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## Economic analysis of paddy cultivation in district Prayagraj of Uttar Pradesh

**Ayush Kumar Pathak, Dr. Ramchandra and Ashutosh Chaturvedi**

### Abstract

The present study is based on economic analysis of paddy production with the objective to work out the cost and returns of paddy in the study area. The present study was conducted in Prayagraj district of Uttar Pradesh, India. Primary data were collected on various parameters by using personal interview/enquiry method for the period of 2019-2020 from the selected 12 villages and 240 respondents spread over two blocks Soraon (Gangapar) and Jasra (Yamunapar) of Prayagraj District by survey method using interview schedule. The major findings of this study revealed that on an average the per hectare cost of cultivation of paddy was calculated as Rs. 34537.28/ha, on an average yield of paddy was observed 61.91 quintals and average cost of production per quintal of paddy is Rs. 557.86. Overall Benefit cost ratio of the study area was 1:1.67.

**Keywords:** Paddy, economic analysis, cost of cultivation, Income & Expenditure, BC Ratio, Prayagraj.

### 1. Introduction

Paddy is the most important staple food crop in Asia. Paddy is the most important human food crop in the world, directly feeding more people than any other crop. India is one of the world's largest producers of Paddy and brown rice, accounting for 20% of all world Paddy production. More than 90% of the world's paddy is grown and consumed in Asia, where 60% of the world's population lives. *Paddy (Oryza Sativa)* it is believed is related with wet, humid climate, though it is not a tropical plant. It is probably a descendent of wild grass that was most likely cultivated in the foothills of the far Eastern Himalayas. Another theory believes that the Paddy may have originated in south of the country, then spread to the north India and then onwards to China. It then arrived in Korea, the Philippines near about 2000 B. C. and then Japan and Indonesia about 1000 B. C. Paddy is the key crop of providing mutual food for Indian population, namely Rice. India is facing problems to feed its increasing population. It is predicted that near about 260 million tonnes of foodgrains are to be produced annually by the year 2029-2030 to meet the food requirements in the country. Paddy is one of the foremost foodgrain crops in country occupying 43.79 million hect. with a production of 116.42 million tonnes. The agricultural economy of Uttar Pradesh is dominated by foodgrains. In spite of the fact that Paddy production occupies a significant place in the countries agriculture. Uttar Pradesh have maximum area under Paddy cultivation with 5.75 Million Hectare which is 13.12 per cent of total area under Paddy cultivation, whereas West Bengal is on second position with area 5.52 Million hectare (12.61 per cent,) and Odisha is on third with 3.71 Million Hectare (8.47 per cent). Let's talk about production of Paddy in UP is on second position of total production with 15.54 Million Tonnes (2704 Kg./Hectare ) which is 13.34 per cent of total Paddy production, west Bengal is on top with 16.05 Million Tonnes (13.79 per cent, 2906 Kg./Hectare) and Punjab is on third with 12.82 million tonnes (11.01 per cent, 4132 Kg./Hectare) in 2018-2019.

### Materials and Methods

The present study, primary data were collected on various parameters by using personal interview/enquiry method for the period of 2019-2020 from the selected 12 villages and 240 respondents spread over two blocks Jasra (Jamunapar) and Soraon (Gangapar) of Prayagraj District by survey method using interview schedule. The respondents were stratified into four size groups i.e., (i) marginal (below 1 ha), (ii) small (1-2 ha), (iii) Large (2-4 ha), (iv) Large (4ha and above)

To work out the cost of cultivation standard method of cost of cultivation as per CACP will be adopted which includes cost A, cost B and cost C.

These cost concepts and the items of costs included under each concept are given below:

#### Cost A1

1. Value of hired human labour.
2. Value of hired bullock labour
3. Value of owned bullock labour.
4. Value of owned machinery labour.
5. Hired Machinery Charges.
6. Value of seed (both farm produced and purchase).
7. Value of insecticides and pesticides.
8. Value of manure (owned and purchase)
9. Value of fertilizer.
10. Depreciation on implements and farm buildings.
11. Irrigation charges.
12. Land revenue, cesses and other taxes.
13. Interest on working capital.
14. Miscellaneous expenses (Artisans etc.).

