Journal of Environmental Sciences Studies

Journal home page: www.jess.ir

Investigation of Palm Gardens Random Performance in Kerman Province with Random Data Approach

Abdolreza Borjiabad[*1], Ahmad Ghanbari[2], Mohammadreza Asgharipoor[3], Mahmoud Ahmadpour Borazjani[4]

[*]1- PhD student in Agroecology, Zabol University

2- Professor of Agroecology, Faculty of Agriculture, Department of Agriculture, Zabol University

3- Associate Professor of Agroecology, Faculty of Agriculture, Department of Agriculture, Zabol University

4- Assistant Professor of Agricultural Economics, Faculty of Agriculture, Department of Economics, Zabol University

[*]Email Address: abdolrezaborji@gmail.com

Received: (19-02 -2020)

Accepted: (29-04 -2021)

Abstract

Iran is one of the major producing and exporting countries in the world. Due to the comparative advantage and importance of this product has in Bam in terms of production, landscaping and job creation, the economic study of this product plays an important role in the prosperity of the agricultural economy of the county and this region. Checking the performance of this product is a very important factor in increasing its production and performance, without the need for additional costs. The present study was conducted to determine the randomness of the experiment in the eastern region of Kerman province in 2017-2018 years. In this study, the average total technical efficiency of palm farms was calculated 63% for four counties; the minimum efficiency of the units belongs to the city of Narmashir. On the results, effective factors affecting the technical efficiency of palm trees are estimated significant in production units, that including coefficients of poisoning, water consumption, mixed cultivation, participation in training classes and investment. Suggesting that a one percent increase in investment would increase efficiency by 7.4%. It is expected that with increasing the variables of participation in educational classes, investment and cultivation (dates and other products), will increase the economic efficiency of the dates of production units of the study area. Other factor that was analyzed on efficiency were factors such as farmer's record, land size and chemical pesticides, which had no significant effect on the technical efficiency of the units.

JEL: Q1, D61, Q25, C82

Keywords

Date, Bam, Water Use Efficiency, Random Constraint

Introduction

In societies like ours, before the oil revenues, the national economy was based on agriculture, the only source of treasury and government spending. In the current era, despite the decreasing role of this sector in the economy, the study of the functioning of the economic sectors within the framework of the national macroeconomy still confirms the significant role of the agricultural sector. Because it contributes to providing employment and income to residents of the regions, and to balancing inequalities, GDP, meeting the consumption needs of the population, the national income and the value that is the basis of economic and national development. In emerging and transitional countries, agriculture plays a key role in consolidating its economic foundations. Since this economic sector is important in terms of supplying people's food needs, providing raw materials for industry, employment and income generation, stability and sustained growth can be considered as a major contributor to social stability and economic growth (Afrakhteh et al.,

2014).These issues clearly indicate that a fundamental and rapid change is needed to achieve date production through an ecologically and economically satisfactory method. Today, the need for sustainable resource management has led to the emergence of new methods for classifying resources under management. Today, the need for sustainable resource management has led to the emergence of new methods for classifying resources under management. Considering that the total per capita domestic resources of renewable water in the county are decreasing and agricultural products are dependent on this institution, considering the water efficiency debate has deep roots in agricultural studies. The application of fertilizers and chemical pesticides in agriculture has multiplied several times. The high utilization of these inputs to meet the needs of growing population has led to the cross-border production of fiber products to be moved upwards, which has resulted in many harmful environmental consequences. Chemical pesticides play an important role in the production of agricultural products in developing countries. These inputs have made it possible to harvest more than one hectare of agricultural land at a lower cost as well as increase the yield of labor and capital inputs (Mollaei et al., 2018). Based on the statistics provided by FAO (2017), the application of fertilizers (nitrogen fertilizer, potash and phosphate) and chemical pesticides are increasing. The challenge for researchers in this section is to minimize or remove these negative consequences for achieving cleaner environment for future generations, along with increasing productivity and efficiency through advanced technologies to reduce environmental pollution. Therefore, this research was conducted to evaluate the relative efficiency and factors affecting its efficiency by using the environmental performance model in Bam's date gardens. Efficiency is one of the most important factors in the growth of productivity, especially in the agricultural economy of developing countries. Efficient use of inputs in agricultural production can improve the quality and quantity of products, and, on the other hand, will have a significant impact on the continuation of the increase in income of agricultural units, Which will increase the living standards of farmers and the development of rural communities. Existing agricultural units, especially in developing countries, face shortages of resources and limited opportunities for the development and adoption of modern technologies. On the other hand, the excessive and uneven use of resources in order to increase the production of agricultural products has reduced the resources available in the agricultural sector into the past and faced agricultural units in the process of development with various challenges (Gomsen, 2008). Therefore, attention to the issue of efficiency in the agricultural economy of developing countries, including Iran, is important. The date product has a special place in Iranian agriculture due to its nutritional qualities and potential for value. Iran generated an estimated 1076000 tons worth of approximately 564410 thousand dollars in 2014, accounting for nearly 14 percent of the world's total, and ranked second in the world in terms of production (FAO, 2014). Among the cultivars produced in Iran, the Mazafati cultivar is considered to be the most important economic figure of the county after the Estemaran and Shahani, which Bam city is one of the important poles of production of Mazafati cultivar in Iran. The city of Bam has ranked first with production of 90313 tons of Mazafati dates per year in Iran (Agricultural Jihad, 2017). Considering that Iran is one of the major producer and date exporting countries in the world due to the relative advantages and importance of this product in terms of production, landscaping and job creation in Bam, economic evaluation of this product plays an important role in the prosperity of the agricultural economy of the county. Considering the shortage and limitation of production resources, one of the most efficient and effective methods for achieving economic growth and development in the agricultural sector, and especially date production, is the evaluation of the efficiency of agricultural production units of dates. Therefore, increasing the efficiency of palm production will help to reduce resource and production facilities to improve the weak economic infrastructure and restore the competitive position of this product (Tajik et al., 2011).Isfahani and Khazaee (2010) evaluated the efficiency of poultry units in South Khorasan province. By analyzing with EVIEWS software, the efficiency of the machine with a constant return to scale and a change to the scale of 0.9 and 0.93, respectively, and show a significant relationship between variables Experience, education, education, and the use of banking education.Khezimeh et al. (2017) studied the efficiency of profitability of broiler chickens and its effective factors by using the randomized production function approach and simultaneous estimation of profit inefficiency model in Sistan province poultry farms. The results showed that

