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Economic Evaluation of Maize Production in Kohgiluyeh and Boyer-Ahmad Province (Case study of Gachsaran city)

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ABSTRAT: The aim of research iCTs study of economic maize production in Kohgiluyeh and Boyer-Ahmad (Case study of Gachsaran city). Data and information needed for have been gathered from the crop year of 2008-2009 that with sample random sampling of 120 Gachsaran city's planters of maize through questionnaires and interviews. Estimating and analysis of Cobb - Douglas and Transcendental Production Functions, and with test of an excellence model, the Cobb - Douglas was chosen as the top model. The results showed that farmers use cultivation inputs, seeds, chemical phosphate fertilizers, potash and urea herbicide spraying pesticides, irrigation frequency and machines in the second economical region, and other inputs including pesticides, pesticides, manure and labor are used in the third economical region. Returns to scale ratio was calculated equivalent to 1.46 and indicates that if all inputs affecting output be k , the production increases over k times. Calculation of technical efficiency of maize cultivation showed that the mean technical efficiency using stochastic frontier production function of cultivated corn is 97%, and show that with improved management, technical performance can be increased only by 3%. So to increase the production, new technology should be entering into the area.

Key words: production function, returns to scale ratio, technical efficiency, maize, Kohgiluyeh and Boyer-Ahmad

INTRODUCTION

Due to population growth and high lives of people around the world and they also need more livestock, corn alone as a main source of food for humans and much of their food is an important livestock and poultry. This plant has high strength and adaptation to different climatic conditions, can be grown in most tropical and cold weather. In some countries, such as Iran wheat is the main food of people, but in other countries, because of the short growing period and higher corn yield, is the main source of food for people and livestock sector (Khodabandeh, 2005). Economically, the area under maize cultivation and consumption in recent years in most countries increased rapidly from 1984 onwards due to the importance of the product in the today world with had higher growth (Khodabandeh, 2005).

According to the latest data released by the provisions of FAO in 2007 , about 158 million hectares of corn acreage and value of production totaled 780 million tons, after wheat and rice, has the third rank (FAO Census Center). The main maize-producing countries in the world in recent years include: America, Argentina, Brazil, Colombia, Mexico, Romania, France, Hungary, Yugoslavia, Indonesia, Turkey, China, Philippines, India, Tanzania, Kenya Zambia and Malawi.

Cultivation of this plant a few years ago was not so common, a lot of attention in recent years due to the fact that livestock and poultry, and also because ranchers and farmers welcomed the eggs and broiler chickens transition, and ranchers foster ongoing dairy and beef cattle, and on the other hand, requiring the many industrial even drug product processes of the plant, the acreage has increased rapidly (Khodabandeh, 2005).

Kohgiluyeh and Boyer-Ahmad province, due to favorable climatic conditions is a best production location for corn. Actual and potential risk of using the facilities available in feed in corn production, the production could increase with an increase in yield per hectare. According to the latest data released by

Agriculture Organization of the Province in crop year from 2006-2007 corn acreage in the state was about 2700 hectares, which out of this amount, approximately 2,381 hectares are for the seed corn, and major the acreage of approximately 1,600 hectares in the city of Gachsaran. Corn production in the province is estimated at 17,475 tons, of which about 14,000 tons of corn produces about 80 percent of it is the Gachsaran city (Agriculture Organization data center of province)

Table 1. Cultivation, production and yield of maize to different continents in 2007

Continent	Oceania	Europe	America	Africa	Asia
Cultivation(Million hectares)	0.1	14	66	29	48.7
Percent of the world	0.05	8.9	41.9	18.4	31
Production (million tons)	0.6	69	452	51	213
Percent of the world	0.08	8.8	57.3	6.5	27.1
Yield (tons)	6.7	4.9	6.8	1.8	4.4
The world	1.4	0.98	1.4	0.4	0.78

Source: www.fao.org

Thus, given the economic importance of this crop in the country and the economy of farmer household, corn production in this study is the economic in Gachsaran for maize production in the region is important. Using information obtained from farmers and analyzing them under conditions, corn production functions should be an estimate, and the impact of production on the production rate, production elasticity and technical efficiency of corn were planted, and the influence of socioeconomic factors on technical efficiency of maize cultivation were studied.

