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The Effective Factors of Saffron Cultivation Development on Foreign Exchange Income with Respect to Climatic Conditions

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Abstract: The purpose of this study was to investigate the effective factors of saffron cultivation developments on foreign exchange income. The used research method in this study was a descriptive-correlation method. The target population of the study was all the farmers of Birjand city, Iran, and 50 farmers were randomly used as the sample population. The data of this study were collected during the years of 2011 and 2014 and then were examined by Eviews 7 software. The results of the analysis indicated that there was a significant relationship between climatic conditions and job creation, economic growth, price of saffron and expansion of areas under cultivation in Birjand, Iran. It also revealed that there is a significant relationship between water resources and areas under cultivation in Birjand, Iran.

Keywords: Foreign Exchange Income, Economic Growth, Climate, Job Creation, Saffron.

Introduction

Saffron, known as red gold in Iran, is the most valuable agricultural product and is the most expensive spice in the world, has had a prominent position in the non-oil export of Iran, after pistachio. Saffron is a plant that grows in dry climates and most of the historians believe that had originated from Iran and India. However, saffron is the local plant of Spain and was cultivated in Iran since long times ago. In the past, saffron was cultivate in most provinces of Iran but today it is limited to Khorasan, Fars, Isfahan Kerman and Yazd provinces among which Khorasan is in the first place and produces 90% of the saffron of Iran. According to economic theories, abundance of capital resources in a country can provide the background for economic growth.

The exports of the developing countries are usually limited to one or a few general agricultural products and raw natural resources the percentage of which are about 80-90 % of the total export of the country. Thus, in case of price fluctuations in world market of these products, there will be an imbalance in the balance of payment of the countries. Iran is also among the mentioned countries because the main product of Iran is oil. The policy of the governments in the recent years were also towards decreasing the foreign exchange income from oil export and increasing non-oil exports and this lead to the decrease of oil exports in relation to total exports in recent years. However, oil export is still the major export product of Iran. Thus, any fluctuation in the price of oil will affect the short term and long term economic policies (Khazaei, 2007). Therefore, it is necessary to put more emphasis on non-oil exports such as agricultural products, particularly those products that will have better opportunities for export in

the future. Saffron is one these products and Iran is the largest producer and exporter of saffron in the world with more than 45000 hectare of areas under cultivation and average production of 120-170 ton per year. About 65-85 % of the saffron of the world is produced in Iran. Because saffron needs little water resources and it is compatible with different conditions, most of the areas in Iran are suitable for cultivation of saffron. Currently, most of the saffron of Iran is produced in Razavi Khorasan, North Khorasan, South Khorasan, Fars, Kerman, Yazd, Markazi and Isfahan provinces (Akbarzade, 2010).

Materials and Methods

This study was an applied study and the used research method in this study was descriptive-correlation type. The target population of this study was all the farmers of Birjand, Iran. The sample size included 50 farmers. Regarding the limited size of the target population, the sample size is considered equal to target population. The data of the study were collected during the years 2011 and 2014.

Research Hypotheses

Main hypothesis: There is a significant relationship between effective factors of saffron cultivation development on *foreign exchange income of the country.*

Sub-hypotheses

1. There is a significant relationship between climatic conditions and development of the areas under saffron cultivation in Birjand.
2. There is a significant relationship between water resources and area under saffron cultivation in Birjand.
3. There is a significant relationship between job creation and areas under saffron cultivation in Birjand.
4. There is significant relationship between economic growth and areas under saffron cultivation in Birjand.
5. There is significant relationship between price of saffron and areas under saffron cultivation in Birjand.

Research Model

Using the collected data and information the following regression model can be estimated.

$$EXCH_{it} = \alpha + \beta 1 PRICE_{it} + \beta 2 WAT_{it} + \beta 3 TEMP_{i,t} + \beta 4 EDA_{i,t} + \beta 5 EB_{i,t} + \varepsilon_{i,t})$$

Where Y_{it} is the area under saffron cultivation (in terms of hectare) by i^{th} farmer in t time, $PRICE_{it}$ is the price of saffron (in terms of Rial), $EXCH_{it}$ is the independent variable and indicates the currency rate (in terms of Rial), WAT_{it} is the independent variable and indicates the water resources of Birjand (in terms of cubic meters) and $TEMP_{it}$ is the temperature (in terms of centigrade).

The coefficients α and β were interception and estimated coefficients associated with each of the independent variables. ε_{it} indicates regression error term.

Results

As, according to Hausman test, fixed effects method was used for the model assessment. The results of Eviews 7 software are presented in the table below.

