

Economics of Rice Cultivation in West Godavari District of Andhra Pradesh

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ABSTRACT

The present study is based on economic analysis of paddy production with the objectives to work out the cost and returns of paddy and also constraints in production and marketing of rice in the study area. It was found that the total cost of cultivation per hectare has been increased with the increase in the size of the holdings from Rs. 72,200.22 for small farmers to Rs. 77,007 for large farmers. The gross returns obtained also increased with increase in farm size from Rs. 85,120 for small farmers to Rs. 1,01,388 for large farmers. The major constraints in production and marketing of rice were low price for produce followed by MSP after official and unofficial cut, marginal size of holding leading to lesser production and lack of drainage facilities.

Key words: *Costs and returns of rice, Production and marketing constraints.*

Agriculture is the backbone of Indian economy. It continues to be the mainstay of the Indian economy contributing 17.32 per cent (statisticstimes.com) of GDP and the largest employment providing sector with 48.9 per cent during 2016-17 (the hansindia.com). The production costs of rice were ever increasing because of heavy usage of chemicals, high labour wages, and prices of agricultural inputs, rental charges of agriculture machinery and lack of adequate credit. One-third of the world's rice area, (83 million hectares) is in India. It is grown in almost all the states of India. During 2015-16, production of rice in India was 104.4 million tonnes with an area of 43.4 million hectares and yield of 2400 kg/ha (www.indiastat.com). In Andhra Pradesh, West Godavari District is the leading producer of rice, with an area of 3.99 lakh hectares, production of 2499 thousand tonnes and an yield of 6257 kg/ha during 2016-17.

MATERIALS AND METHODS

The present study was carried out in west Godavari district of Andhra Pradesh in 2018. A multi-stage random sampling procedure was adopted for the selection of mandals, villages and farmers. In the first stage, West Godavari district of Andhra Pradesh is selected based on the highest area under rice cultivation. In the second stage four mandals were selected, in the third stage a total of eight villages, two from each mandal were selected. In fourth stage a total of 120 farmers were selected randomly 15 farmers from each selected village then post stratified into small, medium and large farmers. The farmers were interviewed using specially prepared schedules. The farmers were also asked to prioritize the most important constraints faced by them during production and marketing of rice cultivation.

Analysis of data

Cost concepts

Various cost concepts developed by different economists to assess the extent of the cost of cultivation were used. The cost concepts classification adopted by CACP (Commission on Agricultural Costs and Prices), New Delhi was used in the present study for estimating the cost of cultivation of rice.

Cost A_1 = Value of hired human labour
 + Value of bullock labour (both hired and owned)
 + Value of machinery power (both hired and owned)
 + Value of seeds (purchased and owned)
 + Value of insecticides, pesticides and weedicides
 + Value of manure (both owned and purchased)
 + Value of fertilizers
 + Value of irrigation charges
 + Depreciation and maintenance of implements and farm buildings
 + Miscellaneous expenses (electricity charges, fuel, gunny bags etc.)
 + Land revenue/cess and other taxes
 + Interest on working capital

Cost A_2 = Cost A_1 + Rent paid for leased in land

Cost B_1 = Cost A_1 + Interest on fixed capital

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 per cent of cost C_2

Measures of farm income

Farm business income = Gross income - Cost A_1

Family labour income = Gross income - Cost B_2

Farm investment income = Farm business income - imputed value of family labour

Garrett's Ranking Technique

To identify the major production and marketing constraints faced by the farmers, Garrett's ranking technique was used. According to this, the respondents were asked to assign rank to different problems by using the following formula (Garrett and Woodsworth, 1969):

$$\text{Per cent position} = \frac{[100*(R_{ij} - 0.50)]}{N_j}$$

where,

R_{ij} = rank given for i^{th} problem by j^{th} individual;

