



An Economic Analysis of Paddy Cultivation and Constraints in Surguja District of Chhattisgarh, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

For the study, 150 farmers were selected at randomly from the Surguja district that covers the majority of Chhattisgarh's expanded area. In order to gather information about farmers from the previous year, primary data was gathered through direct farmer contact for questionnaires and interviews. Secondary data for the previous ten years was provided by many government agencies. Objective is to calculate the costs and return from the paddy crop in the study area. According to estimates, the total cost of paddy cultivation per hectare was Rs. 43584.81; this cost ranged from Rs. 41502.65 at marginal farms to Rs. 44466.62 at large farms. The cost-per-hectare for the sampled farms have been estimated to be Rs. 23430.04, Rs. 23430.04, Rs. 40829.91, Rs. 26584.81, Rs. 43584.80, and Rs. 47943.28 for Cost-A1, Cost-A2, Cost-B1, Cost-B2, Cost-C1, Cost-

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C2, and Cost-C3 overall. On an overall basis, the net income over Cost-A1, Cost-A2, Cost-B1, Cost-B2, Cost-C1, Cost-2, and Cost-C3 were calculated to be Rs. 95631.96, Rs. 95232.09, Rs. 78232.09, Rs. 92477.20, Rs. 75477.20, and Rs. 71118.72, respectively. The overall gross return was Rs. 141373.30 per hectare, the overall net income was Rs. 97788.49 per hectare, and the overall input-output ratio was 1:2.24 calculated in the study area. Because of the high land value, labor costs, high hybrid seed costs, chemical fertilizer, and other factors, rice cultivation in this region is expensive. Thus, it's critical to maintain the ecology by changing to an improved local variety of paddy and applying FYM and wormi compost in place of chemical fertilizers. Labour costs can be reduced through the use of machinery and technology.

Keywords: Cost of cultivation; yield value; input output ratio.

1. INTRODUCTION

Paddy is our most important cultivated plant, feeding more people than any other crop. It is an annual or short-lived perennial grass species native to Asia. Its domestication (i.e. cultivation and modification by humans) started 8 to 13 thousand years ago. Paddy (*Oryza sativa* L.) is one of the most significant food crops in India and is likely to continue to hold this position in the future. It is a member of the Gramineae family. Rice should be acknowledged as the world's most valuable commodity because for millions of people, it represents their lifestyle, culture, tradition and source of income. It is an important staple food providing consumers with 66–70% of their daily body calorie requirements [1]. The crop can be grown in both tropical and arctic climates thanks to its high physiological adaptability [2]. After China, India is the second-largest producer of rice. Additionally, rice cultivation covers a significant portion of this country because it is one of the most important rich in nutrients staple crops [3]. Rice is farmed on 45 million hectares of land in India, with West Bengal and Uttar Pradesh producing the most, while Punjab has the highest rice productivity [4].

Paddy is one of the most important cereal crops in the world, paddy is grown allover the world. According to the USDA, global rice production will reach a record 520.5 million tons in 2023–24, an increase of more than 2 percent from the previous year. Bangladesh, the European Union, China, Pakistan, and the United States are expected to contribute the majority of this growth. Global domestic and residual use is anticipated to reach a record 523.0 million tons in 2023–24, an increase of 1.5 million from the previous year, with South Asia contributing the majority of the growth. Global ending stocks in 2023–24 are anticipated to drop 2.5 million tons to 166.7 million tons, the lowest level since 2017–18, as domestic and residual use is anticipated to once

more outpace global production (Outlook report 2023) Paddy is the main crop India. Chhattisgarh is also called the rice bowl of India. The main reason for this name for Chhattisgarh is the variety of rice grown in this region. There are over 20,000 varieties of rice grown in this region. In Chhattisgarh paddy cultivated area about 3.7 million hectares, productivity has been calculated at 3,212 kg per hectare. In the last kharif marketing season, the state set a record by procuring over 10.7 million tonnes (mt) of paddy from farmers at the minimum support price, which was higher than the previous record of 9.8 mt in 2021-22. In which most of the area is based on rainfed farming (Agriculture Development and Farmer Welfare and Bio-Technology Department 2023). The Northern Hill Zone's Surguja District is where most of the rice is grown. The Surguja district has the biggest area under rice cultivation in the Northern hill region with 117268 acres. The district has the most hybrid rice being grown. The Surguja area was selected for the research with this in mind [5].