the mean efficiency of sample poultry farmers was 54.27% and for 88.27% of the poultry farmers had a profitability of less than 80%. Based on the findings of the borderline function, the cost of one-day-old chicks, health services, feed and fuel, poultry age, poultry education, number of years of poultry experience, distance from the center of the city, level of equipment and number of production cycles per year have a significant effect Positive and meaningful performance benefits.Fathi et al. (2018) compared the energy and environmental performance of developing countries with favorable and unfavorable outcomes in competitive environments. Their findings showed that through the combined assessment model in all intended years China and Poland had maximum energy and environmental performance.Mollaei et al. 2018 in a study evaluated the environmental performance of input-oriented agricultural products and the effect of technology advancement and efficiency changes on the growth of productivity of agricultural sector of Iran in different provinces of the county. For this purpose, using the data envelopment analysis method and Malek Quist model, have been investigated the effects of changes in efficiency and technology on productivity growth during the period of 2005-2015. The results showed that the changes in efficiency have a dominant role in productivity growth and is low the share of technology changes. The findings also showed that is positive the effect of labor force changes on productivity growth and capital changes have little effect on the productivity of production factors.Ezillong et al. (2018) studied the measurement and decomposition of the overall environmental factors of China's green water industry by using the DEA-SBM model with undesired output. The results showed that most of the study areas have low environmental performance, which will be used to evaluate the biological efficiency of the Chinese industry to improve the productivity of China's green industrial water resources in order to save groundwater consumption. Rafiei and Amir Nezhad (2007) investigated the productivity of the factors of production and the effect of its constituent components on rainfed wheat cultivation in 10 provinces of the county over a two period in one year found that there was a significant correlation between productivity and technology changes in Khorasan province. However, there is no significant correlation between changes in productivity and productivity changes in this region.The importance of the discussion of the evaluation of the operation of palm plantations in the studied areas in relation to structural transformation is not overlooked by anyone. So that the palm garden, which lacks the efficient performance evaluation system, is essentially regarded as a unit of the patient. Because without a precise evaluation system, it is not possible to identify the strengths and weaknesses of the control process and, consequently, the improvement of performance.

Climatic and geographical characteristics of the location of the project

This research was conducted in the region of East of Kerman in the years of 2016-2017 and 2017-2018 years. The center of this region is geographically 58 degrees latitude and 29 degrees longitude at 1060 meters above sea level. The climate of this region is warm and dry, but due to its proximity to the desert, it has variable climate, which is sometimes the warmest in the summer and the coldest part of the county is reported in winter. Annual rainfall is an average of 68 mm.

Materials and methods

The absolute efficiency of the fields can not be seen alone. Therefore, to evaluate the efficiency, the efficiency of a field was measured relative to the other farm. Two main methods: parametric method and nonparametric method was used to estimate the relative efficiency of farms.

Nonparametric Approach to Data nvelopment Analysis

In this method, input data and product of each farm were used to construct a nonparametric generating boundary, In this case, all fields observed are placed on or under the coverage border. Therefore, the efficiency of each farm is compared to the efficiency of all farms in the sample. Data envelopment analysis models can be product oriented or inventive. In product-oriented models, the goal is maximum production based on a given amount of inputs, but in the inventive approach, the goal is to use the minimum input according to a given production level. The surface coverage of models (both product-oriented and inventive) can have constant returns relative to scale or variable yield versus scale (Norozian et al., 2019).