About the factors of production and technical efficiency of farmers, many studies have been conducted within and outside the country. Since the production and technical efficiency in maize in relation to a study has been done, so some of the studies that have been done in similar products, it is pointed out (Muhaddes Hosseini & Yazdani 1996), the economic efficiency of rice farmers in the Mazandaran province have different rice cultivars. The results of their study are that the technical performance of long grain rice quality, and lower amount but most of it is full of long grain rice, and the highest value has high quality medium grain rice, rice farmers are to be given the vote, while the least efficient allocation of labor and the product was full of long grain rice. (Turkamani & Shirvani 1997), using data collected from 50 of planter beets in Fasa city determine the frontier production functions and technical efficiency of farmers who have studied in the estimation. The results showed that using a deterministic frontier production function, technical efficiency is calculated, and increased production of beet by improving technical efficiency is possible, but the results of the stochastic frontier production function represents an estimate of technical efficiency.(Rahmani 2001) study technical efficiency and its determinants in cultivated wheat suppliers in Kohgiluyeh and Boyer-Ahmad province review. Results showed that the level of technical efficiency of the farmers with other farmers' efficiency is very different, and on the other hand, potential increase in city of Kohgiluyeh and Boyer-Ahmad was 41%, in Do-Gonbadan city was 33%. (Norouzi Mehrian 2007), study the production function and technical efficiency of rice cultivation in the Kohgiluyeh and Boyer-Ahmad province and after estimating two functions of Cobb - Douglas and transcendental reviews, then Cobb - Douglas was selected as the best model. The results showed that the production elasticity of capital inputs, seed, fertilizer, machinery, labor, acreage and water, respectively are 0.102, 0.147, 0.039, 0.181, 0.552 and 0.183. Results from the final model showed that the least efficient estimation of technical efficiency of rice farmers is 3/33% and a maximum efficiency is 100%. These are great difference between the minimum and maximum technical efficiency shows that there is still production increased significantly. (Ali and Chaoudri 1990), study efficiency of farms in four districts of Pakistan's Punjab province. Per one of the areas of products, cotton, rice, sugarcane are planted or a combination of them. Their potential frontier production functions for crop year from 1984 to 1985 have been estimated. Results showed that the technical efficiency of farmers in different regions, there is no significant difference between low economic efficiency of farmers due to their low efficiency. (Bravo, Aurta and Aunson 1994), using the stochastic frontier production function, study efficiency of rural farm in East Paraguay cotton and cassava products. The results suggest that there is potential to increase profits with current technology, and instead increase the acreage can be increased technical efficiency. (Batis et al 1996) study wheat farmers in four districts of technical inefficiency of Pakistan. Average performance in these areas was 78.9, 58.4, 57 and 77.5%. The results also showed that age, education, family males working have a positive effect on efficiency. (Anonymous and colleagues 2004), have investigated the factors affecting Cameroon's forest farmers and farm technical efficiency in the system, including corn, peanuts, grain, and peanuts using stochastic frontier production function Cobb - Douglas. Model variables include acreage, labor, production costs, production of seeds and tools, and the farm have a total of 450 observations. The mean technical efficiency of 77 subjects, respectively have achieved 73 and 75. Education, distance to roads, soil quality, membership in agricultural associations, and liquidity, the determinants of technical efficiency. (Tingly, Pasko and Kooglan 2005), have studied the factors affecting technical efficiency in a fishery channel in the England. The results showed that fishing time, staff skills, and use of appropriate technology have a significant effect on technical efficiency.

