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Economic Analysis of Rice Crop under Three Categories of Farm Holders at the Time of Covid-19 Pandemic

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ABSTRACT

The study was relatively undertaken at the time of Covid-19 pandemic in Bilaspur District of Chhattisgarh state, India, to know the overall economic structure of gross expenditure, profitability structure, production cost concept, net returnes, benefit-cost ratio (BCR) of rice crop under three categories of farm holders. Purposive as well as multistate random sampling methods were adopted for the research study. A total of 30 farmers were selected from the categorized three group's *viz.* small, medium, and large farmers. With the help of a prepared pre-tested interview schedule, a survey method was applied for primary data collection. The actual gross and net return of rice grower was needed to know at the situation of the covid-19 pandemic. So that could reach on real cost and net returns structure and explain it under three different farms size holders, therefore worked on this vital subject of the overall economic profile. This research revealed that Cost C2, C3, production cost (Rs. /quintal) at C3, net profit at C3, and (BCR) benefit-cost ratio at C3 in one acre of small rice grower was Rs. 27662, Rs. 30,428.2, Rs. 1521.41, Rs. 19571 and 1:1.64 respectively. Thus, cost C2, C3, cost of production (Rs. /quintal) at C3, net profit at C3, and the benefit-cost ratio at C3 in one acre of medium rice grower was Rs. 31576.08, Rs. 34,733.68, Rs. 1447.23, Rs. 25266.32 and 1:1.72 respectively. Similarly, cost C2, C3, cost of production (Rs. /quintal) at C3, net profit at C3, and the benefit-cost ratio at C3 in one acre of large rice grower was Rs. 32908.08, Rs. 36,198.8, Rs. 1447.95, Rs. 26301.12 and 1:1.72 respectively. After jointly calculating the categories of data based on farms size, it revealed that the average total expenditure, Cost 2, C3, production cost (Rs./q) at C3, net profit at C3, and BCR at C3 were Rs. 30715.38, Rs. 30715.39, Rs. 33786.92, Rs. 1472.19, Rs. 23712.81, and 1:1.69 respectively. According to findings medium and large farmers do higher production of rice crop in one acre comparison of the small farmer. Labor cost is more in the rice farming in the study area, need to them the economical planning that could help ineffective use of input and get maximum profit through better farming.

Figure : 00 References : 07 Tables : 04
KEY WORDS : BCR, Cost concepts, Net returns and Rice crop, Total expenditure.

Introduction

Rice is the major cereal crop that plays a significant role in economic growth and feeds it approximately half the population of the world[3]. Rice framings are a prime source of earning for millions of households engaged in the cultivation, processing, trading, and related products. It is time to develop a sustainable ecological model such as a rice-based farming system which can play a prime role in promoting higher production and in eradicating poverty from the world and provide a way to conserve the human resources as well as the environment for present and future generations[4]. In India, total rice production was 121 million tons in 2020-2021 and 122 million tons in 2021-2022[1]. Chhattisgarh state is known as the "Rice Bowl" of Central India. This state got second position in entire India in paddy acquisition with 92 lakhs metric tons in 2020-21. 83 lakhs metric tons of rice were procured in 2019-20 and 80 lakh metric tons in 2018-19[6]. Paddy production area of Chhattisgarh state was 0.84 lakhs hectare in 20-21[6]. Rice cultivation provides both tangible and intangible benefits such as profitability, cost reduction, quality products, performance and loyalty

TABLE-1: Estimates of the total cost of rice cultivation under the different size of farm holders

S. No.	Cost components	Expenditure incurred of Small Farmers/ Acre (Rs.)	Expenditure incurred of Medium Farmers/ Acre (Rs.)	Expenditure incurred of Large Farmers/ Acre (Rs.)	Overall (Rs/acre)
A.	**Primary and secondary operations**	**A. Labour and equipment Cost**			
a)	Machine/labor (Ploughing, Levelling, Paddling, Bund preparation, and trimming)	2990(10.81)	3000(9.50)	3140(9.54)	3043.33(9.91)
b)	Family labor	1410(5.10)	1870(5.92)	1880(5.71)	1720(5.60)
c)	Application cost of manure and fertilizers	790(2.86)	1010(3.20)	1200(3.65)	1000(3.26)
d)	Application cost of pesticides and herbicides	700(2.53)	970(3.07)	730(2.22)	800(2.60)
e)	Harvesting and transport (Machine, Manual harvesting cost, Bagging, other labor costs)	2530(9.15)	2600(8.23)	2790(8.48)	2640(8.60)
	Total -Cost	8420(30.43)	9450(29.92)	9740(29.59)	9203.33(29.96)
B.	**Seeds and sowing**	**B. Material cost**			
a)	Cost of seed (Treatment, sowing, gap-filling charges)	990(3.58)	1155(3.66)	1225(3.72)	1123.33(3.66)
C.	**Manures and Fertilizers**				
a)	Cost of organic manures	800(2.89)	900(2.85)	1050(3.19)	916.66(2.98)
b)	Cost of fertilizer (Urea, DAP, SSP, MOP)	1994.5(7.21)	2183.58(6.92)	2515.58(7.64)	2231.22(7.26)
D.	**Weed control**				
a)	Cost of manual weeding	720(2.60)	900(2.85)	1080(3.28)	900(2.93)
b)	Cost of herbicide	650(2.35)	890(2.82)	920(2.80)	820(2.67)
E.	**Plant Protection**				
a)	Cost of pesticides	760(2.75)	960(3.04)	1010(3.07)	910(2.96)
F.	**Irrigation cost if any**	100(0.36)	1250(3.96)	1150(3.49)	833.33(2.71)
	Sub-Total	6014.5(21.74)	8238.58(26.09)	8950.58(27.20)	7734.55(25.18)
	Operational cost	14434.5(52.18)	17688.58(56.02)	18690.58(56.80)	16937.88(55.14)