Table 1. Results of the assessed regression pattern

Research model	$EXCH_{it} = \alpha + \beta 1 PRICE_{it} + \beta 2 WAT_{it} + \beta 3 TEMP_{i,t} + \beta 4 EDA_{i,t} + \beta 5 EB_{i,t} + \varepsilon_{i,t})$			
Research variables	Coefficient	Standard error	T statistic	Sig.
Constant coefficient	2.566	2.316	1.108	0.269
Price of saffron	0.548	0.125	4.099	0.000
Area under cultivation	0.111	0.078	3.428	0.000
Water resources	0.208	0.090	4.044	0.000
Temperature	0.390	0.048	3.858	0.000
Job creation	0.432	0.276	3.583	0.000

Economic growth	0.700	0.301	2.319	0.021
F statistic 0.443	8.417	Jarque-Bra statistic	3.240	
F statistic probability	0.00	Jareque-Bra statistic probability	0.197	
Durbin-Watson statistic	1.934			
Coefficient of	0.580			
Adjusted coefficient of determination	0.528			

F test was used to investigate the significance and linearity of the regression model. The null hypothesis if F test indicates the significance and linearity of the regression model. According to the results of F test for the second hypothesis presented in the table 1, the probability of F statistic was 0 which was lower than the considered significance level of the study α and thus the null hypothesis of F test in 95 % of confidence score was rejected. Therefore, the model was significant and there is a linear relationship between independent and dependent variable.

According to the results presented in the table 1, the coefficient of determination was 0.580 that means 58 % of the changes in dependent variables can be explained by independent variables. The high coefficient determination indicates the high explanation power of the model in explaining the changes in dependent variable. The important issue of error terms independency was fitted in the model. To investigate this, Durbin-Watson statistic was used and because this value was between 1.5 and 2.5 it can be concluded that there was no significant correlation between error terms in the model. Durbin-Watson statistic was 1.93 which lied in the acceptable range (1.5-2.5).

Normal distribution of error terms was an important assumption regarding error terms in fitted model. Jarque-Bra test was used to investigate the normality of error terms. According to the results, the estimated Jarque-Bra statistic for fitted regression model was and 3.240 and regarding the significance level of the test which was 0.197 and was higher than 0.05 the null hypothesis indicating the normality of the errors terms is not rejected. Thus, the normality of error terms was approved.

Conclusion

First hypothesis*:* There is a relationship between climatic condition and development of the area under saffron cultivation in Birjand. According to the results, because the coefficient of temperature variable was positive (0.390) and it is significant regarding the significance level of T test (0.0), thus there is a positive and significant relationship between temperature and areas under saffron cultivation. Therefore the first hypothesis is approved in 95% confidence score. This was in line with the results of the study of Amiri aqdaei et al. (2012).

Second hypothesis: There is a relationship between water resources and areas under saffron cultivation in Birjand. According to the results, the coefficient of water resources variable was positive (0.208) and regarding the significance level of t test (0.0), it is significant. Thus, there is a positive and significant relationship between water resources and areas under saffron cultivation in Birjand. Therefore, the second hypothesis is approved in 95% confidence. These results are in line with Khademi (2011).

Third hypothesis: There is a relationship between job creation and areas under saffron cultivation in Birjand. According to the results, the coefficient of job creation variable was positive (0.432) and regarding the significance level of t test (0.0), it was significant. Thus, there was a positive and significant relationship between job creation and areas under saffron cultivation in Birjand. Therefore the second hypothesis was approved in 95% confidence. This was in line with Aqaei and Rezaqolizade (2011).

Fourth hypothesis: there is a significant relationship between economic growth and areas under saffron cultivation in Birjand. According to the results, the coefficient of economic growth variable was positive (0.700) and regarding the significance level of t test (0.0), it was significant. Thus, there was a positive and significant relationship between economic growth and areas under saffron cultivation in Birjand. Therefore the second hypothesis was approved in 95% confidence. This was in line with Khademi (2011).

Fifth hypothesis: There is a relationship between price and saffron and areas under saffron cultivation in Birjand. According to the results, the coefficient of price of saffron variable was positive (0.548) and regarding the significance level of t test (0.0), it was significant. Thus, there was a positive and significant relationship between price of saffron and areas under saffron cultivation in Birjand. Therefore the second hypothesis was approved in 95% confidence. This was in line with Khademi (2011).

Recommendations

The price of saffron has significant effect on areas under cultivation. The relationship between price of saffron and areas under cultivation is negative and significant. The reason may be the increase in the price of agricultural tools that in turn pursue farmers to produce other agricultural products. It is recommended to the Agricultural Jihad organization of Birjand to take some measures and consider some encouraging factors for farmers when the prices are increased so to prevent the decrease in areas under saffron cultivation.

It is recommended to Agricultural Jihad organization of Birjand to improve the facilities for mechanized irrigation in all farms and gardens of the province so to prevent water loss which in turn increases the areas under cultivation.

Saffron products have social benefit. That is, saffron cultivation leads to comparative advantage on production, job creation and added value and thus it has social benefits in national level.

Exporting saffron in bulk and not processing it in the country leads to low added value of this product and high added value and the real benefit is for countries like Spain that buy saffron in bulk from Iran, process it and then export it to the world. Thus, it is necessary to train expert individuals and establish knowledge-based companies to research and investigate the issues related to marketing and packing of saffron and to develop a plan to promote saffron industry standards.

According to the fact that saffron production in Birjand had the required comparative advantage and efficiency and is able to compete in world market, it seems logical to develop the areas under saffron cultivation in this region. With a long term strategic plan for development of saffron cultivation and management of this product, it can, undoubtedly provide the conditions for developments in the region and also improvements of comparative advantage on production.

Conflict of interest

The authors declare no conflict of interest

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