(Hanson and Ohlmer 2008) have studied technical efficiency of dairy farms in Sweden to evaluate operating procedures. Results showed that participation in classes, employing techniques suitable for livestock feed, and apply the principles of health, have a positive impact on technical efficiency. (Kahind, Avioumi, Omenna and Akand 2009), have investigated technical efficiency of wood factories in Osan and Onod of Nigeria. The data from the two-stage sampling of 170 mills producing wood is collected. The researchers estimate the production function using ordinary least squares, the effects of various factors on the production of wood. The results showed that the technical efficiency of wood mills and medium scale over small-scale factories.

MATERIALS AND METHODS

Used data has been gathered from a simple random sampling of fields of corn grown by completing the questionnaire from planter in 2007-2008. In this research, the study of maize farmers Gachsaran city formed research sample, and the share of agriculture in total production rate, a sample of 120 randomly selected maize of city selected.

To investigate how the production and consumption of inputs an estimate produce used. Production function list, table, graph or mathematical equation that represents the maximum amount of output that can be generated from any set of specific inputs, given the technology, or what "other conditions" permanent affecting. Appropriate way for analyzing of the relationship between outputs and inputs, is the production function form curve or math. In estimating the production function should choose a model that can also take into account variables, to satisfy the research objectives (Fergusen, 1997).

Important functions can be used in agricultural are production function Cobb - Douglas and transcendental. The Cobb - Douglas function developed in 1928 by Cobb and Douglas that for simplicity has many applications in agriculture. In this function, the elasticity of production inputs considered constant. Thus, the neoclassical production function cannot explain the three stages, and only able to determine the area of production. However, the generalized form of this function is the production of all three steps. Using this function Is simply type returns to scale can be efficiency of production factors, elasticity of substitution and the tension between production which can be determined. The general form of the function with n input variables are as follows:

$$Y = A \prod_{i=1}^{k} X_i^{\beta_i} e_i^{u_i}$$

(1)

which Y is production rate, X_i is production factors, β_i function parameters, and A is the intercept. Production elasticity of ith factor is equal to β_i, and this is the characteristic function of Cobb -Daglas function. Aggregate production function was first exalted by the Halter, Carter and Hakyng introduced in 1957. This function also has all properties are subject to the neoclassical, to describe the relationship of inputs - outputs in the production of agricultural products and agricultural research applications. The general form for the input variables to is as follow (Debertyn, 1997).

$$Y = A \prod_{i=1}^{k} X_i^{\alpha_i} e_i^{\beta_i x_i + u_i}$$

(2)

In this function, the independent variables in logarithmic form, the linear form of tuition is added to the model. This causes instability, tension and elasticity of substitution among production and so the value of the parameter for consumption is the dependent variable. Elasticity of production with respect to any of input is obtained from the following equation:

$$EP_{x_i} = \frac{MP_{x_i}}{AP_{x_i}} = \frac{dy}{dx_i} . \frac{x_i}{y} = \alpha_i + \beta_i x_i$$

(3)

To select the best model among these models, test F used as follows:

$$F = \frac{(R_{ur}^2 - R_r^2)/M}{(1 - R_{ur}^2)/(N-K)}$$

(4)

which R_{ur}^2 and R_r^2 are respectively determine the coefficient of the non-binding model (higher) and constrained model (Cobb-Douglas). M is the difference between two models, N is the number of estimated parameters, and K is the number of variables in the model. If the amount of calculated F is smaller than from F from table, the model Cobb - Douglas is accepted. And if calculated is larger from F of table, the transcendental model will be accepted (Gujarati, 1997).

Technical Efficiency

Efficiency was first proposed by Farrell in 1957. He produced the performance of a high enough output from a given amount of data, takes upon all data and output correctly. He divided economic efficiency into two components, technical efficiency and allocation efficiency. On defined by Farrell, technical efficiency is the maximum possible output from a given amount of production factors which can be achieved. The allocation efficiency is to apply a combination of factors that cause costs to produce a certain amount of product, and will lead to maximum profits with the present methods. Economic efficiency is the ability to obtain the maximum benefit manufacturing firms may have with respect to prices and input levels.