Cost A2: Cost A1 + rent paid for leased in land

Cost B1: Cost A1 + interest on value of owned fixed capital assets (excluding land).

Cost B2: Cost B1 + rental value of owned land (net of land revenue) and rent paid for leased-in land.

Cost C1: Cost B1 + imputed value of family labour

Cost C2: Cost B2 + imputed value of family labour

Cost C2\*: Cost C2 adjusted to take into account valuation of human labour at market rate or statutory minimum wage rate whichever is higher.

Cost C3: Cost C2\* + value of management input at 10 percent of total cost (C2\*).

- Interest on working capital: It was calculated @4% per annum for half of the crop period.
- Interest on fixed capital: It was calculated @10% per annum for the crop period.
- Rental value of owned land: It was calculated based on the prevailing rates in the sampling villages.
- Depreciation: It presents the value by which a farm resource decreased in value as a result of cause other than a change in general Paddy of the item. Straight line method was used for calculating the depreciation:

#### Income measures

- a. Gross income: It includes the final Paddy of main product and by product of the crop.

b. Net income: Net income = Gross income – Cost C2

c. Family labour income: It is measured on earning of a farmer and his labour and managerial work. It is equal to gross income minus total expenses excluding wage of unpaid family labour.

Family labour income = Gross income - Cost B2

d. Farm business income: It is a measure of earning of farmer and his family for his capital investment, labour and managerial work.

Farm business income = Gross income – Cost A1

e. Farm investment income: This is the sum of net income, rental value of owned land and interest on fixed capital.

Farm investment income = Farm business income – Imputed value of family labour.

F. B. C. Ratio (Input output ratio) : It is ratio between input and output and computed by dividing value of total output by value of total input.

B. C. Ratio (Input output ratio) = O / I Where, I = Total input and O = Total output

#### Result and Discussion

##### Cost of cultivation and returns from Paddy

The description of cost of cultivation and returns from main and by product of Paddy is given below.

##### Component wise cost of cultivation of Paddy

The component wise various costs incurred in the cultivation of Paddy crop are given in Table 1. A perusal of table reveals that, the overall cost of cultivation of Paddy was Rs. 34537.28. from the total cost of cultivation, 39.56 per cent (Rs. 13662.5/ha) expenditure was incurred as operational cost, human labour constituted the most important component of operational cost with its share of more than 21.98 percent The material cost accounted 24.76 per cent (Rs. 8552.75 /ha), among the material cost items 11.10 percent expenses incurred on manure and fertilizer and seed, irrigation and plant protection accounted 4.40, 7.07 and 2.20 percent respectively. The share of rental value of land accounted 21.72 per cent (Rs. 7500/ha) and the remaining was accounted by land revenue, depreciation on implements, interest on working capital and interest on fixed capital of the total cost of cultivation.

**Table 1:** Cost of cultivation of Paddy crop in different size groups (Rs./ha) Number of Respondents=240 M S M L= 140+ 60+25+15 =240