N_j = number of problems ranked by the j^{th} individual

RESULTS AND DISCUSSION

COSTS AND RETURNS OF RICE CULTIVATION

Cost of cultivation of paddy

The total cost of cultivation (TCOC) of paddy was worked out to be Rs. 74,698.21 per hectare for pooled farmers. The TCOC increased with the increase in the size of the holding from Rs. 72,200.22 for small farmers to Rs. 77,007 for large farmers indicating a direct relationship with the size of the holding. This was due to intensive use of inputs by large farmers. These results are consistent with Churpal *et al.*, (2015) and Pushpa *et al.*, (2017)

The total operational costs per hectare ranged from Rs. 54,342.22 (73.88%) for small farmers, Rs. 55,279.57 (74.34%) for medium farmers to Rs. 57,007 (74.02%) for large farmers, with an overall average of Rs. 55,437.93 (74.62%) for pooled farms. These results are in-line with Narasimham (2003) and Konar *et al.* (2015).

It is evident from Table 5.7 that, the cost of human labour was the major cost component among variable costs with an amount of Rs. 17,950 per hectare accounting for 24.03 per cent of TCOC on pooled farmers. The same was Rs. 16,290.54 for small farmers, Rs. 17,200 for medium farmers and Rs. 17,300 for large farmers accounting for 22.56, 23.13 and 22.46 per cent of their respective TCOC. The similar results were observed by Hamsa *et al.*, (2017)

The next important item of operational cost was mechanical labour which accounted to an amount of Rs. 13,350 on pooled farmers accounting for 17.87 per cent. The same was Rs. 13,126 (18.18%) for small farmers, Rs. 14,4360 (19.31%) for medium farmers and Rs. 15,240 (19.79%) for large farmers. The expenditure on machine labour increased with the increase in size of the farmers and the same was observed by Gupta *et al.* (1985). The other items of expenditure in the order of importance were shown in table 1

Fixed costs per hectare were estimated at Rs.18,858, Rs.19,077, Rs. 20,000 and Rs. 19,260.28

accounting for 26.12 per cent 25.66 per cent, 25.98 per cent and 25.38 per cent of TCOC for small, medium, large and pooled farmers respectively as shown in Table 5.7. The rent paid for the leased in land (or) owned land was the major cost item among the fixed costs which accounted for 24.93, 24.21, 23.37 and 24.10 per cents on small, medium, large and pooled farmers. Depreciation and interest on fixed capital were other fixed cost items accounting for 0.55 and 1 per cents respectively on pooled farms.

The overall analysis of TCOC of paddy crop revealed that, the large farmers incurred higher costs than small farmers and medium farmers. This was mainly because of intensive use of human labour, mechanical labour and fertilisers by the large farmers compared to small and medium farmers. These findings were similar with the Vardan and Kumar (2012) revealed that the labour cost occupied more than 50 per cent in the total cost of cultivation. These present results are also similar with the Nirmala and Muthuraman (2009) study which indicated that machine labour and human labour constituted major cost in the total variable costs.

The large farmers were incurring high cost of cultivation, followed by medium and small group of farmers, inferring that the total cost of cultivation was varying directly with the farm size.

Cost concepts in paddy cultivation

Of all the cost concepts (Table 1), cost C_2 is the most comprehensive cost as it covers all the variable costs and fixed costs. The TCOC *i.e.*, Cost C_2 per hectare of paddy was Rs. 72,200.22, Rs.74,356.57, Rs.77,007, Rs. 74,698.21 for small, medium, large and pooled farmers respectively.

On an average, the cost C_3 of paddy per hectare was Rs. 82,168.03 for pooled farmers. It was highest for large farmers (Rs. 84,708) as compared to small farmers (Rs. 79,420.24) and medium farmers (Rs.81,792.23) indicating a direct relationship with farm size. The, cost of cultivation was more in large farmers and less in small farmers. The same trend was observed in Cost C_1 and Cost C_3 . These findings were consistent with the Nectam *et al.* (2017).