2. MATERIALS AND METHODS

2.1 Materials

For the study, 150 respondents were mostly collected from two blocks in the Surguja district. Surguja district was randomly selected for the study because this district largest cultivated area of Chhattisgarh According to the needs of the respondents for the primary data from the farmers, personal interviews and questionnaires were used, and secondary data was gathered through various government agencies, including the Department of Agriculture, the Directorate of Economics and Statistics, articles, and research papers [6-8].

2.2 Cost Concepts Consist of Following 15 Items of Costs

1. Value of hired human labour
2. Value of permanent labour

3. Value of owned bullock labour
4. Value of hired bullock labour
5. Hired machinery charged
6. Value of fertilizers
7. Value of manure (produced on farm and purchased)
8. Value of seed (both farm-produced and purchased)
9. Value of insecticides and fungicides
10. Irrigation charges
11. Canal-water charges
12. Land revenue, cusses and other taxes
13. Depreciation value
14. Interest on the working capital
15. Miscellaneous expenses

2.3 The standard technique of cost of cultivation as per CACP will be used to calculate the cost of production and comprises-

Cost A1 = All actual expenses in cash and kind incurred in production by owner operator.

Cost A2 = Cost A1+ Rent for leased in land

Cost B1 = Cost A2+ Interest on owned fixed capital

Cost B2 = Cost B1+ Rental value of owned land

Cost C1 = Cost B1 + Imputed value of family labour

Cost C2 = Cost B2+ Imputed value of family labour

Cost C3= Cost C2 + 10% of cost C2

Cost C3+FL= Cost C3 + Imputed value of family labour

- Interest on working capital it was calculated @ 4% per annum for half of the crop period.
- Interest on fixed capital: It was calculated @ 7% per annum for the crop period.
- Rental value of owned land evaluated using either the going prices in the village for similar types of land or the feedback from the local farmers.
- Land revenue and other cases on the basis of the proportionate area under crops and their duration, the land revenue and other instances were divided among the crops that were grown.
- Depreciation

$$\text{Depreciation} = \frac{\text{Purchase value of the asset} - \text{Junk value}}{\text{Number of useful years of life (expected life)}}$$

3. RESULTS AND DISCUSSION

3.1 Input Wise Cost of Cultivation of Paddy

The cost of cultivation of paddy is shown in Table 1 and Fig. 1 It can be seen that on an overall per hectare cost of cultivation of Paddy was estimated as Rs. 43584.81 per hectare which varied from Rs. 41502.65 per hectare at marginal farms to Rs. 44466.62 per hectare at large farms respectively, Human labour cost (both family and hired labour) was noted as a share of significant costs in the cultivation of paddy. The overall per hectare human labour cost was estimated Rs. 6916.56 which varied from Rs. 6150.00 per hectare at marginal farms to Rs. 7300.00 per hectare at large farms respectively [9-13]. The next major cost was observed as bullock and machinery which was estimated about Rs. 2730.12 per hectare of the total cost of cultivation which varied from Rs. 2277.74 per hectare at marginal farms to Rs. 2784.67 per hectare at large farms respectively. The overall cost of seed was estimated as Rs. 5983.12 per hectare which varied from Rs. 5922.87 per hectare at marginal farms to Rs. 6000.00 per hectare at large farms respectively and overall cost of manure and fertilizer was estimated as Rs. 7675.99 per hectare which varied from Rs. 7405.47 per hectare at marginal farms to Rs. 7822.87 per hectare at large farms respectively. Plant protection Rs. 610.48 per hectare, depreciation is Rs. 127.50 per hectare, Interest on fixed capital is Rs. 399.87 and rental value of owned land is Rs.17000.00 per hectare respectively. On an overall gross return were 141373.30 [14-17].

3.2 Cost of Return on the Basis of Cost Concept and Income Over Different Cost of Paddy

Costs and return based on cost concept in paddy production were provided in Table 2. Overall on an overall Cost-A1, Cost-A2, Cost-B1, Cost- B2, Cost-C1, Cost-C2 and Cost-C3 were worked out to Rs. 23430.04, Rs. 23430.04, Rs. 23829.91, Rs. 40829.91, Rs. 26584.81, Rs. 43584.80 and Rs. 47943.28 per hectare respectively on the sampled farms. On an overall net income over Cost-A1, Cost-A2, Cost-B1, Cost- B2, Cost-C1, Cost-2 and Cost-C3 were calculated to be Rs. 95631.96, Rs. 95631.96, Rs. 95232.09, Rs. 78232.09, Rs. 92477.20, Rs. 75477.20 and Rs. 71118.72 respectively.