For measuring performance, it is necessary to estimate the frontier production function. Farrell (1957) noted that estimates of the frontier production function as a standard for comparison with other manufacturing firms is not an easy task, and is optimistic merely an estimate of. If you need to generate more than two inputs, the production function of the geometry boundary problem, so economists have different methods for estimating the frontier production functions suggest that can be classified in the three ways of Maximum Likelihood Estimation (MLE), Linear Programming (LP) , Corrected Ordinary Least Squares (COLS). Corrected ordinary least squares and linear programming methods are sensitive to the final observations, so there are several causes that mean the elimination of technical efficiency calculated by the two methods are significantly different. Most economists believe that the technique of stochastic frontier functions are estimated using the maximum likelihood estimation, will lead to better results (Batis and Cora, 1977). Farrell in 1957, using the production frontier was able to introduce a measure to assess performance. After Farrell, economists use two methods of Deterministic Production Frontier and the Stochastic Production Frontier attempted to calculate their performance. Deterministic production frontier approach using ordinary least squares estimate is revised and linear programming. Modified ordinary least squares method is superior to the ordinary least squares method of linear programming that it can be corrected value T and Standard Errors 10 obtained for each parameter.

Weaknesses of the two mentioned methods are that all deviations from the frontier production units due to lack of technical performance management factors that attribute. Stochastic production frontier approach was introduced by Schmidt, Lowell and Agner (1977) and the Miocene and Van den Brook (1977). The model has a production function with cross-sectional data is a disturbing element. What distinguishes it from other methods of the stochastic frontier approach is that a violation of this procedure is divided into two independent parts.

To introduce the method to generate a random boundary, consider the following stochastic frontier production function:

$$Y_{it} = f(X_{it}, \beta)\exp(\varepsilon_{it}) \quad (5)$$

which Y_{it} is Ith unit production in year t, F is proper function, X_{it} vector of inputs consumed Ith unit in year t, and β is vector of unknown parameters and ε_{it} is residual term which including the two independent components consists of the following:

$$\varepsilon_{it} = U_{it} + V_{it} \quad (6)$$

V_{it} is different from the random variations due to factors beyond our control such as weather, the farmer is in the can. It has a normal distribution with mean zero and variance δ_V^2. $\left[V \sim \left(0, \delta_V^2\right)\right]$ On the other hand, U_i is related to technical efficiency units and management factors are included. This component is a normal distribution with a range of unilateral $\left[u_i \sim \mu, \delta_u^2\right]$. The production value of the units is on the frontier production function, U_i is zero and the boundary curve for the production of units of production, U_i is greater than zero.

The variance of the error in relation to the production frontier is as follows:

$$\delta_s^2 = \delta_v^2 + \delta_u^2 \quad (7)$$

To determine the technical efficiency, Batis and Cora in 1977 have defined parameter γ as follow:

$$\gamma = \frac{\delta_u^2}{\delta_s^2} = \frac{\delta_u^2}{\delta_v^2 + \delta_u^2} \qquad 0 \le \gamma \le 1 \quad (8)$$

Whenever γ has not significantly different from zero, variance components, disrupting U_i is zero, and the difference between the units is related to factors that are beyond the control of farmers. In this case, non-technical efficiency will be the most accurate method of ordinary least squares method. Otherwise preference will be given power, the maximum likelihood is used.
In 1982, John Drew, Lovell, Matro and Schmidt in given the assumption that the V_i and U_i have obtained a measure of technical efficiency through the following formula.

$$E(U_i|E_i) = \frac{\delta_u \delta_v}{\delta_s}\left[\frac{f^*(E_i\lambda|\delta)}{1-F^*(E\lambda|\delta)}\right] = \frac{E_i\lambda}{\delta}$$