It was found that from the data, Cost A_1 increased from Rs. 51,747.22 for small farms to Rs. 56,997 for large farms with an average of Rs. 54,853.21 per hectare for the pooled farmers. The high value of cost A_1 on large farmers was due to higher expenditure incurred on items like hired human labour, mechanical labour, fertilizers, and plant protection, Cost A_2 was minimum (Rs. 69,747.22) for small farms and increased with the increase in farm size. It was Rs. 72,853.13 per hectare for the pooled farmers. These results were in consistent with Pushpa *et al.*, (2017)

Table 1. Item wise cost of cultivation of paddy farmers in sample area (Rs.ha⁻¹)

S. No.	Particulars	Size groups			
		Small	Medium	Large	Pooled
A.	Variable costs				
i	Seeds / seedlings	1,953.95 (2.71)	1,980.00 (2.66)	2,030.00 (2.64)	1,955.42 (2.61)
ii	Labour	29,416.54 (40.74)	31,560.00 (42.44)	32,540.00 (42.25)	31,300.00 (41.90)
	a. Human labour	16,290.54 (22.56)	17,200.00 (23.13)	17,300.00 (22.46)	17,950.00 (24.03)
	1) Hired human labour	14,290.00 (19.79)	16,300.00 (21.82)	16,550.00 (21.52)	16,850.00 (22.55)
	2 Family labour	2,000.00 (2.77)	900.00 (1.21)	750.00 (0.97)	1,100.00 (1.47)
	b. machine labour	13,126.00 (18.18)	14,360.00 (19.31)	15,240.00 (19.79)	13,350.00 (17.87)
iii	Bullock labour	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
v	Plant Protection Chemicals	10,925.00 (15.13)	9,300.00 (12.51)	8,550.00 (11.10)	9,153.33 (12.25)
vi	Manure	780.00 (1.08)	1,500.00 (2.02)	1,600.00 (2.08)	1,420.25 (1.90)
vii	Fertilizers	9,500.00 (13.16)	9,895.00 (13.31)	10,998.00 (14.28)	10,425.80 (13.95)
viii	Irrigation charges	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
ix	Miscellaneous expenses	0.00 (0.00)	250.00 (0.34)	470.00 (0.61)	380.00 (0.51)
x	Interest on working capital	766.73 (1.06)	794.57 (1.06)	819.00 (1.06)	803.13 (1.07)
Total variable cost		53,342.22 (73.88)	55,279.57 (74.34)	57,007.00 (74.02)	55,437.93 (74.62)
B.	Fixed costs				
i.	Depreciation	305.00 (0.42)	340.00 (0.46)	640.00 (0.83)	415.28 (0.55)
ii.	Land revenue/ cesses and other taxes	100.00 (0.14)	100.00 (0.13)	100.00 (0.13)	100.00 (0.13)
iii.	Rental value of owned land/ Rent paid for leased in land	18000.00 (24.93)	18000.00 (24.21)	18000.00 (23.37)	18000.00 (24.10)
iv.	Interest on fixed capital	453.00 (0.63)	637.00 (0.86)	1260.00 (1.64)	745.00 (1.00)
Total fixed cost		18858.00 (26.12)	19077.00 (25.66)	20000.00 (25.98)	19260.28 (25.38)
C.	Total cost (A+B)	72200.22 (100.00)	74356.57 (100.00)	77007.00 (100.00)	74698.21 (100.00)

Note: Figures in parentheses indicate percentages to the respective column totals.

Table 2. Cost of cultivation of paddy as per cost concepts (Rs. ha⁻¹)