Table 1. Input wise cost of cultivation of paddy at different size groups of farms

						(Rs/ha.)
S. No.	Particular	Marginal	Small	Medium	Large	Overall
A Variable cost						
1	Human labour					
	a) Family labour	3837.23 (9.25)	3216.96 (7.48)	2678.86 (6.13)	2174.51 (4.89)	2754.89 (6.32)
	b) Hired labour	2312.77 (5.57)	3433.04 (7.98)	4271.14 (9.77)	5125.49 (11.53)	4161.67 (9.55)
	Total human labour	6150.00 (14.82)	6650.00 (15.46)	6950.00 (15.91)	7300.00 (16.42)	6916.56 (15.87)
2	Bullock and machinery power					
	a) Bullock	481.75 (1.16)	173.57 (0.40)	160.17 (0.37)	139.04 (0.31)	180.12 (0.41)
	b) Machinery	1795.99 (4.33)	2573.37 (5.98)	2600.45 (5.95)	2645.63 (5.95)	2550.00 (5.85)
	Total bullock and machinery	2277.74 (5.49)	2746.94 (6.39)	2760.62 (6.32)	2784.67 (6.26)	2730.12 (6.26)
3	Seed	5922.87 (14.27)	5955.79 (13.85)	6000.00 (13.73)	6000.00 (13.49)	5983.12 (13.73)
4	Manure & fertilizers	7405.47 (17.84)	7552.56 (17.56)	7698.99 (17.62)	7822.87 (17.59)	7675.99 (17.61)
5	Plant protection	405.84 (0.98)	557.99 (1.30)	620.13 (1.42)	695.01 (1.56)	610.48 (1.40)
6	Irrigation charge	875.91 (2.11)	911.24 (2.12)	931.66 (2.13)	979.50 (2.20)	936.19 (2.15)
7	Miscellaneous cost	200.00 (0.48)	250.00 (0.58)	300.00 (0.69)	350.00 (0.79)	308.72 (0.71)
8	Interest on working capital	676.02 (1.63)	856.30 (1.99)	903.30 (2.07)	952.30 (2.14)	896.25 (2.06)
	Total variable cost	24013.86 (57.86)	25480.82 (59.24)	26164.70 (59.88)	26934.35 (60.57)	26057.43 (59.79)
B Fixed cost						
9	Land revenue	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)
10	Depreciation	89.80 (0.22)	128.67 (0.30)	130.02 (0.30)	132.28 (0.30)	127.50 (0.29)
11	Interest on fixed capital	399.00 (0.96)	399.90 (0.93)	399.93 (0.92)	399.99 (0.90)	399.87 (0.92)
12	Rental value of owned land	17000.00 (40.96)	17000.00 (39.53)	17000.00 (38.91)	17000.00 (38.23)	17000.00 (39.00)
	Total fixed cost	17500.80 (42.17)	17540.57 (40.78)	17541.95 (40.15)	17544.27 (39.45)	17539.37 (40.24)
C	Total cost (A+B)	41502.65 (100.00)	43009.39 (100.00)	43694.65 (100.00)	44466.62 (100.00)	43584.81 (100.00)

Note: Figures in the parentheses are percentage to total cost of cultivation of paddy

3.3 Yield and Benefit of Paddy at Sample Farms

The yield value of the output per hectare and the production price per quintal of paddy are shown in Table 3 and Fig. 2. The overall cost was to be estimated as Rs. 43584.81 per hectare which

varied from Rs. 41502.65 per hectare at marginal farms to Rs. 44466.62 per hectare at large farms. Overall, 137.54 qtl. per hectare) were recorded on an overall yield (both main and by-product yield). On an overall gross return was Rs. 141373.30 which varied from Rs. 132740.00 per hectare at marginal farms to Rs. 146480.00 per

hectare at large farms. On an overall the net income was Rs. 97788.49per hectare. The overall production costs per quintal were estimated as Rs. 729.21. On an overall input

output ratiowas 1:2.24 which varies from 1:2.20 at marginal farms to 1:2.29 at large farms respectively.