(9)

In the above equation, F^* is standard normal density function, and f^* is standard normal distribution function, and λ is ratio of δ_u and δ_r . Hence, the technical efficiency units can be calculated using the following equation:

$$TE = \exp[-E(U_i|E_i)]$$

(10)

Batis, Coelli and Kolbi in 1993 have presented a model where in addition to the allocation efficiency is considered, there is the possibility of the use of time series. This model has the following relation:

$$Y_{it} = X_{it}\beta + (V_{it} + U_{it}) \qquad i = 1,2,3,\dots,N \qquad t = 1,2,3,\dots,T$$
$$U_{it} = [U_i \exp(-\eta(t-T))]$$
$$U_{it} \sim N(\mu.\delta_u^2)$$

(11)

N is the number of observations, Y_{it} is Ith unit production in year t, X_{it} is vector of inputs consumed Ith unit in year t, β is vector of coefficients, V_{it} disruption of the random variable, U_{it} is technical inefficiency that represents non-variable. η and β both are estimated parameters.
While the restriction of $\mu = 0$ is considered, the model will change to the model of Piit and Lee (1981). If the restriction $T = 1$ is considered to be the model to the original model, which was introduced in 1977 by Agner et, and if the restriction is $\eta = 0$, the above model will change to model Batis, Coelli and Kolbi (1989). The level of technical efficiency in the model is assumed constant over time.
Using the software package of Frontier 4.1, which was produced in 1994 by the Coelli, all of these models can be estimated.
To select the appropriate model, the Generalized Likelihood Ratio Test is used.

$$\lambda = -2[\log \text{likelihood}(H_0) - \log \text{likelihood}(H_1)]$$

(12)

In the above equation, λ is the maximum likelihood ratio, H_0 is null hypothesis, and H_1 is against hypothesis.
In the next section we introduce the parameters that we assume to be applied to them:
γ : Indicates the status of the sentence is disturbing.
μ : is the mean disturbing sentences of u . It's being positive means double the normal distribution, and the distribution of zero indicates that one way is normal for such violation.
η : Indicates the changes in technology over time. The parameter can be positive, negative, or zero, respectively, which indicates ascending or descending labeled technical work and constant over time.
Assuming that it can be analyzed as follows:
A) Model without limitation: in this case, we allow each of the parameters η, μ, γ take the desired values.
B) $\mu = 0$: this represents the normal distribution is one way for such violation.
C) $\eta = 0$:this case shows that, compared to the neutral model, in this case, changes in technical efficiency over time is zero.
D) $\eta = \mu = \gamma = 0$: in this case, the disturbance variance would be zero, and therefore, all disputes between the units are due to factors outside the control of the farmer. Therefore, technical efficiency will be invisible.

RESULTS AND DISCUSSION

Cultivated area, production and yield of corn in different continents of the world and also the percentage of each of these variables in different continents in Table 1. According to the table, it is clear that Asia produces about 30 percent of the corn acreage is allocated. Iran is allocated about 0.13 of acreage and a

0.2% of global corn production to a small amount. Of course the average yield is about 7.5 tones, which is about 2 times the global average.

Based on available information, the amount of corn production in the crop year from 2006 to 2007 period was 2.3 million tons in, that Fars province produced 753,035 tons, about 31 percent of the country's corn production is allocated to the It also has the country is ranked first. Kohgiluyeh and Boyer-Ahmad province produced 17,475 tons of production is devoted to rank 15 in the country. Also on last information published, the corn yield at Iran in 2006-2007 is about 7698 kg per hectare per year. Among the provinces, Qazvin had the highest corn yield of 10808 kg ha 2006-2007. Kohgiluyeh and Boyer-Ahmad province with grain yield per hectare to 7339 kg per hectare has ranked 10 in the country (Census and Data Center of Ministry of Agricultural Jihad).

