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Resource Use Efficiency of Mechanized Rice Farmers in Khammam District of Telangana State

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Abstract

Resource use efficiency of mechanized rice farmers in Khammam district of Telangana state, study examined that resource use efficiency of rice under different levels of mechanization in Khammam district of Telangana. In total district 120 farmers are selected as sample size. Two mandals, Kalluru mandal and Nelakondapally mandal has been selected. Data was collected through interview method. Farmers are categorized into different levels of mechanization. Coefficient of determination was 0.65, 0.68, and 0.71 for low, medium and high mechanized farms respectively. The returns of scale of the selected inputs were 1.25, 1.18 and 0.78 for high, low and medium mechanized farms respectively. It was also found that, farmers in the study area had scope to increase rice production by attaining full efficiency through reallocating the resources. It was suggested that, supply of inputs at fair price at time when required and an organized marketing system is essential for expanding the rice production in the country.

Keywords: Resource use efficiency, Returns to scale, Rice production and Inputs.

Introduction:

Rice (*Oryza sativa.L.*) is the most important and extensively grown food crop of India. It is staple food for more than half of the world's population and of paramount importance to Indian economy. In India, rice is grown in an area of 433.88 lakh ha with a production of 104.4 mt and in Telangana it is grown in an area of 104.6 lakh ha with a production of 304.7 mt tons (Ministry of Agriculture 2015-2016). To mitigate the needs of growing population, rice production should rise to 320 million tons by 2020. Agricultural mechanization is one of the critical inputs which not only facilitates timely completion of operations but also helps to

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combat labour scarcity, increases the production, productivity and profitability (Verma 2008).

Mechanization is the process of doing work with machinery. Mechanical aids, machinery, tools and implements are the components of mechanization, a technological improvement in agriculture. These technological improvements in Indian agriculture since mid sixties have brought about revolutionary increase in agricultural production. In the context of increasing commercialization of agriculture, mechanization also took a lead role in increasing agricultural productivity. The increase in the requirement of human and bullock labour for agricultural activities, rising wage rates and maintenance cost of bullock and shortage of labour in agriculture has increased the demand for mechanization of various agricultural operations. Improved farm implements and machinery are used for different farm operations to increase productivity of land and labour through timeliness of operations and efficient use of inputs. Mechanization is also needed for good quality of work. It also imparts capacity to the farmer to carry out farm operations, with ease, being free from drudgery, making the farming agreeable vocation for educated youth as well.

Mechanized farms are those in which operations like land preparation, sowing, transplanting, harvesting, threshing are mechanized. Mechanization as it relates to agriculture requires the study, manufacture, utilization, maintenance and repair of all tools, implements, machines, equipment and structures which will enable the farmer to raise the productivity of human labour economically (Kamruzzaman, 2009).

Mechanization possibility is strongly influenced by the farm size, cost of farm labour, availability of machines and energy. The farming system continues to utilize manual power, animal power and tractor power. In order to bring more land under cultivation and to improve productivity per unit area, it is necessary to use all sources of power like tractors, power tillers, oil engines, electric motors and renewable energy. In fact, the mechanization in India was driven by assured price to farmers for their produce (wheat and rice initially). The intensification of agriculture was assisted by higher inputs of farm power causing greater profitability of farming-generated surpluses that could be spent on capital equipment.

Due to rapid industrialization and large scale migration to urban areas labour is becoming increasingly scarce and also proving costly. This labour shortage during harvesting

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resulted in delayed harvest and consequent field grain losses. Mechanization of harvesting was the alternative solution (Manjunatha *et al*., 2009).

Material and Methods:

Khammam district will be purposively selected for the present study as there is large scale adoption of farm mechanization in major agricultural crop like rice. In this total district 120 farmers are selected as sample size. Two mandals, Kalluru mandal and Nelakondapally mandal has been selected in each mandal total 60 farmers are selected. Four villages from each selected mandal, in each village 15 farmers are selected by simple random sampling method. Primary data was collected using specifically designed and pretested questionnaires for farmers.

Functional analysis

In the present study, Cobb-Douglas production function was employed to estimate the resource use efficiency of crop inputs in selected farms. The Cobb-Douglas production function is linear in logarithmic form and is expressed in the following general form.

