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Technical Efficiency in Wheat Production of Amravati Division

KEYWORDS: Technical efficiency, Wheat production

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ABSTRACT *This study was designed to measure technical efficiency in wheat production of Amravati division of Vidharbha region of Maharashtra state using a stochastic frontier production model. The sample of 81 Wheat farmers were selected from which input-output data collected based on 2011-12 rabi cropping season. The results revealed that the technical efficiency of wheat production range from 66% to 96% with mean 85%. Indicating the presence of 15% inefficiency. It implies that there is scope to increase the productivity of the farmers to the extent of 15%, if the gap between technology adopted and the technology recommended is minimized.*

INTRODUCTION

Agriculture and allied activities are important in state economy as about 65 % population is depend on it. Within the Agriculture, cereal crops occupy the commanding position in the economy of our country and Maharashtra is no exception to it. The production of wheat is 94.88 million MT in 2011-12. The productivity of wheat which was 2602 kg/ hectare in 2004-05 has increased to 3140 kg/hectare in 2011-12. (Source: FAO STAT and IGC reports) In Maharashtra in the year 2011-12 area under wheat was 84 million hectares, Production 1.31Million Tonnes and productivity 1558 Kg./ Hectare The present investigation aims to examine technical efficiency of various resources used in the production process of wheat.

In view of above investigation entitled " Technical Efficiency in Wheat Production of Amravati Division" was undertaken with following objective.

To estimate the Technical efficiency in Wheat production.

MATERIALS AND METHODS

The present study was carried out in Amravati division of Vidarbha region of Maharashtra state where Wheat 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 81 cultivators were collected and compiled from Agriculture Price Cell scheme of the Agricultural Economics and Statistics, Dr PDKV,Akola. For the year 2011-2012 wheat growers.

The selected farmers from the Amravati division are as bellow,

Table 1 district wise selected wheat growers in Amravati division.

Sr.no.	District	No. of Wheat growers
1	Buldhana	17
2	Akola	12
3	Amravati	13
4	Yavatmal	15
5	Washim	24
6	Total (Amravati division)	81

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 produce from a given set of inputs and given level of technology. It was estimated by using stochastic frontier production function. Wheat is the most preferred cereal crop in day to day consumption. The maximum likelihood of the parameters of the stochastic frontier and Cobb-Douglas production function analysis of wheat 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 81 individ-

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ual cultivators of Wheat crop in Amravati division (Table 3) shows that the variation of technical efficiency in the range of 66 to 96 per cent across all the individuals cultivators.

The minimum and maximum technical efficiencies in the selected samples where 66 per cent and 96 per cent respectively. In sample of 81 cultivators, 37.03 per cent had a technical efficiency in the range of 91 to 96 per cent. Nearly about 35.80 per cent of the total sampled farmers exhibited technical efficiencies in between 81 to 90 per cent. Remaining other samples, 20.98 per cent and 6.17 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 0.85 i.e. 85 per cent, indicating the presence of 15 per cent inefficiency. It implies that there is scope to increase the productivity of the farmers to the extent of 15 per cent, if the gap between technology adopted and the technology recommended is minimized.

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

Dependent variable : log y		
Sr.No.	Explanatory variables	Bi
1	Constant	-0.68
2	Log seed rate	0.46**
3	Log human labour	0.03*
4	Log machine labour	0.14**
5	Log bullock labour	0.12**
6	Log nitrogen	0.07**
7	Log phosphorous	- 0.26**
Log likelihood		124.78
		λ = 42.37(0.035)
		σ = 0.65
		σ^2u=0.083
variance of u		σ^2v= 0.037
Variance of v		
Average TE		0.85(85%)

** Significant at 1 per cent level

* Significant at 5 per cent level

Table 3 : Frequency distribution of sample technical efficiency for 81 individual cultivators of Wheat 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	05 (6.17)
71.0-80.0	17 (20.98)
81.0-90.0	29 (35.80)
91.0-100.0	30 (37.03)
Total	81 (100)
Average Technical efficiency	85% (15)*
Maximum of technical efficiency among selected farmers	96 %
Minimum of technical efficiency among selected farmers	66 %

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

* figures in parentheses indicate inefficiency levels.

CONCLUSION

The results of the study revealed that technical efficiency in wheat production of Amravati division of Vidarbha region of Maharashtra state range from 66% to 96% with a mean of 85%. This means that there are substantial opportunities to increase productivity and income through more efficient use of productive resources.

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