| Variable cost                   |                       |              |              |              |                 |
|---------------------------------|-----------------------|--------------|--------------|--------------|-----------------|
| (A)-Operational cost            | Category of farm size |              |              |              |                 |
|                                 | Marginal              | Small        | Medium       | Large        | Over all        |
| Family labour                   | 4210(11.98)           | 3076(8.94)   | 2108(6.05)   | 1745(5.16)   | 2784.75(8.06)   |
| Hired labour                    | 4075(11.59)           | 4175(12.13)  | 5698(16.34)  | 5278(15.60)  | 4806.5(13.92)   |
| Machinery labour                | 4678(13.31)           | 4532(13.17)  | 4478(12.84)  | 4389(12.97)  | 4519.25(13.09)  |
| Transportation cost             | 1600(4.55)            | 1567(4.55)   | 1489(4.27)   | 1654(4.89)   | 1552(4.49)      |
| Subtotal (A)                    | 14563(41.43)          | 13350(38.80) | 13773(39.50) | 13066(38.61) | 13662.5(39.56)  |
| (B)- Material cost              |                       |              |              |              |                 |
| Seed                            | 1305(3.71)            | 1687(4.90)   | 1592(4.57)   | 1489(4.40)   | 1518.25(4.40)   |
| Manure & fertilizer             | 3985(11.34)           | 3897(11.33)  | 3846(11.03)  | 3601(10.64)  | 3832.25(11.10)  |
| Irrigation                      | 2206(6.28)            | 2395(6.96)   | 2486(7.13)   | 2678(7.91)   | 2441.25(7.07)   |
| Plant protection                | 734(2.09)             | 789(2.29)    | 773(2.22)    | 748(2.21)    | 761(2.20)       |
| Subtotal (B)                    | 8230(23.42)           | 8768(25.48)  | 8697(24.94)  | 8516(25.17)  | 8552.75(24.76)  |
| Total variable cost (A+B)       | 22793(64.85)          | 22118(64.28) | 22470(64.44) | 21582(63.78) | 22215.25(64.32) |
| Other cost                      |                       |              |              |              |                 |
| Interest on working capital @7% | 797.75(2.27)          | 774.13(2.25) | 786.45(2.26) | 755.37(2.23) | 777.53(2.25)    |
| Depreciation                    | 145(0.41)             | 145(0.42)    | 145(0.42)    | 175(0.52)    | 152.5(0.44)     |
| Land revenue                    | 0(0.00)               | 0(0.00)      | 0(0.00)      | 0(0.00)      | 0(0.00)         |
| Interest on fixed capital       | 717(2.04)             | 745(2.17)    | 798(2.29)    | 749(2.21)    | 752.25(2.18)    |

|                                                             |                  |                  |                  |                  |                  |
|-------------------------------------------------------------|------------------|------------------|------------------|------------------|------------------|
| Rental value of own land                                    | 7500(21.34)      | 7500(21.80)      | 7500(21.51)      | 7500(22.16)      | 7500(21.72)      |
| Subtotal (C)                                                | 9159.75(26.06)   | 9164.13(26.63)   | 9229.45(26.47)   | 9179.37(27.13)   | 9182.28(26.59)   |
| Cost c <sub>2</sub> * total (A+B+C)                         | 31952.75(90.91)  | 31282.13(90.91)  | 31699.45(90.91)  | 30761.37(90.91)  | 31397.53(90.91)  |
| 10% of c <sub>2</sub> * for managerial work                 | 3195.27(9.09)    | 3128.21(9.09)    | 3169.94(9.09)    | 3076.13(9.09)    | 3139.75(9.09)    |
| Cost C <sub>3</sub> =(C <sub>2</sub> *+C <sub>2</sub> *10%) | 35148.03(100.00) | 34410.34(100.00) | 34869.39(100.00) | 33837.50(100.00) | 34537.28(100.00) |

Source: Survey Data

Figures in brackets are percentages of the total.

**Cost concept wise cost of Paddy crop on various sized farms groups.**

The results related to various categories of cost as per CACP cost concepts for the Paddy of different sized farms are presented in Table 2. The table indicates that per hectare cost

A<sub>1</sub> was Rs. 19525.75 on marginal farm, Rs. 19961.13 on small farm, Rs. 21293.45 on Medium farms and Rs. 20767.37 on Large, the share of cost A<sub>1</sub> was 55.55 per cent, 58.01 percent, 61.07 per cent and 61.37 per cent of “Cost C<sub>3</sub> “ on the respective categories.

**Table 2:** Cost concept wise cost of cultivation of Paddy crop. (Rs./ha) Number of Respondents=240 M S M L= 140+ 60+25+15 =240