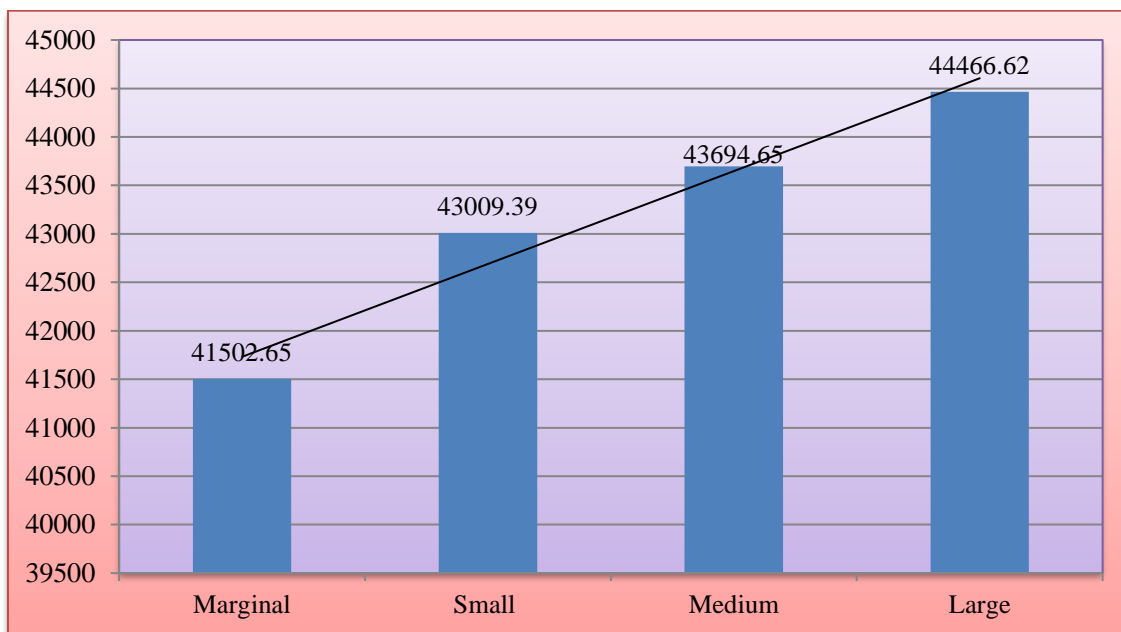


Fig. 1. Cost of cultivation of paddy at sampled households (Rs/ha.)

Table 2. Break-up of total cost, cost concept wise income over different cost of paddy

(Rs./ha)						
S. no.	Particular	Marginal	Small	Medium	Large	Overall
A Break-up of cost						
1	Cost A1	20266.43	22392.53	23615.86	24892.12	23430.04
2	Cost A2	20266.43	22392.53	23615.86	24892.12	23430.04
3	Cost B1	20665.43	22792.43	24015.79	25292.11	23829.91
4	Cost B2	37665.43	39792.43	41015.79	42292.11	40829.91
	A2+FL	24103.66	25609.49	26294.72	27066.63	26184.93
5	Cost C1	24502.66	26009.39	26694.65	27466.62	26584.80
6	Cost C2	41502.66	43009.39	43694.65	44466.62	43584.81
7	Cost C3	45652.93	47310.33	48064.12	48913.28	47943.28
B Gross income over different cost						
1	Income over cost A1	90743.57	92857.47	95914.14	98957.88	95631.96
2	Income over cost A2	90743.57	92857.47	95914.14	98957.88	95631.96
3	Income over cost B1	90344.57	92457.57	95514.21	98557.89	95232.09
4	Income over cost B2	73344.57	75457.57	78514.21	81557.89	78232.09
5	Income over cost C1	86507.34	89240.61	92835.35	96383.38	92477.20
6	Income over cost C2	69507.34	72240.61	75835.35	79383.38	75477.20
7	Income over cost C3	65357.07	67939.67	71465.89	74936.72	71118.72

Table 3. Yield and benefit of paddy at sample farms

							(Rs. / ha.)
S. No.	Particulars	Marginal	Small	Medium	Large	Overall	
1	Main yield (qt /ha.)	56.00	58.00	60.00	62.00	59.77	
	Price/qt.	2040.00	2040.00	2040.00	2040.00	2040.00	
	Return (Rs./ ha.)	114240.00	118320.00	122400.00	126480.00	121930.80	
2	By product yield (qt /ha.)	74.00	76.00	78.00	80.00	77.77	
	Price/qt.	250.00	250.00	250.00	250.00	250.00	
	Return (Rs./ha.)	18500.00	19000.00	19500.00	20000.00	19442.50	
3	Gross Return (1+2) (Rs. /ha.)	132740.00	137320.00	141900.00	146480.00	141373.30	
4	Cost of cultivation (Rs./ha.)	41502.65	43009.39	43694.65	44466.62	43584.81	
5	Net return (Rs./ha.)	91237.35	94310.61	98205.35	102013.38	97788.49	
6	Cost of production (Rs/qt.)	741.12	741.54	728.24	717.20	729.21	
7	Input- output ratio	1:2.20	1:2.19	1:2.25	1:2.29	1:2.24	

Note: Figure in the parenthesis indicates net return and input output ratio.