$$\min \theta$$

$$\begin{aligned} s.t. \quad & \sum_{j=1}^{n} \lambda_j x_{ij} \le \theta x_{io} && i = 1,2,\ldots, m \\ & \sum_{j=1}^{n} \lambda_j y_{rj} \ge y_{ro} && r = 1,2,\ldots, s \\ & \sum_{j=1}^{n} \lambda_j = 1 && j = 1,2,\ldots, n \\ & \lambda_j \ge 0 && j = 1,2,\ldots, n \end{aligned} \qquad (3.1)$$

Formula 1: evaluating the efficiency of farms using the input-oriented model

Data analysis was performed using Excel software and EViews v. 8.1 software, and the data was institutionalized in the following formulas. In this regard, θ a scalar, λ is a vector of non-negative integer values; x_i and y_r represent the inputs and outputs of firm j, m shows the number of inputs, s the number of leads, and n the number of firms. The θ value represents the technical efficiency of the firm j, which is less than or equal to one. The value of 1 indicates that the production unit is fully efficient and the unit is located on the efficient border. Therefore, the level of current inputs can not be reduced. The above linear programming problem must be solved for each firm (n order). Value 1 represents the firm with full technical efficiency. The variable is obtained from the scale by adding $\sum_{j=1}^{n} \lambda_j = 1$ to the static return model relative to the scale (Norozian et al., 2012).

Possible performance

The DEA method is a method for estimating performance by considering multiple inputs and outputs. Suppose there are n decision-making units (DMU_j) for evaluation. For each decision unit j, j = 1, ..., n, the following definitions are expressed:

The number of inputs, $i = 1,\ldots, m$. Output number, $r = 1,\ldots, q$. Vector input, $x_j = (x_{1j},\ldots, x_{mj})^T$ .Vector output, $y_j = (y_{1j},\ldots, y_{qj})^T$. In the set of production facilities is considered as follows.

$$PPS = \left\{ (x, y) : x = \sum_{j=1}^{n} x_j \lambda_j, \quad y = \sum_{j=1}^{n} y_j \lambda_j, \quad \sum_{j=1}^{n} \lambda_j = 1, \quad \lambda_j \ge 0, \quad \forall_j \right\} \qquad \textbf{(3-2)}$$

These definitions relate to the concepts of the performance of DEA models that are definite (non-probable) when there is no possibility of a violation of the PPS (production possibilities Set) or the dominant performance. In the random framework, it is assumed that for each DMU, j = 1, ..., n, the uncertainty affecting the input-output vector is represented by random variables defined in a given probability space. So x_j (ω) and y _j (ω) respectively represent random data and output vectors. Suppose that the distribution function ⟦(x)⟧ _j (ω), y _j (ω)) is specified. The dominant concept can achieve a predominant random effect by comparing the inputs and outputs with each other. Hong and Lee (2001) suggest that, for a given coefficient $\alpha \in [0,1]$, DMU_k do not randomly dominate their efficiency if and only if there is a common probability of less than or equal to α, some of DMU which indicate the dominant performance of the related (Chellattan et al., 2011). According to this definition, the randomness of a DMU_k can be obtained by solving the following random model:

$$\alpha^* = \max_{\lambda} \mathrm{P} \left\{ \begin{array}{l} \sum_{j=1}^{n} \tilde{x}_{ij}(\omega)\lambda_j \le \tilde{x}_{ik}(\omega), \quad i = 1,\ldots, m \\ \sum_{j=1}^{n} \tilde{y}_{rj}(\omega)\lambda_j \le \tilde{y}_{rk}(\omega), \quad r = 1,\ldots, q \end{array} \right\} \qquad \textbf{(3-3)}$$

In which the $\sum_{j=1}^{n} \lambda = 1$ -limit and the inequality of the $\lambda \geq 0$ are established. In relation (3-3), the symbol P represents probability, and, on the other hand, $\hat{\alpha}^*$ represents the decision-maker's risk taking due to the inaccurate identification of the DMU_k as a non-random random DMU on its efficiency. Whatever the amount of $\hat{\alpha}^*$ is higher, the risk that the DMU_k is randomly dominated by other DMUs is lower and less reliable (Bruni et al., 2009).

Effective Factors on the Productivity of Date Production Units

Because of the invalidity of the traditional regression methods used in previous studies, and because of the inherent dependence between performance values, Bootstrap's regression model is proposed to address this problem, which is examined for the factors affecting efficiency, which is obtained through the following equation (Norozian et al., 2019):

$$\hat{TE}_j = \alpha + \beta_j \sum_{j=1}^{k} LnX_{ij} + \beta_j X_{ij} + \varepsilon_i \quad \textbf{(3-4)}$$

$$\hat{TE}_j = \alpha + \beta_1 LnX_{i1} + \beta_2 LnX_{i2} + \beta_3 LnX_{i3} + \ldots \beta_6 LnX_{i6} + \beta_7 X_{i7} + \beta_8 X_{i8} + \varepsilon_i \quad \textbf{(3-5)}$$