| Particulars           | Farm size groups |                  |                  |                  |                  |
|-----------------------|------------------|------------------|------------------|------------------|------------------|
|                       | Marginal         | Small            | Medium           | Large            | Over all         |
| Cost A <sub>1</sub>   | 19525.75(55.55)  | 19961.13(58.01)  | 21293.45(61.07)  | 20767.37(61.37)  | 20360.53(58.95)  |
| Cost A <sub>2</sub>   | 19525.75(55.55)  | 19961.13(58.01)  | 21293.45(61.07)  | 20767.37(61.37)  | 20360.53(58.95)  |
| Cost B <sub>1</sub>   | 20242.75(57.59)  | 20706.13(60.17)  | 22091.45(63.35)  | 21516.37(63.59)  | 21112.78(61.13)  |
| Cost B <sub>2</sub>   | 27742.75(78.93)  | 28206.13(81.97)  | 29591.45(84.86)  | 29016.37(85.75)  | 28612.78(82.85)  |
| Cost C <sub>1</sub>   | 24452.75(69.57)  | 23782.13(69.11)  | 24199.45(69.40)  | 23261.37(68.74)  | 23897.53(69.19)  |
| Cost C <sub>2</sub>   | 31952.75(90.91)  | 31282.13(90.91)  | 31699.45(90.91)  | 30761.37(90.91)  | 31397.53(90.91)  |
| Cost C <sub>2</sub> * | 31952.75(90.91)  | 31282.13(90.91)  | 31699.45(90.91)  | 30761.37(90.91)  | 31397.53(90.91)  |
| Cost C <sub>3</sub>   | 35148.03(100.00) | 34410.34(100.00) | 34869.39(100.00) | 33837.50(100.00) | 34537.28(100.00) |

Source: Survey Data

Figures in brackets are percentages of the total.

It has been observed that as land holding size increases cost A<sub>1</sub> also increases till semi large size of farm, in case of large size farm is decreases, and same as in case of cost A<sub>2</sub>. cost B<sub>1</sub> and cost B<sub>2</sub>. But in Cost C<sub>1</sub> its decreasing then increasing then decreasing, the cost C<sub>2</sub> and cost C<sub>2</sub>\* where same for all the farm size groups in the study area. Per hectare cost C<sub>3</sub> is the total cost of cultivation of Paddy crop, includes the managerial cost of farmers also. Marginal size group of farmers were spends more amount on Paddy cultivation Rs 35148.03/ha than that of other category and the overall average cost of cultivation per hectare of Paddy was Rs. 34537.28 /ha.

**Cost of production and returns from Paddy crop on various farm size group**

Table 3 shows the yield of main product, by-product and their prices, the yield of Paddy was observed 65.68, 64, 61.87, and 56.09 quintal per hectare under marginal, small, Medium and Large category of farms and the yields of by-products 85, 82, 81, and 80 quintals per hectare in the respective categories. The Paddy received by the farmers in the all respective category was Rs. 800/qtl. The gross returns per hectare were estimated Rs. 61044, 59400, 57596, and 52872/ha for marginal, small, medium and large farm size, respectively. The gross return was found more than per hectare cost of cultivation. Therefore, net returns per hectare were found positive i.e. Rs. 39851, 38849, 36615, and Rs. 32944 on marginal, small, medium, and large size of farms respectively.

**Table 3:** Returns from Paddy on various farm size group Number of Respondents=240 M S M L= 140+ 60+25+15 =240

| Particulars                      | Farm size groups |          |          |          |          |
|----------------------------------|------------------|----------|----------|----------|----------|
|                                  | Marginal         | Small    | Medium   | Large    | Over all |
| Yield of main product(qtl/ha)    | 65.68            | 64       | 61.87    | 56.09    | 61.91    |
| Yield of by product(qtl/ha)      | 85               | 82       | 81       | 80       | 82       |
| PPaddyof main product (Rs/qtl.)  | 800              | 800      | 800      | 800      | 800      |
| PPaddyof by product (Rs/qtl.)    | 100              | 100      | 100      | 100      | 100      |
| Return of main product (Rs/ha.)  | 52544            | 51200    | 49496    | 44872    | 49528    |
| Return of by product (Rs/ha.)    | 8500             | 8200     | 8100     | 8000     | 8200     |
| Gross return (Rs/ha.)            | 61044            | 59400    | 57596    | 52872    | 57728    |
| <b>Return over various costs</b> |                  |          |          |          |          |
| Cost A <sub>1</sub>              | 41518.24         | 39438.87 | 36302.55 | 32104.63 | 37367.46 |
| Cost A <sub>2</sub>              | 41518.24         | 39438.87 | 36302.55 | 32104.63 | 37367.46 |
| Cost B <sub>1</sub>              | 40801.24         | 38693.87 | 35504.55 | 31355.63 | 36615.21 |
| Cost B <sub>2</sub>              | 33301.24         | 31193.87 | 28004.55 | 23855.63 | 29115.21 |
| Cost C <sub>1</sub>              | 36591.24         | 35617.87 | 33396.55 | 29610.63 | 33830.46 |
| Cost C <sub>2</sub>              | 29091.24         | 28117.87 | 25896.55 | 22110.63 | 26330.46 |
| Cost C <sub>2</sub> *            | 29091.24         | 28117.87 | 25896.55 | 22110.63 | 26330.46 |
| Cost C <sub>3</sub>              | 25895.96         | 24989.65 | 22726.60 | 19034.49 | 23190.71 |
| Cost of production (Rs/qtl.)     | 535.14           | 537.66   | 563.59   | 603.27   | 557.86   |
| Profit margin (Rs/qtl.)          | 264.85           | 262.33   | 236.40   | 196.72   | 242.13   |