Table 1. Acreage, production and yield of corn according to continents in 2007.

Continent	Oceania	Europe	America	Africa	Asia
Cultivation(Million hectares)	0.1	14	66	29	48.7
Percent of the world	0.05	8.9	41.9	18.4	31
Production (million tons)	0.6	69	452	51	213
Percent of the world	0.08	8.8	57.3	6.5	27.1
Yield (tons)	6.7	4.9	6.8	1.8	4.4
The world	1.4	0.98	1.4	0.4	0.78

Source: www.fao.org

Table 2. Statistical indicators relating to inputs used in maize production in the study area

Input	Average consumption	Standard deviation	Maximum	Minimum
Cultivation (hec)	6	1.95	10	1.5
Seed (kg per hec)	23	4.25	45	10
Phosphate chemical fertilizer (kg per hec)	246	54.58	638	117
Potash chemical fertilizer (kg per hec)	152	31.97	300	99
Urea chemical fertilizer (kg per hec)	354	65.58	666	165
Toxic of pesticide (liters per hec)	1.8	0.55	6	0.71
Toxic of herbicide(liters per hec)	4.6	1.28	8.6	1.8
Animal fertilizer (kg per hec)	6640	1221.48	12666	3000
Irrigation frequency	23	1.81	27	19
Labor (day - Person per hectares)	47	6.66	54	27
Machinery (hour per hec)	7	2.02	10	4

Source: research findings

Table 3. Results of the estimation of the maize production Cobb - Douglas function in the study area

Variable	Coefficient	Significant level
Intercept	-3.994	0
Cultivation	0.033	0.0423
Seed	0.172	0.0102
Phosphate chemical fertilizer	0.17	0.016
Potash chemical fertilizer	0.135	0.0062
Urea chemical fertilizer	0.43	0
Toxic of pesticide	-0.002	0.0913
Toxic of herbicide	0.03	0.016
Animal fertilizer	-0.002	0.9562
Irrigation frequency	0.457	0
Labor	-0.01	0.7387
Machinery	0.049	0.0019
$\bar{R}^2 = 0.993472$	$D-W = 1.84$	$\text{sign } F = 0.000$

Source: research findings

Intermediate consumption, standard deviation, maximum and minimum amount of inputs used in the production of corn samples, are presented in Table 2., For review of factors affecting maize production in the study area, Cobb-Douglas production functions and higher estimation results show in Tables 3 and 4, respectively. After studying classical assumptions, ordinary least squares estimation methods such as variance, dissonance, and a model clearly disrupting the normal components of the two models, the estimated Cobb-Douglas function and Transcendental were compared using the test of a model of excellence. The results indicate that the Fisher statistic is less than the critical value of future computations, and the Cobb-Douglas production function was recognized as a top model. Given the estimated coefficients as a function of the elasticity of production with respect to the input. It be noted which operate all production inputs other than pesticide spraying, manure and labor are used in the third region, the inputs used to produce the financial district. Adjusted coefficient of determination also shows that 99 percent of total inputs in the production of changes in interest. Return to scale assumption was tested using the Wald test and determined that the function has increasing returns to scale, equivalent to 1.46 and it suggests that if all factors of production k be equal, the production will be $k^{1.46}$.