$\hat{TE}_j$ refers to the economic efficiency of j dated garden, X_i is the vector $m \times 1$ of inputs of production i, β is the vector $m \times 1$ of unknown parameters and ε_i is a waste or error. ε_i component has a normal distribution, with the mean zero and the variance $\sigma_v^{\,2}$ and $\varepsilon_j \geq 1 - \alpha - Z_{ij}\delta$, the distribution of the sentence ε_i for random and non-random elements of the model. The estimation of the maximum probability of the case is evaluated according to $\sigma_\delta^{\,2}, \delta$ and the Bootstrap regression model is investigated for estimating the confidence interval. (Fu et al., 2011). In relation (3-5), x_{i1} the amount of toxin used, x_{i2} farmer's record, x_{i3} water consumption, x_{j4} land size, x_{i5} participation in training classes, visits to research centers, x_{i6} chemical pesticides, x_{i7} investment rates and x_{i8} mixed cultivation, can be considered as influential variables The efficiency of palm groves should be investigated (Norozian et al., 2019).

Results and Discussion

The total experimental results reported by the randomized efficiency model are presented in Table (1). In this study, an attempt has been made to evaluate the efficiency of date production units of Kerman province (Bam, Fahraj, Reagan and Narmashir) and has been used a randomized data envelopment analysis.

Table 1: Technical Efficiency of Date Farms in Different Areas Using Data Envelopment Analysis Method in 2016

region	Performance Technical	region	Performance Technical	region	Performance Technical	region	Performance Technical
Fahraj	0.93	Bam	0.90	Rigan	0.37	Narmashir	0.36
Fahraj	0.86	Bam	0.98	Rigan	0.70	Narmashir	0.4
Fahraj	0.25	Bam	1	Rigan	1	Narmashir	0.49
Fahraj	0.67	Bam	0.34	Rigan	0.76	Narmashir	0.41
Fahraj	1	Bam	0.41	Rigan	0.35	Narmashir	0.42
Fahraj	0.85	Bam	0.42	Rigan	1	Narmashir	0.301
Fahraj	0.89	Bam	0.24	Rigan	0.99	Narmashir	0.323
Fahraj	0.25	Bam	0.67	Rigan	0.4	Narmashir	0.519
Fahraj	0.23	Bam	0.52	Rigan	0.37	Narmashir	1
Fahraj	0.38	Bam	0.81	Rigan	0.70	Narmashir	0.49
Fahraj	0.96	Bam	0.97	Rigan	1	Narmashir	0.63
Fahraj	1	Bam	0.95	Rigan	0.96	Narmashir	0.35
Fahraj	0.79	Bam	0.35	Rigan	0.35	Narmashir	1
Fahraj	0.64	Bam	0.60	Rigan	0.28	Narmashir	0.30

Fahraj	0.54	Bam	0.82	Rigan	0.60	Narmashir	0.82
Maximum performance	1		1		1		1
Minimum efficiency	0.23		0.24		0.28		0.30
Average region efficiency	0.68		0.66		0.65		0.52

Findings of the research * Technical Efficiency Percentage * Total Performance of Regions 63%**

The results of Table 1 show that the average technical efficiency of palm farms of the four counties is 63% and the maximum and minimum efficiency is 100% and 24%, respectively. The minimum efficiency level is related to the low level of capital of these production units, which increases with the amount of investment and managing the right management and transferring management knowledge from the most efficient date fields to low efficiency farms can enhance their efficiency. The results show that the range of technical efficiency of agricultural units of dates (the gap between the most efficient and the most inefficient units) is high in these areas. It is observed that the average technical efficiency of the city of Narmashir is 52%, which the farms of this city are less efficient than the other farms of the cities. The main reason of inefficiency of these farms is management weakness and excessive consumption of water resources that increases costs and reduces the efficiency of farms. In the whole, Narmashir, has a low efficiency at the level of studied regions. In this regard, it is necessary for the government to provide serious support to the district production units of the city and to oversee the investigation of the cause of the lack of efficient farms in order to ensure that the production of this region is in a good condition for the production of dates and its fields are located on an efficient frontier. The palm farms in the area have low technical efficiency. The results indicate that date production units in Narmashir, Reagan and Bam are less efficient than production units in Fahraj city, which is possible to transfer the technical and managerial knowledge from efficient units to these farms to increase their economic efficiency. There are many agricultural units in these cities, most of which use old management methods and are irrigated in the form of flood irrigation and the farmers' literacy levels are lower than those of the farmers, and the number of farms in the area is very high, which has not been investigated. As a result, it can be considered a regional weakness in the production of palm efficiency in the region, and action should be taken to identify their weaknesses and their problems and efforts to resolve them. Therefore, in order to solve this problem, the officials can help with increase their efficiency by supporting, encouraging and providing new knowledge and technology to the palm farms in order to invest in date production.

Table (2) Distribution of the technical efficiency of all date production units throughout the study area Findings of the research

The cumulative percentage	(%)	Number	(%) Technical Efficiency Levels
28/3	28/3	17	Less than 40
45	16/7	10	40-60
60	15	9	60-80
75	15	9	80-90
100	25	15	More than 90

The results of Table (2) show that 28.3% (that is, 17 date farms) have an economic efficiency of less than 40%, with assets of very low efficiency and about 25% of them having a productivity of over 90%. According to the results, the efficiency of palm farms in the cities is moderate to low and is not relatively efficient. The average technical efficiency of palm farms in the studied areas is 63%, with a potential upgrade of 37% and low technical efficiency, which can be improved by managing water resources, costs, upgrading technical knowledge and technology.

