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Technical Efficiency in Gram Production of Amravati Division

KEYWORDS: Technical efficiency, Gram production.

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ABSTRACT *This study was designed to measure technical efficiency in gram production of Amravati division of Vidharbha region of Maharashtra state using a stochastic frontier production model. The sample of 75 Gram farmers were selected from which input-output data collected based on 2011-12 rabi cropping season. The results revealed that the technical efficiency of gram production range from 61% to 93% with mean 82%. Indicating the presence of 18% inefficiency. It implies that there is scope to increase the productivity of the farmers to the extent of 18%, if the gap between technology adopted and the technology recommended is minimized.*

INTRODUCTION

Agriculture being one of the major sectors associated with country's population has attracted much attention since independence. The first two decades after independence did not show much growth of agricultural sector. It was attributed to expansion of land, area sown under different crops and not by technological changes. Economic environment has changed through greater urbanization and planned agricultural development programs of the nation, with the introduction of new technology, high yielding variety seed, fertilizer, pesticides, labour saving devises and machines, improved cultural practices and additional irrigation facilities. The traditional equilibrium in agricultural is showing way to system of agricultural characterized by dynamic equilibrium.

Role of pulses in Indian agriculture needs hardly any emphasis. India is a premier pulse growing country. The pulses are an integral part of the cropping system of the farmers all over the country because these crops fit in well in the crop rotation and crop mixtures followed by them. In Maharashtra, during 2010-11 the area under chickpea was 13.95 lakh hectare whereas the production was 13.01 lakh tons. In Vidarbha during 2010-11 the area under chickpea was 3.65 lakh hectare and the production was 3.55 lakh tons. In Vidarbha Akola, Amravati, Yavatmal, Buldhana, Nagpur and Washim are the major districts which growing chickpea on large area. The present investigation aims to examine technical efficiency of various resources used in the production process of gram. In view of above investigation entitled "Technical Efficiency in Gram Production of Amravati Division" was undertaken with following objective.

To estimate the Technical efficiency in Gram production.

MATERIALS AND METHODS

The present study was carried out in Amravati division of Vidarbha region of Maharashtra state where Gram is the commonly grown as rabi season crop by the farmers. Amravati division comprises of five districts namely Akola, Amravati, Washim, Buldhana and Yavatmal.

The data of 75 cultivators were collected and compiled from Agriculture Price Cell scheme of the Agricultural Economics and Statistics, Dr PDKV,Akola. For the year 2011-2012 gram growers.

The selected farmers from the Amravati division are as bellow,

Table 1 district wise selected gram growers in Amravati division

Sr.no.	District	No. of Gram growers
1	Buldhana	14
2	Akola	18
3	Amravati	16
4	Yavatmal	13
5	Washim	14
6	Total (Amravati division)	75

Model Specification:

The Stochastic frontier, assuming a Cobb- Douglas specification was used to study the technical efficiency.

The model is written as fallows,

The Production Frontier Model:

Technical Efficiency of different resources will be worked out using the Stochastic -frontier production function. The Stochastic frontier, assuming a Cobb-Douglas specification, can be written as,

$$\text{Log } y_i = \beta_o + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + \beta_6 \log X_6 + u_i$$

Where,

$i = 1,2,\ldots,n$

Y_i= Output of wheat crop including main crop and by products (qts).

X_1= Seed including owned and purchased for sowing of crops in (kg/ha)

X_2= Human labour, including family labour and hired human labour (days/ha)

X_3= Bullock labour including owned and hired bullock labour (days/ha).

X_4= Machine labour including owned and hired machine labour (hrs/ha)

X_5= Nitrogen fertilizers applied in the farm in (kg/ha)

X_6= Phosphorous fertilizers applied in the farm (kg/ha)

u_i = Farm specific technical efficiency related factor

From the residual, using the equation the farm specific technical efficiencies were estimated.

The parameters of the model were estimated by the method of maximum Likelihood Estimates (MEL).

