SHORT COMMUNICATION

Medium land rice production in Puri district of Odisha: an economic analysis

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ABSTRACT

Rice is a staple food in Odisha as it is grown on an area of 4.4 million hectares. In the context of higher demand for rice, any strategy that would produce higher yield with less cost is the need of the day. The general objective of the study is to find the economics of production of rice emphasizing on benefit cost ratio. A study was conducted in Puri district of Odisha to find out the cost, return, farm and resource use efficiency of rice in the year 2015-16. A multi-stage random sampling method was used to draw the sample. Primary data was collected from 60 respondents, consisting of 20 marginal, 20 small and 20 large farmers. It was found that, the total cost on an average Rs. 14041.15 in all farms out of which total variable cost Rs. 11048.9 of which marginal farmer, small farmers and large farmers expended Rs. 9940.50, Rs. 10029.91 and Rs. 13175.99 respectively that was 78.60% of total cost. Total fixed cost was Rs. 2992.25 out of which marginal farmers, small farmers and large farmers expended Rs. 2613.10, Rs. 3088.67 and Rs. 3275.00 respectively which was 21.32% of total costs. Yield of rice was highest in case of large farms i.e. 20.58 q/ha followed by small farms 16.45 q/ha and marginal farms 14.00 q/ha. On an average, the total revenue was Rs. 42842.67 for all farms, out of which marginal, small and medium farmers got the net return of Rs. 41354.00, Rs. 27132.40 and Rs. 60041.60 respectively. Benefit cost ratio was 2.27 for all farms. Labour, machine, fertilizer and pesticide are under utilized where as manure is over utilized in the study area. Insufficient capital is important production problem in the study area. Suitable funding agency is also a lacuna in the area. Government should provide more subside to the marginal and small farmer as it is given upto 25% of the cost of plants and machineries in case of rice.

Key words: *Rice, Production, Cost, Return, MVP*

Rice is one of the important food crops in the world and ranks second in terms of area and production. It is the staple food for 50% of the population in Asia, where 90% of the world's rice is grown and consumed. Asia's food security depends largely on the irrigated rice fields, which account for more than 90% of the total rice production and India has the largest area under irrigated rice responsible for 30% of globe (FAO, 2006). There is a growing demand for rice due to growing population. It was estimated that rice demand by the year 2010 will be of 100 million tonnes in India. To assure food security in the rice-consuming countries of the world, rice production would have to be increased by 50% in these countries by 2025 and, this additional yield will have to be produced on less land with less usage of water, labour and chemicals (Devi and Ponnarasi, 2009).

Rice is grown under diverse ecosystems and a wide range of climatic conditions. Classification of rice lands on the basis of some dominant factors like soil, water, climate influencing rice productivity is essential to make variety development and formulation of package of practices. It will improve communication with the rice growers and among the rice researchers (Mohanty et al., 1995). In Odisha rice is synonymous with food; agriculture in Odisha to considerable extent means growing rice. Age-old social customs and festival in Odisha have strong relevance to different phases of rice cultivation. The total food grain production has generally been fluctuating i.e. at increasing trend. It

was 82.98 lakh tones in 2014-15 as compared to 75.5176.19 lakh tones in 2010-11 (GOO, 2010). Paddy still constitutes about 90% of total production of food grains and continued to be the dominant crop in Odisha. The productivity of paddy was found stagnate over a period of time. The major reasons were rational way of cultivation, dominance of local varieties in any type of land, lack of infrastructural facilities and irregular marketing which make paddy cultivation unprofitable. Majority of paddy lands in Odisha is medium types. Whether paddy cultivation is profitable or not in medium land, a study is needed. In Puri district, staple food is rice and land is mostly medium type. Hence, the present study covers the paddy production and it's economics with the problems faced by the farmers in the Puri district. This investigation suggested possible corrective measures to bring about the desired improvement in paddy production.