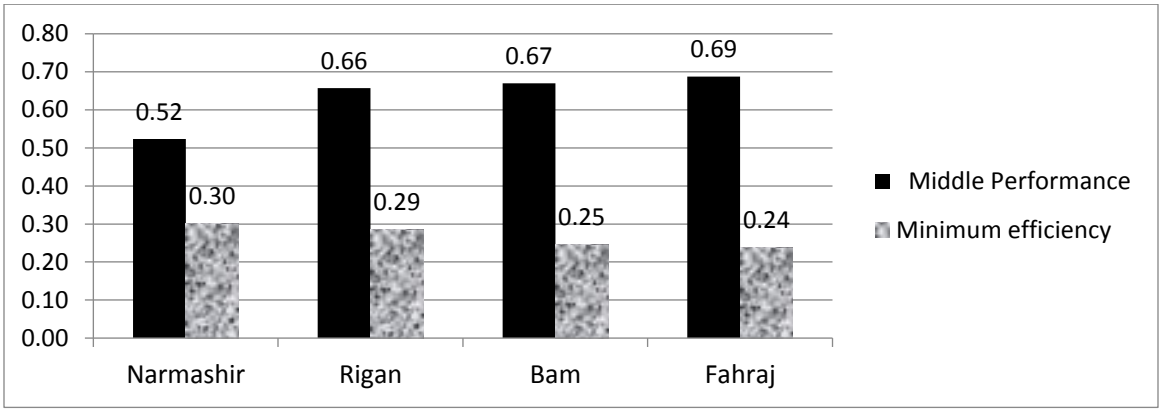

Chart 1. The average technical efficiency of palm farms in the studied cities

In Chart 1, the average technical efficiency of palm farms is compared in the studied cities. Accordingly, the highest mean efficiency is in the city of Fahraj. The efficiency of Narmashir farms is very low in the study area. The efficiency of the Rigan, Bam and Fahrej cities is relatively efficient. The results indicate that farmers in these areas are far away to be efficient, which can increase the productivity of farmers by educating and promoting new methods of irrigation and cultivation. The average technical efficiency of agricultural units of dates in cities (Fahraj, Bam, Reagan and Narmashir) is 69, 67, 66 and 52 percent respectively.

The technical efficiency of farms by size of farms in the county level

The technical performance status of date production units in cities is expressed in Table 3, which is classified into three major groups of palm farms (large, medium and small), large farms (2 ha to 5 ha), medium farms (2 Hectares up to one hectare) and small farms, including farms smaller than a hectare.

Table 3: The average technical efficiency of farms in cities by data envelopment analysis method

small farms		medium farms		large farms	
Production unit	Efficiency	Production unit	Efficiency	Production unit	Efficiency
Narmashir	1.00	Narmashir	0.49	Narmashir	0.37
Narmashir	0.63	Narmashir	0.41	Narmashir	0.41
Narmashir	0.82	Narmashir	0.52	Narmashir	0.42
Fahraj	0.94	Narmashir	0.49	Narmashir	0.30
Fahraj	0.86	Narmashir	1.00	Narmashir	0.30
Fahraj	0.89	Fahraj	0.68	Narmashir	0.36
Fahraj	0.96	Fahraj	1.00	Narmashir	0.31
Fahraj	1.00	Fahraj	0.39	Fahraj	0.25
Rigan	0.71	Fahraj	0.80	Fahraj	0.86
Rigan	1.00	Fahraj	0.65	Fahraj	0.25
Rigan	0.99	Rigan	0.76	Fahraj	0.26
Rigan	1.00	Rigan	1.00	Fahraj	0.55
Rigan	0.96	Rigan	0.40	Rigan	0.37
Rigan	0.60	Rigan	0.37	Rigan	0.36
Bam	0.90	Rigan	0.71	Rigan	0.35
Bam	0.99	Rigan	0.29	Bam	0.35
Bam	1.00	Bam	0.42	Bam	0.42
Bam	0.82	Bam	0.67	Bam	0.25
Bam	0.60	Bam	0.98	Bam	0.52
Bam	0.82	Bam	0.95	Bam	0.36
Minimum efficiency	0.60		0.29		0.24
Maximum performance	1.00		1.00		0.86
Medium performance	0.88		0.65		0.38