Source – Survey Data

Figures in brackets are percentages of the total.

The Profit per hectare obtained by the marginal farmers was more than the other categories of farmers in the study area which were due to better farming practices. when we examine the per quintal cost of production of Paddy crop then we found that the semi- Large and Large farmers were spending relatively large amount of money on field preparation, planting, seeds, fertilizers and on harvesting for producing one quintal of Paddy than other categories of farmers.

The profit margin on marginal, small, Medium, Large was Rs. 264.85, Rs. 262.33 Rs. 236.40, and Rs. 196.72 respectively. It is clear from the study that as the size of farm increase the cost of crop production decreased. The farm size and cost of production of paddy crop has direct relation with each other

and due to the lowest cost of production among all farm size groups the marginal farmer having highest profit of Rs. 39851/ha in case of Paddy crop and the profit was also found to be highest in case of marginal farmers. On an average farmers having the profit of Rs. 37064.75/ha from the Paddy cultivation.

#### Income analysis and Benefit Cost Ratio in different size groups

Income analysis explains the income from farm on various components like farm business income, family labour income, net income and farm investment income. Benefit cost ratio explain benefit ratio on farm towards cost.

**Table 4:** Income analysis and Benefit Cost Ratio of Paddy Number of Respondents=240 M S M L= 140+ 60+25+15 =240

| Particulars            | Marginal | Small    | Medium   | Large    | Over all |
|------------------------|----------|----------|----------|----------|----------|
| Farm Business Income   | 41518.24 | 39438.87 | 36302.55 | 32104.63 | 37367.46 |
| Family Labour Income   | 33301.24 | 31193.87 | 28004.55 | 23855.63 | 29115.21 |
| Net Income             | 25895.96 | 24989.65 | 22726.60 | 19034.49 | 23190.71 |
| Farm Investment Income | 34112.96 | 33234.65 | 31024.60 | 27283.49 | 31442.96 |
| B C Ratio              | 1: 1.73  | 1: 1.72  | 1: 1.65  | 1: 1.56  | 1: 1.67  |

Source: Survey Data

Figures in brackets are percentages of the total.

#### Summery and Conclusion

The major findings of this study revealed that the overall cost of cultivation of Paddy was Rs. 34537.28/ha from the total cost of cultivation. Where in marginal farm size group its Rs. 35148.03/ha small farm size groups Rs. 34410.34/ ha, Medium farm size groups Rs. 34869.39/ ha and in Large farm size groups Rs. 33837.50/ha. The overall return from paddy from different size groups is Rs. 57728/ha. the gross return from marginal, small, semi-medium, and medium farm size group is Rs. 61044/ha, Rs. 59400/ha, Rs. 57596/ha, Rs. 52872/ha. The overall farm business income, family labour income, net income and farm investment income of paddy was Rs. 37367.46, Rs. 29115.21, Rs. 23190.71, Rs. 31442.96 respectively. Overall Benefit cost ratio of the study area was 1:1.67.

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