$Y = a\ x_1^{b1}\ x_2^{b2}.....x_n^{bn}$

$\log Y = \log a + b1\log X1 + b2\log X2 + ... + bn\log Xn$

In this case the function is expressed as

$\log Y = \log a + b1\log X1 + b2\log X2 + b3\log X3 + b4\log X4 + b5\log X_5 + b6\log X_6$

Where,

X1, X2, X3, X4, X5 and X6 are all parameters affecting the level of Y.

b1, b2, b3, b4, b5 and b6 are elasticity coefficients

'a 'denotes a constant

In the above equation:

Y= Gross returns (Rs/ha)

X1= Seed cost (Rs/ha)

X2= Human labour cost (Rs/ha)

X3= Machine labour cost (Rs/ha)

X4= Manures cost (Rs/ha)

X5 =Fertilizer cost (Rs/ha)

X6 = Plant protection chemicals charges (Rs/ha)

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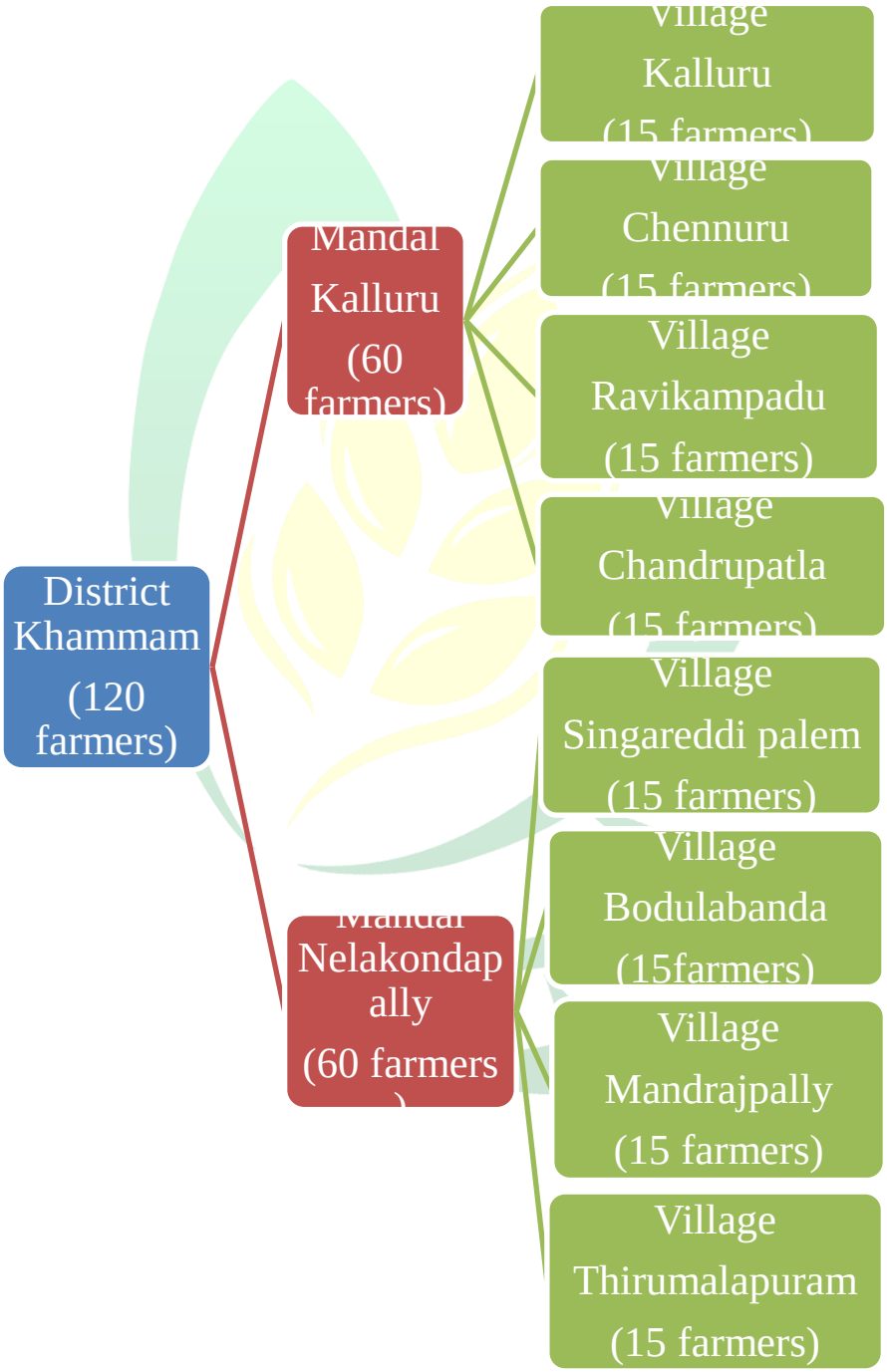
Thus, six independent variables and one dependent variable were selected for fitting the Cobb-Douglas production function.