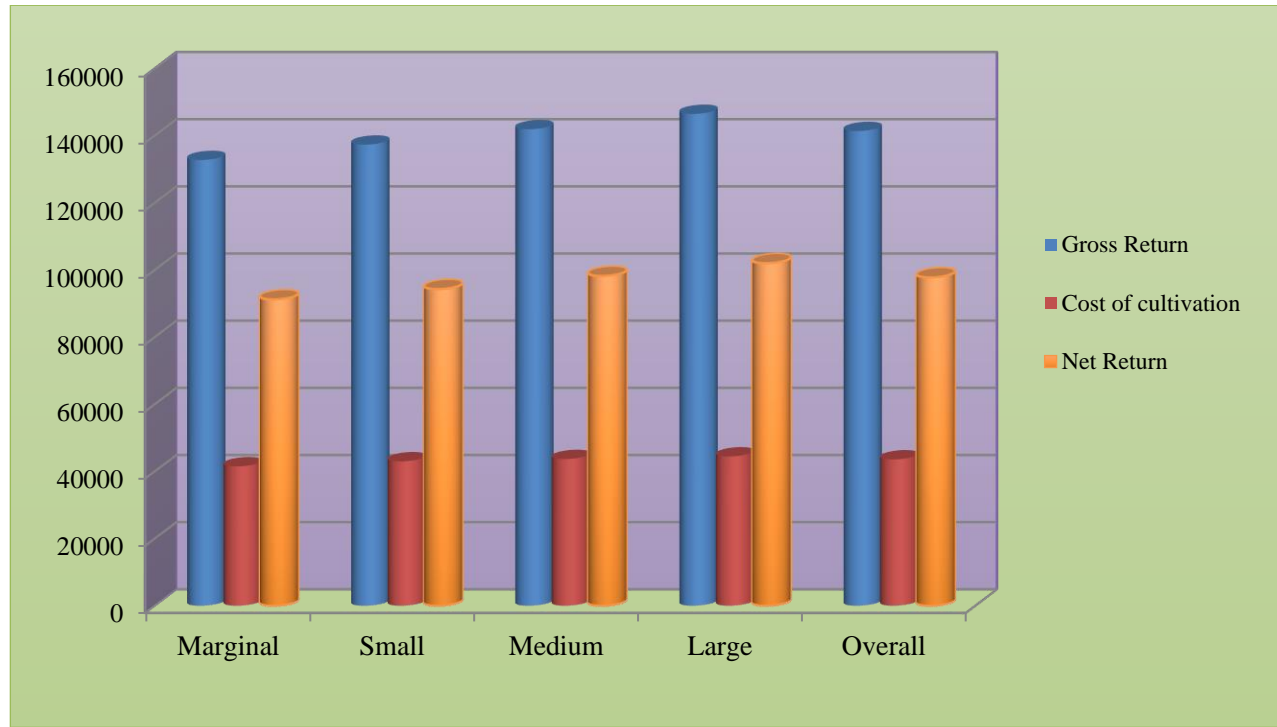


Fig. 2. Yield and benefit of paddy at sample farms (Rs/ha.)

4. CONCLUSION

Chhattisgarh's main crop in terms of both production and consumption is paddy. In the case of Surguja district was highest growing area paddy and one of the highest hybrid rice producing district of Chhattisgarh. Major finding of this paddy relevant that the overall cost of cultivation of paddy is Rs. 43584.81 per hectare from the total cost of production, which has the highest cost of production input wise, was rental value of land and labour cost (40.24 and 15.87 percent). Overall gross return recorded was Rs. 141373.30 per hectare. Overall net return Rs.97788.49 and overall input output ratio was 1:2.24 respectively. The cost of cultivation of rice in this region is high and major constraint faced by paddy producer was large number of family member, small size of farm holdings, high value of land, Labour cost (human, bullock and machine labour), and High hybrid seed cost, chemical fertilizer and other environmental factor of this region. Suggested by the farmer was availability of local and improved variety of paddy should be maintain the organic farming and their ecosystem, Chemical fertilizer replaced by the FYM and worm compost, Labour costs can be reduced by using machinery equipment.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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