A multi-stage purposeful and random sampling method was used to collect the data. The main purpose of the study was to know about the rice production variability according to the land type. At first stage, purposefully selecting the district, Puri and second the Block, Nimapara. The list of GPs prepared and five GPs were selected at random. From the five GPs, five villages and from five villages, 60 farmers were selected at random. In the study, cost concept was used. These were as follows:

Variable cost: Cost of seeds, manure, fertilizer, human labour, machine, pesticide etc.

Fixed cost: Rental value of land, interest on fixed capital, depreciation etc.

Total cost (TC) = Total variable cost (TVC) + Total Fixed Cost (TFC)

Gross farm income: Gross farm income was estimated at prevailing market prices of main product and bi-product at the time of harvest.

Cost	Items of the costs included
Cost A1	Seed, Manure, Fertilizer, Human labour, Hired labour, pesticides etc.
Cost A2	Cost A1 + rent paid for leased in land
Cost B1	CostA1 + interest on fixed capital
Cost B2	Cost B1+ rent paid on leased in land+ rental value of owned land
Cost C1	Cost B1+imputed value of family labour
Cost C2	Cost B2+ imputed value of family labour

Net farm income: It is calculated by deducting total cost from gross farm income

Farm business Income: It is the disposable income that includes retunes to family labour, owned land, owned fixed capital and management.

Family labour Income: It is the income of family labour (including management).

Return over cost: It was estimated by dividing gross income to the total cost

Cost ratios

Gross ratio: It is the ratio of total expenses to gross income.

Fixed cost ratio: It is the ratio of fixed cost and the gross income

Return over variable capital: This was calculated by deducting operational cost (TVC) from gross farm income.

Resource use efficiency

To examine resource use efficiency a log-linear multiple regression analysis was conducted in which per hectare gross income (Y_i) was regressed with manure (X_1), fertilizer (X_2), labor (X_3). Machine (X_4) and pesticide (X_5) From the regression result only significant variables were considered for resource use efficiency.

$$\ln Y_i = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + U$$

The significance difference between MVP of resource and their acquisition cost was tested using following 't' test.

$$t = \{(MVPx_i/Px)-1\} / S.E \text{ of } MVPxi$$

Where,

S.E of MVPxi = S.E of b_i. MVPxi

MVPxi = bi (Y / X_i)

Variable cost

The variable cost is the expenses incurred on variable resources like labour, seeds, manure, fertilizer, pesticides and interest on working capital which varies with production levels. It was observed from the Table 1, that the total variable cost per hectare Rs. 11048.90. Per hectare variable cost of marginal farmers, small

Table 1. Composition of variable cost in different categories of farm holdings (Rs/ha).

Particulars	Marginal farmers	Small farmer	Large farmer	All farms
Seeds	281.34	226.85	326.81	278.33
	(2.84%)	(2.27%)	(2.49%)	(2.52%)
Fertilizer	1357.01	1376.75	1956.35	1563.36
	(13.66%)	(1373%)	(14.85%)	(14.15%)
Labor	5758.56	6050.34	7400.02	6402.96
	(57.94%)	(60.33%)	(56.17%)	(57.95%)
Plant protection chemical	157.57	90.38	261.13	169.63
	(1.59%)	(0.90%)	(1.99%)	(1.54%)
Machine	777.85	639.85	1056.35	824.68
	(7.83%)	(6.34%)	(8.01%)	(7.46%)
Manure	958.50	990.04	1312.81	1087.10
	(9.65%)	(9.88%)	(9.97%)	(9.84%)
Interest on working capital	650.31	656.16	861.93	722.80
	(6.55%)	(6.55%)	(6.55%)	(6.54%)
Total variable costs	9940.50	10029.91	13175.99	11048.90
	(100.00)	(100.00)	(100.00)	(100.00)

farmers and large farmers were Rs. 9940.50, Rs. 10029.91 and Rs. 13175.99 respectively. The variable cost increases with the size of holding and the study was same as the study of (Churpal et al., 2015). The per hectare expenditure on labor was highest among all the inputs used which accounted about 57.95% of the total variable cost. The next important component was expenditure on fertilizer accounting for 14.15% of TVC. Per hectare expense on seeds was 2.51% of TVC. The expenditure on plant chemical and interest on working capital was Rs. 169.63 (1.54%) and Rs. 722.80 (6.54%) respectively. It was found that the expenditure on pesticide accounts least to the variable cost of rice in the study area.