S.No.	Particulars		Size groups			
			Small	Medium	Large	Pooled
1	Cost A ₁ : Cultivation costs					
	i	Seeds / seedlings	19,53.95 (2.46)	1,980.00 (2.42)	2,030.00 (2.40)	1955.42 (2.37)
	ii	Hired human labour	14290 (17.99)	16300 (19.92)	16550 (19.53)	16850 (20.51)
	iii	Bullock labour	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	iv	Machine labour	13126 (16.53)	14360 (17.56)	15240 (17.99)	13350 (16.25)
	v	Plant protection chemicals	10,925.00 (13.75)	9,300.00 (11.37)	8,550.00 (10.09)	9,153.33 (12.25)
	vi	Manure	780.00 (0.98)	1500.00 (1.83)	1600.00 (1.89)	1420.25 (0.11)
	vii	Fertilizers	9500.00 (11.96)	9895.00 (12.10)	10998.00 (12.98)	10425.80 (12.69)
	viii	Irrigation charges	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	ix	Depreciation	305.00 (0.38)	340.00 (0.41)	640.00 (0.75)	415.00 (0.50)
	xii	Land revenue	100.00 (0.12)	100.00 (0.12)	100.00 (0.12)	100.00 (0.12)
	xii	Interest on working capital	766.73 (0.96)	794.57 (0.97)	819.00 (0.97)	803.13 (0.98)
	ix	Miscellaneous expenses	0.00 (0.00)	250.00 (0.30)	470.00 (0.55)	380.00 (0.46)
	Cost A ₁		51747.22 (65.16)	54819.57 (67.02)	56997.00 (67.29)	54853.21 (66.76)
2	Cost A ₂		69,747.22 (87.82)	72,819.57 (89.03)	74,997 (88.53)	72853.21 (88.66)
3	Cost B ₁		52200.22 (65.73)	55456.57 (67.80)	58257.00 (68.77)	55598.21 (67.66)
4	Cost B ₂		70200.00 (88.39)	73456.57 (89.81)	76257.00 (90.02)	73598.21 (89.57)
5	Cost C ₁		54200.22 (68.24)	56356.57 (68.90)	59007.00 (69.66)	56698.21 (69.00)
6	Cost C ₂		72200.22 (90.90)	74356.57 (90.90)	77007.00 (90.90)	74698.21 (90.90)
7	Cost C ₃		79420.24 (100.00)	81792.23 (100.00)	84708.00 (100.00)	82168.03 (100.00)

Note: Figures in parentheses indicate percentages to the respective column totals.

Table 3. Measures of farm income in paddy production (Rs. ha⁻¹)

S.No.	Particulars	Small farmers	Medium farmers	Large farmers	Pooled farmers
1	Gross income	85,120.00	95,900.00	1,01,388.00	94,080.00
2	Net income	12,919.78	21,543.43	24,381.00	19,381.79
3	Farm business income	33,372.78	41,080.43	44,391.00	39,226.79
4	Family labour income	14,920.00	22,443.43	25,131.00	20,482.00
5	Farm investment income	31,372.78	40,180.43	43,461.00	38,126.79

Table 4. Production and marketing constraints faced by sample farmers

S. No	Constraint	Scores	Mean score	Rank
1	High marketing cost	5412	45.1	IX
2	Low price for produce	8301	69.18	I
3	More distance to market /marketing society	5570	46.42	VIII
4	Non availability of sufficient storage space	6489	54.08	VI
5	More transport losses	3507	29.23	XIV
6	Inadequate institutional credit for production &marketing	5181	43.18	X
7	Lack of awareness on market information	4742	39.52	XI
8	Lack of knowledge on grading and standardisation	4250	35.42	XII
9	Marginal size of holding leading to lesser production	7701	64.18	III
10	Delayed payment of MSP during procurement	3874	32.28	XIII
11	Existence of more number of middlemen	6427	53.56	VII
12	scarcity of labour during production and marketing	7154	59.62	V
13	Lack of drainage facilities	7349	61.24	IV
14	MSP after official and unofficial cut due to quality discrepancy	8060	67.22	II

Cost B₁ was Rs. 52,200.22, Rs. 55,456.57 and Rs. 58,257 for small, medium and large farmers respectively, with an average of Rs. 55,598.21 per hectare for the pooled farmers. Cost B₂ was Rs. 70,200.22, Rs. 73,456.57, Rs. 76,257, and Rs. 73,598.21 small, medium, large and pooled farmers respectively.

Farm Income in Paddy

An important aspect of farm business management and decision making relates to the manner in which the available resources are allocated. A measuring rod is necessary to evaluate the optimal use of resources. To achieve this objective, various farm efficiency measures *viz.*, gross income, net income, farm business income, family labour income, farm investment income and benefit- cost ratio were computed and are presented in Table 3.