C.	**Fixed cost**			
G. Land revenue and taxes	25(0.09)	25(0.08)	25(0.08)	25(0.08)
H. Rental Value of owned land	12000(43.38)	12600(39.90)	12900(39.20)	37500(122.09)
I. Interest on Fixed Capital (10%)	1202.5(4.35)	1262.5(4.00)	1292.5(3.93)	1252.5(4.08)
Total fixed cost	13227.5(47.82)	13887.5(43.98)	14217.5(43.20)	13777.33(44.85)
Total cost of cultivation (Rs.)	27662(100)	31576.08(100)	32908.08(100)	30715.38(100)

of the farmers to ecosystems that need to be balanced and improved. These types of benefits are provided through better ecosystem services that consist of both marketable and non-marketable[5]. Rice cultivation is more-suited to those countries and regions where less labor expenditure and high rainfall because it is labor-intensive to farming and requires more amount of water. Rice farming's can be practically anywhere in various soil situations as peat, alkali, saline, different water and temperature regions even terrace cultivation on a steep hill or mountain[2]. In this study, the cost of rice production in per hectare analyses with the help of terms as net production, cost-benefit ratio, and total expenditure-returns for find-out the benefits[3]. The cost of farming is an important parameter and based on it marketing choices are formed. Farmers want to sell their produce in the market place only when the market price covers the expenditure of agriculture produced. BCR *i.e.* the benefit-cost ratio of net income of crop produced and total cost of applied input that explains the gross financial profit for each rupee's expenditure in rice farming technique. BCR is an economic mathematical tool to assess the economic structure of various crop cultivation. This study has been applied to examine the economics of rice crops under three categories of farms holders at the time of the Covid-19 Pandemic in Bilaspur district of Chhattisgarh state, India. In the present study, the pattern of input application, expenditures and returns, and different cost concepts of the crop have been identified and analyzed. The present research proposal had been formulated with the following objectives:

1. To assess the expenditures and profitability structure of rice cultivation at the different sizes of farms.

Methodology

The research study was conducted in the year 2021 in the Bilaspur District of Chhattisgarh state, India. The purpose of the study was to know the total expenditure and profitability structure of rice growers at the time Covid-19 pandemic. Bilha block was selected with the help of the purposive sampling technique because the researcher is more acquainted with local farmers as well as the local language. The primary data related to the economical aspect were collected with the help of multistage sampling technique from two villages of Bilha block of Bilaspur district by a pre-tested interview schedule. The rice growers were categorized according to their farm's size into three groups viz. small rice growers (up to 2.0 hectare), medium rice growers (> 2 to 4.0 hectare) and large rice growers (more than 4 hectares), 5 farmers of each group were selected from each village using a random sampling technique. Thereby 30 rice growers were selected for the study. The expenditure of farmers in rice crops and their returns were calculated with the help of the cost concept. This study would be more useful to the economist, policymaker, extensionist in making the policies that can help in growth in profit of farmers.

Cost concepts tool

Cost A1: All actual expenditure incurred in the rice production/acre

Cost A2: Cost A1 + rent paid for lease in the land.

Cost B1: Cost A2 + interest on the value of owned fixed capital (excluding land).

Cost B2: Cost B1 + rental value of owned land.

Cost C1: Cost B1 + imputed value of family labor.

Cost C2: Cost B2 + imputed value of family labor.

Cost C3: Cost C2 + 10 % of cost C2 to account for the managerial cost of inputs of farmers.