Table 4. Results of an exalted estimate maize production in the Gachsaran city

Variable	Coefficient	Significant level
Intercept	-3.45	0.194
Logarithm cultivation	-0.06	0.151
Logarithm Seed	0.81	0.0416
Logarithm Phosphate chemical fertilizer	-0.72	0.0164
Logarithm Potash chemical fertilizer	-0.26	0.1585
Logarithm Urea chemical fertilizer	1.06	0.0143
Logarithm Toxic of pesticide	0.103	0.235
Logarithm Toxic of herbicide	0.002	0.9702
Logarithm Animal fertilizer	0.056	0.76
Logarithm of the frequency of irrigation	0.614	0.5016
Logarithm Labor	-0.137	0.5057
Logarithm Machinery	0.072	0.3123
Cultivation	0.017	0.0473
Seed	-0.004	0.0799
Phosphate chemical fertilizer	0.0007	0.0036
Potash chemical fertilizer	0.0004	0.0302
Urea chemical fertilizer	-0.0004	0.0672
Toxic of pesticide	-0.0114	0.2544
Toxic of herbicide	0.0009	0.6383
Animal fertilizer	0	0.6509
Irrigation frequency	0.005	0.8864
Labor	0.003	0.5649
Machinery	-0.0006	0.7437
$\overline{R}^2 = 0.9937$	$D - W = 1.75$	$\text{sign } F = 0.000$

Source: research findings

Technical performance of study groups was calculated using deterministic frontier production function with the help of a software package of Frontier4.1. The software package is available in two models for performance estimation. In the first model, technical efficiency, regardless of socio - economic factors affecting technical efficiency is calculated. For this Technical efficiency is calculated to determine whether or not, should be tested several hypotheses. The test results of hypotheses are presented in Table 5. The table can be seen in the technical performance of this group of beneficiaries can be calculated. In other words, the difference in technical efficiency between farms due to random factors and uncontrollable factors, management has had little or no role.

Table 5. Technical efficiency hypothesis test of maize production in Gachsaran city with model 1

Assumptions	x^2 Computational	x^2 table	Result
$\gamma = \mu = 0$	13.1	5.99	Rejection
$\mu = 0$	0	3.84	Acceptance

Source: research findings

To investigate the effect of different factors on technical efficiency hypothesis should be tested. The first hypothesis tested is whether the factors affecting technical efficiency for the intercept. Other factors such as age, farmer technical efficiency furthermore, the rate of literacy, history, agriculture, and the number attending school were also tested.

Hypothesis test results showed that the technical efficiency of the factors affecting economic-social factors haven't significant impact on technical efficiency and only influenced by factors such as technical performance and operation time for planting and harvesting, plowing correct use of the right seeds, etc..

Table 6. Technical efficiency hypothesis test of maize production in Gachsaran city with model 2

Assumptions	x^2 Computational	x^2 table	Result
$\gamma = 0$	0	3.84	Acceptance
$\delta_0 = 0$	0	3.84	Acceptance

Source: research findings

Based on the assumption of the test and the final model, the average technical efficiency of farmers and distribution of technical efficiency abundance are calculated in Table 7. Based on the information in this table, the average technical efficiency of maize farmers against 97.6 percent of the work is obtained. The minimum varies from 86.1 up to 99.5. 42 percent of farmers have technical efficiency and 58 percent have less than average technical efficiency for higher than average. In general, the results of the study show that the improvement of management, can be increased only about 3 percent of the average technical efficiency of farmers. So to increase maize production in the study area it should seek to use new technology.

Table 7. Technical efficiency of maize cultivation in Gachsaran city

Technical efficiency (percent)	Abundance	Relative abundance(percent)	Relative cumulative abundance(percent)
≤97.651	50	41.67	41.67
> 97.651	70	58.33	100
Average:97.651	Amplitude:13.4	Minimum:86.098	Maximum:99.491

Source: research findings

Recommendations

According to the results of the estimation of the production function, farmers put all inputs except spraying pesticides, manure and labor are used in second district of production. In this case it is recommended that the management of the farmers to improve the factors in the production inputs used in second district of production so productivity of production factors also increasing.

The return rate to scale upward and equal to 1.46 obtained this can indicate that a marked increase in the proportion of all institutions, production increased more than the increase in inputs.

Although the results of the calculation of technical efficiency differences in technical efficiency for attributed to management factors, but with improved managerial factors can only be increased by about 3 percent. So it suggest that significant increases in the production of new technology into the study area.

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