Gross income exhibited a direct relationship with the farm size and it was of the order of Rs. 85,120, Rs. 95,900, Rs.1,01,388.7 and Rs. 94,080 small, medium, large and pooled farmers respectively. The gross income was more for large farmers due to highest productivity compared to other categories of farmers. Though the gross income is a measure to assess the efficiency of the farm business, it alone does not help us to gauge the success of the farm business. Therefore, another measure namely net income, which represents a surplus of gross income over total costs, was estimated. The net income showed a direct relationship with the farm size. Large farmers recorded a net income of Rs. 24,381 against Rs. 12,919.78 and Rs. 21,543.43 on small farms and medium farmers respectively. The same was Rs. 19,381.79 on pooled farmers. These findings are similar with Tiwari (2015) and Sunitha and Kumar (2013)

Farm business income, which indicates returns on owned resources like land, labour and capital was also more among large farmers (Rs. 44,391) as compared to small farmers (Rs. 33,372.78) and medium farmers (Rs. 41,080.43), which means the large farmers were superior to small and medium farmers in effective usage of these resources.

Family labour income is another measure of farm efficiency representing the returns from farmer's own labour and family labour. Large farmers derive their family labour income amounting to Rs. 25,131, while it was Rs. 14,920 and Rs. 22,443.43 for small and medium farmers respectively. The same for pooled farms was Rs. 20,482.

Farm investment income, a measure of returns to fixed capital was Rs. 31,372.78, Rs. 40,080.43 Rs. 43,641 and Rs. 38126.79 for small, medium, large and pooled farms respectively. Thus, all the farm income measures were increasing with farm size.

Constraints in production and marketing of rice

The constraints faced by the farmers in production and marketing of rice were identified and analyzed using the Garrett's ranking technique. The production constraints were lack of drainage facilities, marginal size of holdings, scarcity of labour, inadequate institutional credit for production & marketing. The marketing constraints were low price for produce, lack of awareness on market information, lack of knowledge on grading and standardisation, high marketing cost, more distance to market, delayed payment after selling of the produce, non availability of sufficient storage space, more transport losses and existence of more number of middlemen. Analytical findings were presented in table 4.

The major constraints faced by farmers during production and marketing were low price for produce (69.18), MSP after official and unofficial cut (67.22). marginal size of holding leading to lesser production (64.18), lack of drainage facilities (61.24), scarcity of labour during production and marketing (59.62), non availability of sufficient storage space (54.08). The other constraints during production and marketing were existence of more number of middlemen (53.56), inadequate institutional credit for production & marketing (43.18), more distance to market /marketing society (46.42) high marketing cost (45.10), lack of awareness on market information (39.52), lack of knowledge on grading and standardisation (35.42), delayed payment after selling of the produce (32.28), more transport losses (29.23). These findings were similar with Prakash (2012) and Thanh and Singh (2006). These findings were also in accordance with Natchimuthu and Umamaheswari (2016).

CONCLUSIONS

- ◆ The average cost of cultivation per ha of rice was Rs. 72,200.22, Rs. 74,356.57, Rs. 77,007.00 and Rs.74,698.21 for small, medium, large and pooled farmers in the study area. Of the total cost, variable costs accounted for a major share of cultivation of rice in all size groups of farmers.
- ◆ Total human labour utilization in rice was high in large farmer group followed by the medium farmer and small farmer.
- ◆ Variable costs, fixed costs and total costs were varying in the three groups of farmers, the per cent contribution of variable costs and fixed costs to total costs remind same in all the three groups. The cost of cultivation was high in case of large farmers followed by medium and small farmers and it was inferred that the cost of cultivation was varying directly with the size of the Farm.

- ◆ The cost of cultivation was increasing with farm size group, the cost of production was decreasing with increasing farm size, indicating that operation of economics of scale. Thus in rice cultivation, large farmers were more benefited than the other two groups. It was also confirmed that benefit-cost ratio was high in case of large farmer, followed by medium group and small group of farmers.
- ◆ The major constraints faced by farmers during production and marketing were low price for produce (69.18), marginal size of holding leading to lesser production with mean scores of 64.18.

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