Production cost (Rs. /quintal) = Total expenditure - value of by - product (Rs/acre) / Yields (quintal/acre)

Profitability concepts tool

Total production: Main product with its by-product.

Gross income = Sum of the value of main product and by - product

Farm business income = Total income – Cost A1

Family labor income = Total income – Cost B2

Net income = Total income – Cost C3

TABLE-2: Estimates of the cost of Rice production/acre according to cost concepts tool

Different costs	Small farmers	Medium farmers	Large farmers	Average (Rs/acre)
Cost A1 (A2)	13049.5	15843.58	16835.58	15242.89
Cost B1	14252	17106.08	18128.08	16495.39
Cost B2	26252	29706.08	31028.08	28995.39
Cost C1	15662	18976.08	20008.08	18215.39
Cost C2	27662	31576.08	32908.08	30715.39
Cost C3	30,428.2	34,733.68	36,198.88	33786.92

Benefit-cost ratio (BCR): Gross income/Total cost

Results and Discussion

Farm management is the most vital resource for different framings. Farm management determines how to do activities such as effective cost, recourses allotted that could attain the maximum profit with less input application from the operating farm. It suggests various strategies and methods make a better farm productive, profitable and sustainable. The farm management studies help to examine of cost from different angles for different motives. The commission on agriculture costs and prices uses the cost of cultivation to decide for Minimum Support Price of agricultural products. Therefore, should be considered the operational and fixed costs to measure the overall cost of every crop. Based on situation-wise package and practices, the total cost of rice cultivation was calculated and shown in Table-1. The total cost of the small, medium, and large farmers in per-acre land was Rs. 27662, Rs. 31576.08, and Rs. 32908.08 respectively. On average, the total cost of rice cultivation was calculated to be 30715.38 Rs. /hectare. Thus, on average 55.14 percent of the cost was operational cost and the remaining 44.85 percent fixed cost. On average, total labor cost was revealed 5.60 percent to the total cost of cultivation which ranged from 5.10 percent in small farms to 5.71 percent in large farms.

Cost of cultivation of rice according to cost concept

The scientific cost of cultivation in per-acre land was calculated with the help of the cost concept tool which has been shown in Table-2.

Cost A1: It includes all actual expenditure such as land revenue & taxes and interest of working costs incurred in per acre rice production. From the calculation, Cost A1 was found to be 13049.5 Rs/acre, 15843.58 Rs/acre, and 16835.58 Rs/acre for small farm size, medium farm size, and large farm size respectively. The overall average of three categories of farm size was found as 15242.89 Rs/acre. Cost A1 was found higher followed by medium and small farm size group.

Cost A2: The farmland of farmers was owned and farmers did not take any land on lease from other farmers. So, rent was not paid for leased-in-land.

Cost B1: In rice cultivation, Cost B1 was found to be 14252 Rs/acre, 17106.08 Rs/acre, and 18128.08 Rs/acre for small farms size, medium farm size, and large farm size respectively. The overall average of three categories of farm size was found as 16495.39 Rs/acre. Cost B1 showed a significant association with the size of farms.

Cost B2: It comprises the rental value of owned land by three categories of farmers. Cost B2 in rice cultivation was observed to be 26252 Rs/acre, 29706.08 Rs/acre, and 31028.08 Rs/acre for small farmers, medium farmers, large farmers respectively. Overall average of three categories farm size was found to be 28995.39 Rs/acre.

Cost C1: It comprises the Cost B1 and imputed value of family labor in rice cultivation that was 15662 Rs/acre, 18976.08 Rs/acre, and 20008.08 Rs/acre for small farmers, medium farmers, and large farmers respectively. Overall an average of Cost C1was found to be 18215.39 Rs/acre.

Cost C2: It comprises the Cost B2 and imputed value of family labor in rice farming that was 27662 Rs/acre, 31576.08 Rs/acre for 32908.08 Rs/acre for small farmers, medium farmers, and large farmers respectively. Thus, the overall cost was observed as 30715.39 Rs/acre.

Cost C3: It comprises 10 % of Cost C2 as an

TABLE-3: Expenditure and returns of Rice production at the different sizes of farm holders

Particulars	Size of farmers Rs/acre			
	Small	Medium	Large	Average (Rs/acre)
Yield (grain) (quintal /acre)	20	24	25	23
Price per quintal (Rs.)	2500/-	2500/	2500/-	25000
Value of main product(Rs./acre)	22,338	28,423.92	29,591.92	26784.61
Quantity of By product (q/acre)	16.08	18.23	19.83	18.04
Price per quintal (Rs.)	200	200	200	200
Value of By product (Rs./acre)	3216	3646	3966	3609.33
Gross income (Rs/acre)	50,000/-	60,000/-	62500/-	57500
Cost of production (Rs./q) at Cost C2	1383.1	1315.67	1316.32	1338.36
Cost of production (Rs./q) at Cost C3	1521.41	1447.23	1447.95	1472.19

incremental cost. In rice farming, cost was observed to be 30,428.2 Rs/acre, 34,733.68 Rs/acre and 36,198.88 Rs/acre for small farmers, medium farmers and large farmers respectively. The overall average cost of the three categories' farm size was 33786.92 Rs/acre.

