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MEASUREMENT OF TECHNICAL EFFICIENCY USING DATA ENVELOPMENT ANALYSIS (DEA) METHOD CASE STUDY OF COLZA FARMERS OF MASJED SOLEYMAN CITY

*Mohammad Aghapour Sabbaghi¹ Jamshidi A.R.² and Maghsoudi T.¹

¹Department of Agricultural Management, Collage of Agriculture, Shoushtar Branch, Islamic Azad University, Shoushtar, Iran

²Department of Mechanization, Collage of Agriculture, Shoushtar Branch, Islamic Azad University, Shoushtar, Iran Agricultural

*Author for Correspondence

ABSTRACT

This study was aimed at calculating and comparing the technical efficiency of colza farmers of Masjed soleyman in two plains. This study is based on DEA, statistics and data were collected through completing 159 questionnaires in the crop year of 2011-2012. Results indicated that the average technical efficiency of colza farmers in Zilae and Golgir plains is 80% and 82%, respectively. In addition, average use of inputs in both plains was compared with the average optimum use of inputs. Given the current difference of using input with the optimum use, holding training-promotional programs to prepare the area to increase the farmers' technical efficiency is suggested.

Keywords: Data Envelopment Analysis, Technical Efficiency, Colza, Masjed Soleyman

INTRODUCTION

Efficiency is important in any economical sector to prevent wasting resources. This factor is important in the growth of production resources' productivity, especially in the developing countries (Breym, 2007). Quantitative analysis of production and optimum use of production resources in agriculture are the principals of agricultural policies seeking the increase of domestic production through optimum use of resources. Thus, given the possibilities and impasses in Iran's agriculture sector, the most appropriate way of production optimization is the increase of technical efficiency, or obtaining the maximum possible production from specific production factors. Generally, increase of efficiency can be considered as a suitable complementary for all policies, which encourage and preserve the domestic production and promote the optimum use of resources (Moradi Shahrehabak and Yazdani, 2005). Several studies were conducted on measuring efficiency, which used different methods. , Shafiee et al. (2006), Seydan (2003), Shirvanian *et al.*, (2006), Karbasi and Moazeni (1999), Moradi Shahrehabak and Yazdani (2005) are among the studies carried out on the calculation of agricultural products' efficiency. Colza is one of the most important oilseeds of the country so in this study, an input-oriented model was used to calculate the technical efficiency of Colza farmers in Masjed Solyman.

MATERIALS AND METHODS

Several methods have been used to evaluate the efficiency of production unit during the last 50 years, but there are two main methods to estimate the relative efficiency of production units, parametric and nonparametric methods. The nonparametric one is a data coverage method, which is a linear planning method and its preliminary model was first introduced by Farrell (1957). Then, Coelli (1995), Lingard *et al.*, (1983), and Battese *et al.*, (1996) stated complementary ideas concerning this method. Given the simplicity and clarity of this method and its easy calculation as well as the no necessity of the presupposition of discrete variable's effects in this method, it is used in the present study, as well (Emammybodi, 2000). Variables of the present study are the annual production in Kg, rate of chemical fertilizer in kg, rate of bestial fertilizer in ton, amount of chemical poisons in liter, hours of using the machinery, rate of colza seed in kg.

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RESULTS AND DISCUSSION

Results

In table 1, results of calculating the technical efficiency of Colza farmers are indicated. Results indicate that the maximum frequency of efficiency in the regions is between 80 and 90%, showing that most of producers are technically in a suitable situation. In addition, results indicate that there is a difference between the best and worst producers in terms of technical efficiency, and it shows that Colza is highly different due to the optimum resource allocation according to their price.

Table 1: Frequency and percentage of agriculture efficiency in Zilaae and Golgir plains

Plain Grope	Zilaae		Golgir	
	Frequency	percentage	Frequency	percentage
0-50	0	0	4	13.8
51-79	5	16.6	5	17.24
90-90	14	46.7	11	37.9
91-100	11	36.7	9	31.1

Reference: Study findings

Statistical characteristics of efficiency calculated for both plains are indicated in table 2. Average technical efficiency in Zilaae and Golgir plains is 80/7 and 82/5%, respectively.

Table 2: Efficiency statistics in constant return to scale

	Average	Standard Deviation	Min	Max
Zilaae Plain	80.6	0.140251	53	100
Golgir Plain	82.5	0.25708	49	100

Reference: Study findings

As indicated in the table above, average Colza production in Zilaae plain is more than Golgir. However, rate of using inputs such as machinery and Colza seed in Golgir plain is more than Zilaae, indicating that Colza farmers of Zilaae plain have a more optimum use of inputs.

Table 3: Compare between real and optimum inputs consumption

Plains Variables	Zilaae		Golgir	
	Real consumption average	Optimum consumption average	Real consumption average	Optimum consumption average
chemical fertilizer(Kg)	34.8	28.9	33.9	33.9
Bestial fertilizer(Kg)	138	217.3	115.1	139.3
Poison(Lit)	0.2	0.2	0.1	0.2
machinery (Hours)	7.3	7.2	5.3	6.9
Colza seed (Kg)	10.2	10.4	7.3	6.6

Reference: Study findings

One output of DEA is the rate of the lack of inputs and proposal of ideal integration of these inputs to reach the maximum efficiency. Since mentioning the optimum program of each enterprise is impossible due to the large number of stakeholders, average real consumption of inputs, which is extracted from the model, is compared in this section and the average rate of the lack of each input for Zilaae and Golgir plains are indicated in the following table. Results indicate that in Zilaae plain, inputs of machinery,

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poisons, and seed are used in an optimum level and chemical and bestial fertilizers were used more and less than the needed amount, respectively. But in Golgir plain, comparison of the actual and optimum consumption of inputs indicates that chemical fertilizer is the only input, which is sufficiently consumed and, except Colza seed which is over consumed, other inputs are less consumed.

Discussion and Suggestions

In the present study, technical efficiency of Masjed Soleyman`s Colza farmers was calculated. Evaluating the technical efficiency of the region`s farmers, they are at a high level of technical efficiency, which is 80/7% , so increase of Colza production through increasing the technical efficiency of farmers is possible. Thus, is suggested that new planting, growing, and harvesting technologies become the top policy of the government to increase this product. In addition, 55/3% difference between the maximum and minimum rate of technical efficiency of colza farmers indicates that there is a considerable difference between the region`s farmers, which can be reduced using different methods. For example, it is suggested that sample farmers with higher efficiency are introduced to other farmers so that farmers can be practically familiar with theses sample producers` programs of increasing the efficiency.

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