Fixed cost

It was observed from Table 2 that the per hectare total fixed cost of marginal farmers, small farmers and large farmers were Rs. 2613.10, Rs. 3088.67 and Rs. 3275.00 respectively. The total fixed cost per hectare

for all farms was Rs. 2992.25. Rental value of owned land and depreciation were Rs. 2255.43 and Rs. 519.89 that were about 74.25% and 17.11% of total fixed cost. But least expenses were in case of land revenue *i.e.,* Rs. 21.17 for all farms that was 0.7% of the total fixed cost. Rental value of owned land was higher for large farms as compared to small and marginal farms. Depreciation was more for large and small farmers as compared to marginal farms because large and small farmers used their own machinery like thresher and sprayer.

Total cost, total revenue and benefit cost ratio

It was observed from the table 3 that total cost (TC) was highest for large farms. The TC consists of variable and fixed cost. Total variable cost constituted 78.60% and total fixed cost 21.32% of TC. The amount of fixed and variable cost increased with the farm size. The total cost on an average was Rs. 14041.15 of all farms. It was highest in case of large farm followed by small

Table 2. Composition of fixed cost in different categories of farm holdings (Rs/ha).

Particulars	Marginal farmers	Small farmers	Large farmers	All farms
Rental value of land	2121.67	2298.96	2345.67	2255.43
	(81.19%)	(74.44%)	(71.62%)	(74.25%)
Land revenue	18.56	19.77	25.2	21.17
	(0.71%)	(0.6%)	(0.77%)	(0.7%)
Interest on fixed capital	170.95	202.06	214.2	198.71
	(6.54%)	(6.54%)	(6.54%)	(6.54%)
Depreciation	301.93	567.88	689.10	519.89
	(11.55%)	(18.38%)	(21.04%)	(17.11%)
Total fixed cost	2613.10	3088.67	3275.00	2992.25
	(100.00)	(100.00)	(100.00)	(100.00)

Table 3. Cost return of rice in different farm size (Rs/ha).

Particulars	Marginal farmers	Small farmers	Large farmers	All farms
Total costs (TVC+TFC)	12553.6 (100.00)	13118.58 (100.00)	16432.99 (100.00)	14041.15 (100.00)
Total revenue (TR)	41354.00	27132.40	60041.60	42842.67
Benefit (TR-TC)	29250.40	14013.82	43690.61	29753.30
Benefit cost ratio (B:C ratio)	2.41	1.07	2.67	2.27

and marginal farms. that The per hectare yield of rice was highest in case of large farms 20.58 quintals followed by small farms (16.45) and marginal farms (14.12) quintals. The cost of production per quintal of rice was highest for large farms, Rs. 16432.99, followed by small and marginal farms (Rs. 13118.58 and Rs. 12553.60). On an average, the total revenue was Rs. 42842.67 for all farms. From the study, it was concluded that, rice cultivation is profitable, as profit is much more than expense in the medium land of Puri district. The study is as same as the result of (Mohandas and Thomas, 1997; Suneetha et al., 2013). Benefit cost ratio on an average was 2.27 for all farms where as it was highest for large farms followed by marginal 2.41 and small farm 1.07.

Farm efficiency measures in different farm sizes

Farm efficiency is the ratio of total expenses to gross income. It is a combined measure of profit making ability of the farm which expresses the percentage of the gross income consumed by the expenses and is therefore, indicative of absolute size of business. It

Table 4. Gross ratio, fixed ratio and operating ratio of different categories of farms.