The economical data on the total return of rice is shown in Table-3 which presents gross income per acre, the total cost of rice farming per acre, and production cost per quintal at different cost levels. It was revealed that the highest total income of rice per acre was observed at 62,500 Rs/acre in the large farm size group followed by medium farm size 60,000 Rs/acre and small farm size group 50,000 Rs/acre. It was found that cultivation cost at cost C3, large farmers was allocated 36,198.88 Rs/acre followed by medium farmer 34,733.68 Rs/acre and small farmer 30,428.2 Rs/acre. Similarly, the production cost (Rs/q.) at cost C3 level was observed as 1521.41Rs/qt. for small, 1447.23 Rs/qt. for medium and 1447.95 Rs/qt. for large rice growers and on overall average, production cost at C3 was observed 1472.19 Rs/qt. It was found that production cost is medium in large farmers.

In the fields of the farm business, profit analysis is the prime consideration. How much amount the farmers earn from their land as a net income and how much farmers involve his family members for the work in the operating farm which is consuming unit. The profit structure of an operational farm explains the net income, total income, farm business income, family labor income, the benefit-cost ratio of different categories of rice growers. The profitability structure of selected rice growers was calculated and shown in Table-4. It is shown that both harvested physical main product and by-product are transforming into monetary terms, it is known as gross return of rice production which was observed Rs. 50000, Rs. 60000 and Rs. 62500 for the small farm, medium and large farm respectively. The overall average income of gross returns of different categories of farmers was Rs. 57500. Gross returns of rice production were found higher in the large farm group followed by the medium and small farm group. It has been found that in the rice production the maximum net returns at Cost C2 level was 29,591.92 Rs/acre for large farm size group followed by medium 28,423.92 Rs/acre and small farmers 22,338 Rs/ha Rs/acre.

Similarly net returns at Cost C3 level, it was observed 26301.12 Rs/acre 25266.32 Rs/acre and 19571 Rs/acre for large farm, medium farm, and small farm size group respectively. The net return of rice production was seen maximum at both cost C3 and C2 level for large farm followed by medium and small farm size group. The family labor income was seen maximum in large farms 45664.42 Rs/acre followed by medium and small farm size group *i.e.* 44156.42 Rs/acre and 36950.5 Rs/acre respectively.

Thus, the benefit-cost ratio explains the return per rupee of expenditure. The benefit-cost ratio of rice production at Cost C2 level was found more positive for medium farm size 1:1.90, followed by large farm 1:1.90,

TABLE-4: Profitability structure of Rice under the different size of farm holders

	Size of farmers Rs/acre			
Particulars	**Small**	**Medium**	**Large**	**Average (Rs/acre)**
Gross income of rice	50,000/-	60,000/-	62500/-	57500
Gross expenses in rice farming	30,428.2	34,733.68	36,198.88	33786.9211
Net profit at Cost C2	22,338	28,423.92	29,591.92	80353.84
Net profit at Cost C3	19571	25266.32	26301.12	23712.81
Farm business income	36950.5	44156.42	45664.42	42257.11
Family labour income	23748	30293.92	31471.92	28504.61
BCR at Cost C2	1:1.80	1:1.90	1:1.90	1:1.86
BCR at Cost C3	1:1.64	1:1.72	1:1.72	1:1.69

and small farm 1:1.80. If the size of landholding increased also their ratio of input-output was increased. Large and medium-sized farm holders effectively utilize the available resources in the farm and got maximum benefit compared to small farmers. In the case of small farmers, it heavily applies the available resources in the farm but does not get proportionate returns. On an average level of benefit-cost ratio was observed 1:1.86 and 1:1.69 at Cost C2 and Cost C3 level respectively.

Conclusion

The expenditure in rice farming can be reduced in small farm size groups by adopting situation-based rice technology such as water management, weed management, integrated nutrient management, and integrated pest management practices. Agricultural Extension agencies can play a vital role to impart the various improved farm productive technologies among farmers of study areas through different extensions such as demonstration, training, and fields visit. Extension program building capacity should be strengthened to the planning of different activities for farmers who will help to solve the problem related to farm production. Improved variety, its price is high but it increases the productivity. Application of fertilizer in balanced form after soil testing should be applied in the crop fields that will help in cost management.

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