RESULTS AND DISSCUTION

Technical efficiency is a measure to quantity the extent of entrepreneurs' success to attain to maximum attainable pro-

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duce from a given set of inputs and given level of technology. It was estimated by using stochastic frontier production function. The maximum likelihood of the parameters of the stochastic frontier and Cobb-Douglas production function analysis of gram is presented in Table 2. It is revealed from the Table 2 that amongst the selected six variables could exhibit significant trend. The contributions explained by the five variables are positive. Frequency distribution of technical efficiency for 75 individual cultivators of gram crop in Amravati division (Table 3) shows that the variation of technical efficiency in the range of 61 to 93 per cent across all the individuals cultivators.

Table 2: Maximum Likelihood Estimates of Cobb- Douglas Stochastic Frontier Production Function of Gram crop in Amravati division.

Dependent variable : log y		
Sr. No.	Explanatory variables	Bi
1	Constant	-3.818605
2	Log seed rate	0.541699**
3	Log human labour	0.059582*
4	Log machine labour	0.044570*
5	Log bullock labour	0.055312*
6	Log nitrogen	-0.312013**
7	Log phosphorous	0.140087**
Log Likelihood		68.97
		λ=28.19(0.01)
		σ =0.67(3.87)
Variance of u		σ^2u=0.048
Variance of v		σ^2v=0.019
Average technical efficiency		0.82 (82 percent)

** Significant at 1 per cent level
* Significant at 5 per cent level

Table 3 : Frequency distribution of sample technical efficiency for 75 individual cultivators of Gram crop in Amravati division.

Efficiency index (per cent)	Number of cultivators
1.00-10.0	-
11.0-20.0	-
21.0-30.0	-
31.0-40.0	-
41.0-50.0	-
51.0-60.0	-
61.0-70.0	11 (14.66)
71.0-80.0	16 (21.33)
81.0-90.0	40 (53.33)
91.0-100.0	08 (10.66)
Total	75 (100)
Technical efficiency	0.82 (0.18)*
Allocative efficiency	0.90(0.10)*
Economic efficiency	0.74 (0.26)*
Maximum of technical efficiency among selected farmers	93 %
Minimum of technical efficiency among selected farmers	61 %

Note: Figures in parentheses indicate percentage of farmers to total farmers.

* figures in parentheses indicate inefficiency levels.

The result indicates the variation of technical efficiency in the range of 60-100 per cent across all the individuals' cultivators. The maximum and minimum technical efficiencies in the selected samples where 93 per cent and 61 per cent respectively.

In our sample of 75 cultivators, 08 (10.66 per cent) had a technical efficiency in the range of 91 to 100 per cent. Nearly about 40 (53.33 per cent) of the total sampled farmers exhibited technical efficiencies in between 81 to 90 per cent.

Remaining other samples, 16 (21.33 per cent) and 11 (14.66 per cent) had a technical efficiency in the range of 71 to 80 and 61 to 70 per cent respectively. The average technical efficiency for the entire sample of farmers is 82 per cent, indicating the presence of 18 per cent inefficiency. It implies that there is scope to increase the productivity of the farmers to the extent of 18 per cent, if the gap between technology adopted and the technology recommended is minimized.

There prevails an allocative inefficiency to the extent of 18 per cent among average farmers in comparison with the "Best Farmers" who obtained maximum yield.

It's important implication is that an average farmer's productivity can increased to the extent of 18 per cent of his prevailing productivity is being persued to follow the resource allocation pattern followed by the best farmers. As regards economic efficiency, it can be concluded that 26 percent farmers are economically inefficient. It implies that there is scope to increase the 26 percent economic efficiency of the selected gram growers.

CONCLUSION

The results of the study revealed that technical efficiency in gram production of Amravati division of Vidarbha region of Maharashtra state range from 61% to 93% with a mean of 82%. This means that there are substantial opportunities to increase productivity and income through more efficient use of productive resources.

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