Results of the research * Technical Efficiency Percentage * in 2016**

The results of Table (3) show that the average technical efficiency of palm farms is divided into three large, medium and small farms, with a minimum yield of 38 percent for large palm

farms. The results show that is high the range of technical efficiency of agricultural units of dates (the distance between big to small fields). It is observed that the average technical efficiency of the city of Narmashir in large farms is lower than that of other county farms, which is the main reason for the inefficiency of these farms to be management weakness, which leads to a decrease in the efficiency of large field farms. In the whole of the city of Narmashir, there is a low efficiency at the level of studied regions. The results show that the small production units of cities that have the average technical efficiency of 88% are more efficient than the production units of the cities, which can be achieved through the transfer of technical know-how and management of efficient units to these fields, thereby increasing their economic efficiency. The city of Narmashir has more fields than other cities, and because of lack of skilled and technical force, they can be efficiently managed by the management and planning of the classes and promoting the training of farmers in the region. According to the results of Table (3), large farms do not reach the efficiency limit (ie 100%) in any unit, and their range of performance is between 24% and 86%, and the average does not exceed 38% of the efficiency at a very critical point. To address this, serious proceedings should be taken that the officials of the agricultural Jihad and the directors of that city are actively involved and that the province's agricultural Jihad is monitored to improve the efficiency of the palm farms. Although in most studies, the size of the field increases the efficiency, But the results were different in this study, it showed that with more precise studies, the problem could be rooted and the necessary action was taken.

Table (4) - Average technical efficiency of farms in cities according to their abundance

Small Farm				Medium Farm		Large Farm
Region	Abundance	Efficiency	Abundance	Efficiency	** Abundance	***Efficiency
Narmashir	3	0.82	5	0.58	7	0.36
Fahraj	5	0.93	5	0.70	5	0.43
Rigan	6	0.88	6	0.59	3	0.36
Bam	6	0.86	4	0.76	5	0.38
Middle performance		0.88		0.65		0.38

Results of research * Percentage ** Number of units of each city in different types of farms**

The results of Table (4) show that the average technical efficiency of palm farms in three large, medium and small farms is divided into different regions, with a minimum yield of large palm farms in Narmashir and Rigan area of 36% and the number of units in this The area is 7 and 3 respectively. It is observed that the average technical efficiency of the city of Narmashir in the large fields compared to the other farms of the county has a lower efficiency, and this area have larger garden than the other areas and has a very low efficiency. Also, small gardens of the city which have an average of 88% technical efficiency compared to the production units of the cities are more efficient and the number of units is more efficient in Bam and Rigan areas, which can be increased efficiency by transferring technical know-how and management of efficient units to these fields. The city of Fahraj has more technical efficiency than other cities (93%), and, on the other hand, the efficiency of this city in general is high efficiency in the study area, Which can be transmitted to the efficiency border with the management, planning and holding of training and promotion classes for farmers in the region.

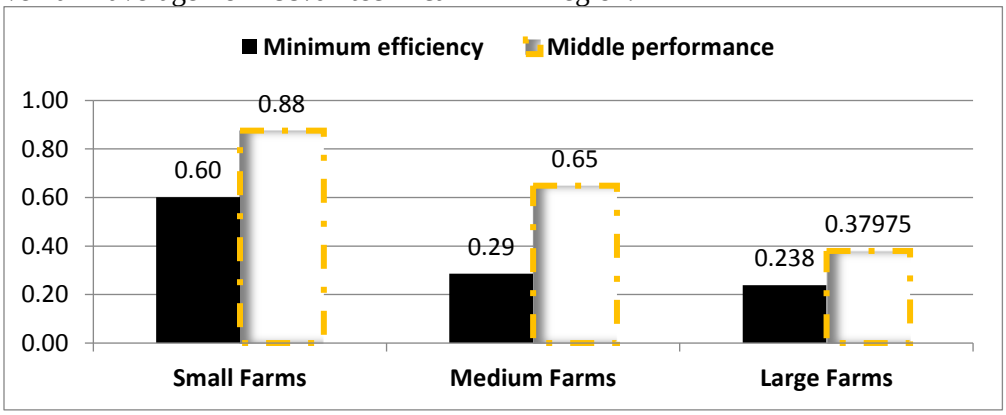

Chart 2 -Comparison of the average technical efficiency of different types of farms in cities

In Chart 2, the average technical efficiency of different farms has been compared in the studied cities . Accordingly, the highest average technical efficiency of palm farms is related to small farms and then to medium and large farms, respectively. Small farms are more efficient than other farms, and the main reason for the efficiency of such farms is having sufficient management and more supervision in the fields. Which can be understood from the ineffectiveness of large farms, and the larger the size of the farms, the efficiency should be reduced because of the weakness of the management.

Factors affecting the efficiency of date producing units

The Bootstrap model was used to investigate the managerial and effective factors on technical efficiency. In Table (4-28),have been presented for example, the results of estimating the effective factors on the technical efficiency of the dates of production units. According to the information obtained, there is a direct relationship between the participation in technical training classes and the consequent increase in the number of farmer units in the training classes, which increases the technical efficiency of agricultural units. But water consumption and poison consumption are one of the variables that affect performance, which has a reverse effect on the technical efficiency of palm gardening, that is, the consumption of water and its losses and consumption of poison in the level of units increases, decreases the efficiency of units.