Chart Showing Sampling



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RESULTS AND DISCUSSION:

Resource use efficiency of rice cultivation under different levels of mechanization

Production function analysis was used for estimation of functional relationship between farm inputs and output. The main objective of any production function analysis was to arrive at a specific judgement about the efficiency of various factors employed in the production process.

Among different types of production functions, Cobb-Douglas production function was selected for this study because of its relative advantages over the other production functions and its very wide usage in agriculture.

Cobb- Douglas production function can compute directly the percentage of change in output to one percent change in a particular input through the estimated elasticity coefficients. The results of Cobb-Douglas production function fitted for different levels of mechanization and pooled farms are presented in Table-1.

Resource use efficiency of Pooled farms

The coefficient of multiple determinations (R2) was 0.76 for pooled farms which indicates that 76 percent variation in gross returns was explained by the independent variables included in the model.

It was observed that elasticity coefficient of seed cost for pooled farms were 0.58 and significant at 10 per cent level. It can be inferred that one percent increase in expenditure of seed cost would lead to increase in gross returns by 0.58 per cent.

Elasticity coefficient of machine labour cost was 0.25 and significant at 10 per cent level. It can be inferred that one per cent increase in expenditure of machine labour cost would lead to increase in gross returns by 0.25 per cent. Regression coefficient of manures cost was -0.16 which showed that negative impact on gross returns. The sum of elasticities (∑bi) was 0.84 indicating decreasing returns to scale.

Resource use efficiency of low, medium and high mechanized farms

The coefficient of multiple determination (R2) were 0.65, 0.68, and 0.71 for low, medium and high mechanized farms respectively indicating that 66, 68 and 71 per cent variation in gross returns was explained by the independent variables included in the model

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In case of low mechanized farms, coefficient of seed cost was significant at 5 per cent level. It indicated that one per cent increase in the expenditure of this resource would lead to increase in gross returns by 2.19. The sum of elasticities (∑bi) was 1.18, indicating increasing returns to scale on low mechanized farms.

In case of medium mechanized farms, coefficient of seed cost was significant at 10 per cent level. It indicated that one per cent increase in the expenditure of this resource would lead to increase in the gross returns by 0.43. The sum of elasticities was 0.78 indicating decreasing returns to scale.

In case of high mechanized farms, coefficients of human labour cost (0.57) and machine labour cost (0.54) were significant at 1 per cent level. It can be inferred that one per cent increase in human labour cost and machine labour cost would increase the gross returns by 0.57 and 0.54 per cent respectively. The sum of coefficients was 1.25 indicating increasing returns to scale. These results were in accordance with the findings of Owombo *et al*. (2012).

Table -1: Resource use efficiency on rice farms of the sample respondents

S.No.	Particulars	Variable	Low mechanized farms	Medium mechanized farms	High mechanized farms	Pooled farms
1	Intercept	a	-5.00 (8.29)	4.71 (2.38)	-2.14 (2.5)	3.53** (1.04)
2	Seed cost	X1	2.19** (0.32)	0.43*** (0.09)	0.22 (0.20)	0.58*** (0.04)
3	Human labour cost	X2	-0.73 (0.63)	-0.14 (0.31)	0.57* (0.26)	0.15 (0.09)
4	Machine labour cost	X3	-0.18 (0.26)	0.66 (0.27)	0.54* (0.22)	0.25*** (0.06)
5	Manures cost	X4	-0.09 (0.20)	-0.16* (0.23)	-0.10 (0.20)	-0.16* (0.07)
6	Fertilizer cost	X5	-0.24 (0.28)	-0.11 (0.16)	-0.15 (0.22)	0.12 (0.08)

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7	Plant protection chemicals charges	X6	0.97 (0.67)	0.06 (0.25)	0.48 (0.41)	-0.07 (0.16)
8	Sum of coefficients	∑bi	1.18	0.78	1.25	0.84
9	R2		0.65	0.68	0.71	0.76

Note: Figures in parenthesis indicates the standard errors

* Significant at 1 percent level

** Significant at 5 percent level

*** Significant at 10 percent level

Conclusions & Implications:

Production resources in the study area were found not to be efficiently utilized to optimum economic advantage for mechanized rice farmers. Based on the result obtained it can be concluded that mechanized rice production is more efficient in resource utilization and subsequently more profitable. It is therefore, recommended that input such as fertilizer should be made available to the farmers by government. In addition, there should be policies to encourage the use of farm machineries to absorb the excess labour cost in rice production. It therefore, follows that increase rice production will be negatively affected, if government agencies do not made fertilizer available to farmer at subsidized rate and also encourage the less privilege into the use of farm machineries. This will enhance optimum use of resources with high returns over cost of production thereby improving the standard of living.

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