labour income as a producing unit and how much satisfaction he and his family derives as a consuming unit, are the major deciding factor in organization and operation of farm. Hence, in this section efforts have been made to discuss the gross income, net income over operational and total cost, family labour income, farm business income, benefit cost ratio of rice. Different measures of farm profitability was worked out and presented in the table 4.

Table 4: Profitability of rice crop under different size groups

Sr No.	Particulars	Size group (Rs.)			
		Rice			
		Small	Medium	Large	Average (Rs.)
1.	Gross income	68409.30	71801.39	80748.80	73653.16
2.	Gross expenses	42241.08	43901.76	46565.36	44236.06
3.	Net income at Cost C_2	30008.32	31890.70	38416.66	33438.56
4.	Net income at Cost C_3	26168.23	27899.63	34183.45	29417.10
5.	Farm business income	51321.34	47749.57	56202.78	51757.89
6.	Family labour income	38528.54	34304.05	41059.19	37963.93
7.	Benefit cost ratio at Cost C_2	1:1.78	1:1.80	1:1.91	1:1.83
8.	Benefit cost ratio at Cost C_3	1:1.62	1:1.63	1:1.73	1:1.66

From the table 4, it is clear that when physical main product and by-product are converted into monetary terms, it is called gross return from rice production which was Rs. 6809.30, Rs. 71801.39 and Rs. 80748.80 in case of small farm, medium and large farm respectively with an overall average of Rs. 73653.16 on sample farm. It may be concluded from table that, Gross return from rice production both were found higher in large size group followed by medium and small size group.

It can be seen that in rice the highest net return at Cost C_2 level was 38416.66 Rs/ha for large farmers followed by medium 31890.70 Rs/ha and small farmers 30008.32 Rs/ha.

Similarly at Cost C_3 level, it was found 34183.45 Rs/ha for large farmers followed by medium and small farmers 27899.63 Rs/ha and 26168.23 Rs/ha respectively. The net return was found higher at both cost level for large farmers followed by medium and small farmers. The family labour income was found highest for large farmers 41059.19 Rs/ha followed by small and medium farmers i.e. 38528.54 Rs/ha and 34304.05 Rs/ha respectively.

Input-output ratio in other words can be termed as the return per rupee of investment. The input-output ratio of rice at Cost C_2 was more favourable to large farm 1:1.91, followed by medium farm 1:1.80, and small farm 1:1.78. Therefore, it may

be concluded that, there is a increase in the ratio of input-output as the size of land holding increase. Large farmers used resources more efficiently as compared to medium and small farmers who invested heavily for a less proportionate return. On an average level of input-output ratio was found 1:1.83 and 1:1.66 at Cost C_2 and Cost C_3 level respectively.

Conclusion
The cost of cultivation incurred in rice production be reduced by curtailing the labour cost in small size farm by adopting improved production technology and intensive cultivation. Extension agencies should be strengthen to popularize the improved production technologies and farming problems in the villages thus production level may be improved in the study area. Improved variety seeds though are of higher unit price but provide high productivity and return, therefore, to be used as per capacity of the growers.

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