Table 5: Factors Affecting Technical Efficiency of Date Production Plants in Bam County

Independent variables Parameter		Coefficients	Statistics t		Confidence interval With a probability of 0.05
Independent variables	β	2/651	5/47	٠/011**	0
Constant factor	β1	-٠/029	3/26	٠/718	٠/004**
Amount of poison	β2	٠/017	٠/43	٠/016**	٠/668
Farmer's record	β3	-٠/001	-2/89	٠/325	٠/006**
Water consumption	β4	٠/063	1/45	٠/0064**	٠/156
The size of land	β5	٠/011	2/15	٠/921	٠/0014**
Participate in training classes	β6	٠/004	٠/295	٠/017**	٠/769
Chemical pesticides	β7	٠/074	3/99	٠/028**	٠/004**
The amount of investment	β9	٠/019	٠/469	-٠/94	٠/001**
Schwarz criterion	-٠/94	٠/96		-1/119	Schwarz criterion
Hannan-Quinn	-1/119	٠/95		1/93	Hannan-Quinn
Durbin-Watson	1/93	13/91			Durbin-Watson

Source: Research findings **: Significantly at a level of 5%

According to the results of Table 5, are x_{i1} the amount of poison used, x_{i2} farmer's record, x_{i3} water consumption, x_{j4} land size, x_{i5} attendance at training classes, visits to research centers, x_{i6} chemical pesticides, x_{i8} investment and mixed cultivation, It is observed that mixed cultivars, participation in training classes and investment in palm farms have a positive and significant effect on efficiency. Based on the results, estimated coefficients of poisoning, water use, mixed cultivation, participation in training classes and investment in units Productions are 0.0219, 0.02, 0.11, 0.074 and 0.029 respectively, respectively. Suggesting that a one percent increase in investment would increase efficiency by 7.4 percent, and is expected to increase the variables of participation in training classes, investment and co-cultivation (dates and other products), economic efficiency of the date manufacturing units of the study area Increase. Also, the greatest impact is on investment in production units, in which the productive units are relatively good, but in the investment section, the private sector faces many problems in the provision and financing of capital. Other factor that was analyzed on efficiency were factors such as farmer's record, land size and chemical pesticides, which had no significant effect on the technical efficiency of the units.

Conclusion

The average of total technical efficiency of palm gardens is 63% in four counties , which the least efficiency in the production units is city of Narmashir, which can increase the efficiency of these gardens by increasing the amount of investment and correct management and transfer

of management knowledge from the most efficient palm gardens to these gardens. Also, the range of technical efficiency of agricultural units of dates (the gap between the most efficient and most inefficient units) is high in the above areas. The average technical efficiency of palm gardens is divided into three large, medium and small gardens, with a minimum yield of 38 percent for large palm gardens. It is observed that the average technical efficiency of the city of Narmashir in large farms is lower than of other cities. The main reason for the inefficiency of these farms is the lack of management, which leads to a reduction in the efficiency of large field gardens. In general, the city of Narmashir has low performance at the studied area. The results show that small towns producing small-scale production units with a 88% technical efficiency average compared to production units of cities, which can be achieved through the transfer of technical know-how and management of efficient units to these fields, thereby increasing their economic efficiency.

Based on the results obtained from the factors affecting the technical efficiency , the coefficients of estimation of variables such as amount of poison, water consumption, mixed cultivation, participation in training classes and investment in production units are significant and suggesting that a one percent increase in investment would increase efficiency by 7.4 percent, and is expected to increase the variables of participation in training classes, investment and co-cultivation (dates and other products), increase economic efficiency of the date manufacturing units of the study area. Other factor that was analyzed on efficiency were factors such as farmer's record, land size and chemical pesticides, which had no significant effect on the technical efficiency of the units.

Suggestion

- Organizing training classes and brochures for farmers to implement correct agronomic management practices and the long-term relationship of farmer with agricultural research centers and getting information from the results of research projects, the latest scientific achievements and transferring them to inefficient farmers can increase their efficiency and profitability.- - Undoubtedly, improving productivity and improving productivity will be a decisive factor in the future of the country's dates gardens and the overall economy of Iran, as a result, consideration of this phenomenon is essential in the formulation of strategies and policies for economic growth. In this regard, conducting studies in this field can be helpful and effective.- The main reason for the inefficiency of these palm farms is the lack of management, which implies that the direct intervention of the government on the market and the use of these units to increase the social welfare of consumers from the producers of this sector. On the other hand, the executive's weaknesses in the executive branch (Agricultural Jihad) has not given enough support. That the jihadist effort of the authorities and serious support to the agricultural sector (date production units) should be put in place so that the production of this area is made in terms of production in an efficient condition.- Creating a marketing unit for the region's date's products (creating a cooperative) so farmers will be aware of the trend of day-to-day products in the domestic and global markets. To provide farmers and producers with the fastest possible access, as well as to strengthen and support the marketing system. - The studied farmers are less familiar with specialized marketing. Therefore, although the strengthening of the marketing team in farmers plays an important role in the success of this region. So, organizing training classes on the principles and methods of marketing by experts related to this field in order to enhance the scientific and applied knowledge of the production marketing system is necessary for farmers.