Size group	Gross ratio	Fixed cost ratio	Operating cost ratio
Marginal farmers	0.29	0.178	0.821
Small farmers	0.48	0.235	0.764
Large farmers	0.27	0.200	0.805
All farm	0.10	0.232	0.844

*significant at 5% level of significance.

represents the profit margin of business as a whole. Farm efficiency measure includes gross ratio, fixed ratio and operating ratio. Table 4 indicated that gross ratio was highest for small farms (0.48) followed by large farms (0.29) and marginal farms (0.27). Fixed cost ratio was highest for small farms (0.235) followed by large farms (0.200) and marginal farms (0.178). But in case of operating ratio, it was highest for marginal farms (0.821), followed by large (0.805) and small farms (0.764), respectively.

Resource use efficiency in different categories of farms

The resource use efficiency of variable input (X_i) was examined by MVPx$_i$/Px$_i$ ratio. The MVPxi/Pxi ratio indicates optimum use of resource. In order to find out optimum use of resource, the difference of MVP and price ratio from unity is tested. A significant difference indicates sub-optimal allocation of resource. It was observed from the Table 5 that, there was sub-optimal use of labor, machine, fertilizer and pesticide as MVP of individual input is greater than the individual unit price. But, manure was over utilized as MVP of manure was less than its unit price. There was sub-optimal use of labour in case of maize in Chhattisgarh (Prusty et al., 2015). The result of the study was same as Ogunniyi (2008), that there was under utilization of resources like farm size, labor, fertilizer, chemical and seed for rice in Oyo state of Nigeria.

It was found that, the total cost on an average Rs.14041.15 per hector in all farms out of which total variable cost was more than 75% of total cost i.e.

Table 5. Resource use efficiency in different categories of farms.

Variable	Coefficients of elasticity	APP	MPP	Output Price (P$_y$)	MVP	Input Price (P$_x$)	Allocative efficiency (MVP/Px)
labor (man day)	0.26908	3.04	11.32	1197	2718.9	250	10.87
Machine (hour)	0.518	1.17	2.27	1197	2569.81	2000	1.77
Manure (tractor load)	0.159	2.21	.352	1197	421.36	1000	1.02
Fertilizer (kg)	0.333	28.25	9.40	1197	11262.06	250	45.04
Pesticide (liter)	0.143		43.64	1197	9905.75	2670	3.57

Rs.11048.90 and total fixed cost was Rs. 2992.25 was more than 20%. Rice business in the medium land of puri district is profitable as return is much more than total cost i.e. Rs. 42842.67. Benefit cost ratio also more than 2. All the factors of production are sub optimally used in the study area. Insufficient capital is important production problems in the study area. Government should provide more subside to the marginal and small farmers. Private funding agency is also essential in the study area.

REFERENCES

Churpal D, Koshta AK and Choudhary VK (2015). An economic analysis of rice cultivation and constraint in Dhamtari district of Chhattisgarh, India. Plant Archive 15(2): 651-656

Devi KS and Ponnarasi T (2009). An economic analysis of modern rice production technology and its adoption behaviour in Tamil Nadu. Agriculture Economics Research Review 22 (conference issue): 341-347

Economic Survey of Odisha (2010). Directorate of Economics and Statistics, Odisha online, http://desorissa.nic.in

FAO (2006). FAO Statistical Database, Online, http://apps.fao.org

Mohandas K and Thomas EK (1997). Economic analysis of rice production in Kuttanad areas of Kerala. Agricultural Situation in India 54(9): 555-560

Mohanty HK, Roy AT, Das SR and Bastia DN (1995). Rice research in Odisha: present position and future outlook. Directorate of Research, OUAT, Bhubaneswar, Odisha

Ogunniyi LT (2008). Resource use efficiency in maize production in Oyo states of Nigeria. Journal of Sustainable Development 1(2): 12-19

Prusty SR, Mohapatra U and Tripathy SK (2015). Economics of hybrid maize cultivation in Sarguja district of Chhattisgarh. Agricultural Science Digest 37(1): 56-59

Suneetha K and Kumar NL (2013). Cost and returns structure of paddy in Andhra Pradesh. Indian Journal of Research 3(5): 40-42