References:

- Afraket, H., Hajipour, M., Garzine, M., & Nejati, B. (2013). The Place of Sustainable Agricultural Development in Iran's Development Plans. Quarterly Journal of Strategic and Military Policies. 1 (1): 43-62.
- Agricultural Jihad Statistics Section of (2016).
- Amir Nezhad H., & Rafiei, H. (2010). Evaluation of margin and rice market efficiency in Mazandaran province. Economics and Agricultural Development Studies. (2) 24.
- Asfnjary Kenary, R. (2011). Economic Analysis of Livestock Poultry Industry. Master thesis, Shiraz University.
- Bruni, M., Conforti, D., Beraldi, P. & Tundis, E. (2009). Probabilistically constrained models for efficiency and dominance in DEA. International Journal of Production Economics, 117(1) : 219-228.
- Chellattan, V. P., Ashok, A., Speelman, S., Buysse, J. & Van Huylenbroeck, G. (2011). Sub-vector Efficiency analysis in Chance Constrained Stochastic DEA: An application to irrigation water use in the Krishna river basin, India. 122nd Seminar, February 17-18, 2011, Ancona, Italy:

European Association of Agricultural Economists.

- Compbell, R., Rogers, K. & Rezek, J. (2008). Efficient frontier estimation: a maximum entropy approach. Journal of Productivity Analysis, 30(3): 213-221.
- Dashti. Q., Rashid Qalam, M. & Pishi Bhar. A. (2017). Application of modified nonparametric methods to evaluate the technical efficiency of sugar beet production in Iran. Economics and Agricultural Development Research, 31 (2), 157-169.
- FAO. (2017). Date Palm Cultivation. FAO plant production and protection papers Food and Agriculture Organization of the United Nation. Rome, Italy.
- Fathi, B, Khodaparast Mashhadi, M, Homayounfar, M, Sajjadifar H . (2018). A Comparative Study of Energy Efficiency and Environmental Efficiency in Developing Countries with a Favorable and Unfavorable Output Approach in a Competitive Environment. Economic Research and Policy (25) 81: 112-85.
- Fu, Y., Liang, Q., Song, Y. & Xu, X. (2011). The efficiency of Chinese farmer cooperatives and its influencing factors.
- Guzmán, I. & Arcas, N. (2008). The usefulness of accounting information in the measurement of technical efficiency in agricultural cooperatives. Annals of Public and Cooperative Economics, 79(1): 107-131.
- Isfahani, SM, Khazaee, J. (2010). Investigating Factors Affecting the Efficiency of Poultry Producers in Southern Khorasan Province. Journal of Agricultural Economics Research, 2 (8).
- Khezimeh, A, Khayri, M, Dehbashi, V, Esfanagari Sharari, R. (2017). Analysis of profitability and efficiency of poultry units in Sistan region. Journal of Research in Agricultural Economics, 9 (36) 173-190.
- Lampe, H.W. & Hilgers, D. (2015). Trajectories of efficiency measurement: an ibliometric analysis of DEA and SFA. Eur. J. Oper. Res. 240, 1e21
- Molaie M. & Sani, f . (2015). Estimation of environmental performance of agricultural sector. Journal of Agricultural Science and Sustainable Production, Volume 40 (2): 91-111
- Mollahi, M, Hessari Shirmameh, N, Javan Bakht, A. (2017). Estimation of Environmental Efficiency of Input-Axis of Agricultural Products (Case Study: Environmental Efficiency of Rice Production), Journal of Agricultural Economics, 11 (2): 157-172.
- Najafzadeh B & Momipour S. (2017). Investigating Factors Affecting the Environmental Efficiency of Iran's Electricity Industry: An Approach to Data Envelopment Analysis and Combined Data. Quarterly Journal of Economic Modeling Research. 1396; 7 (27): 41-83
- Norozian M, Sobhahi M, Researcher P, & heydari. M. (2012), Evaluation of Cotton Cotton Productivity in Iran by Specific Measurement Method and Lack of Variables of the 2nd National Conference on New Developments in the Production of Oil Plants, Islamic Azad University, Bojnourd Branch,
- Norozian, M., Kikha, A. A., & Mohammadi, H. (2019). Evaluation of efficiency of rural production cooperatives in Kashmar. Space Economy and Rural Development, 8(27), 97-118.
- Salariya M, Mohammadinejad. O, & Moghadasi A. (2016). Impact of technological progress and performance changes on productivity growth in Iran's agricultural sector: data envelopment analysis. Economic Modeling Magazine, (2) 105.
- Saroukhani, b . (2002). Methods of research in the social sciences. Seventh Printing, Humanities Research Institute, 35-42.
- Tajik A, Sabuhi M, & Rostami Kh. (2011). Estimation of Technical Productivity of Date Producers in the Hormozgan River Route Area. National Symposium and Persia Scientific Festival in Kerman.
- Xilong, Y., Wei, F., Xiaoling, Z., Wenxi, W., Chentao, Z., & Shaqiu, Y. (2018). Measurement and decomposition of industrial green total factor water efficiency in China, Journal of Cleaner Production,(198):144-1156.