The Impact of Vegetables Exports on Economic Growth in Tunisia

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ABSTRACT:

The aim of this paper is to investigate the long run term and the short run term impacts of vegetables exports on economic growth of Tunisia. In order, to achieve this purpose, annual data were collected from the reports of World Bank for the periods between 1970 and 2015, was tested by using Correlation Analysis, Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) stationary test, co integration analysis of Vector Error Correction Model. According to the result of the analysis, vegetables exports have a positive effect on economic growth in the long run term and in the short run term. These results provide on evidence that vegetables exports, thus, are seen as source of economic growth in Tunisia. For this reason, it is very important to refine investment in this sector.

Keywords: Vegetables Exports, Economic Growth, Cointegration, VECM, Tunisia

Contribution/ Originality: This is the very first study to examine the long run and short run impacts of vegetables exports on economic growth of Tunisia for the period 1970 – 2015, by distinguishing between the weak and false strategies of the agricultural economy policies exercised by the State.

I. Introduction:

Since it began societies are formed and regulated, international trade, which has been going on to this day and intended to improve the well-being through specialization in production and trade have emerged. It is known, the trade began with agricultural products. Exports are judged and perceived as a motivating factor of economic and social development under their monarch to exert influence on economic growth and poverty reduction. Several explanations show and demonstrate the positive impression of exports on economic growth. They are a component of aggregate demand, and therefore an outlet for local goods and services. They are also a source of foreign currency inflows to cope with imports. Finally, they constitute a potential component of State revenues through customs duties they may generate or when they are carried out by public enterprises. Their impact is also reflected in their structures. Usually, exports based mainly on agricultural products or on natural resources depend heavily on climatic contingencies and their prices on the world market. In the other hand, the high proportion of the population in the world in turn leads to a high rate of consumption of agricultural products. As the deterioration of the climate in recent decades and the high rate of pollution caused by the large industrial advancement witnessed by the world result in a negative impact on the deterioration of agricultural products, making their value at the moment the most valuable goods and significance Achieving food security is one of the main priorities of the countries. This highlights that the agricultural sector is a strategic and vital sector, not only in Tunisia, but throughout the world, in addition to its contribution to GDP, agriculture is a labor-intensive sector, a factor in reducing the regional imbalance. According to the National Institute of Statistics (2015), the agricultural sector accounts for 10.448% of the gross domestic product (GDP) and operates about 14.04% of the working population. Also, exports of agricultural products account for 14.23% of the country's total exports and account for 89% of its food imports. These indicators clearly highlight the importance of the agricultural sector in the Tunisian economy. The main agricultural exports are olive oil, citrus fruits, fish, vegetables and sugars, with exports accounting for 36%, 37%, 17%, 8% and 2% respectively of total agricultural exports. The near disappearance of exports of vegetables and sugar seems to be the result of a weak and irregular production, largely absorbed by the Tunisian market, which is a major consumer of these products. Since 2001, the public health authorities emphasizing that it is necessary to eat at least 5 fruits

and vegetables per day since they promote the minimum to protect themselves from the goods of diseases, prevent overweight, protect the heart and the vessels Preventing cardiovascular disease and fortify Osen with calcium and potassium in preventing osteoporosis. For this reason the consumption of fruits and vegetables is becoming more and more important, and this trade flourishing therefore an indisputable quality. These observations emphasize the need for an empirical examination of the link between vegetables exports and economic growth in Tunisia which is not studied because of the negligence of the state of the sector the low quantity of exports. This affirms the originality of our research. The paper is organized as follows. The next section shows the review literature. Section 3 describes the used data and the econometric model. Section 4 presents the main results. Section 5 presents the concluding remarks and policy implications.

II. LITERATURE REVIEW

An immense literature is rational and wise on the turn of exports in stimulating economic growth. In recent decades, an intensive part of empirical research has been commissioned to scrutinize the relationship between exports and economic growth. These studies used time series or cross-sectional data with divergent findings and divided into four groups. The first group includes studies by Chenery and Strout (1966); Michaely (1977); Balassa (1978); Heller and Porter; (1978); Tyler (1891); Kormendi and Mequire (1985) analyzed the link between economic growth and exports by applying a simple correlation coefficient technique and distinguished that export growth and economic growth were fiercely and strongly correlated positively. The second group includes the studies of Voivades (1973); Feder (1983); Balassa (1985); Ram (1987); Sprout and Weaver (1993); And Ukpolo (1994) applied regression techniques to accomplish the copula between export growth and economic growth, given the neoclassical equation of growth accounting. They were able to find a favorable value for the coefficient of export variables. The third group of researchers includes Jung and Marshall (1985); Chow (1987); Kunst and Marin (1989); Sung-Shen et al. (1990); Bahmani-Oskooee et al. (1991); Ahmad and Kwan (1991); Serletis (1992); Khan and Saqib (1993); Dodaro (1993); Jin and Yu (1995); Holman and Graves (1995) carefully observed the causal link between export growth and economic growth using the Granger causality test. The studies concluded that there were signs of a causal relationship between exports and growth. Finally, the fourth group of economists such as Kugler (1991), Serletis (1992), Oxley (1993),

Bahmani-Oskooee and Alse (1993), Dutt and Ghosh (1994, 1996), Ghatak et al. (1997), Rahman and Mustaga (1998) and Islam (1998), which examined the effect of exports on economic growth using the co-integration technique and error correction models.

Table 1:

No.	Authors	Countries	Periods	Econometrics Techniques	Keys Findings
1	Tekin (2012)	18 Least Developed Countries	1970 - 2009	Granger Causality Tests	Export => GDP (Haiti, Rwanda and Sierra Leone) Export <= GDP (Angola, Chad and Zambia)
2	Abdullahi et al (2013)	50 African countries	1991 - 2011	OLS	Export => GDP
3	Bhatt (2013)	Vietnam	1990 - 2008	VAR Granger Causality Tests	Export <= GDP

4	Dritsaki C (2013)	Greece	1960 - 2011	Cointegration Analysis
				VECM
				Granger Causality Tests
					Export # GDP: Long Run
					Export => GDP: Short Run

5	Edoumiekumo and Opukri (2013)	Nigeria	1981 - 2008	Cointegration Analysis Granger Causality Tests	Export <= GDP
6	Dritsaki and Stiakakis (2014)	Croatia	1994 - 2012	ARDL ECM	Export <=> GDP: Long Run Export <=> GDP: Short Run
7	Ronit and Divya (2014)	India	1969-2012	Cointegration Analysis Granger Causality Tests VAR	GDP=> EX
8	Szkorupová Z (2014)	Slovakia	2001 - 2010	Cointegration Analysis VECM	Export => GDP: Long Run
9	Bokosi (2015)	Malawi	1980 - 2013	Cointegration Analysis Granger Causality Tests VAR	EX => GDP
10	Gaber (2015)	Palestine	1968 - 2012	Cointegration Analysis VECM Granger Causality Tests	GDP ≠ EX
11	Gokmenoglu et al (2015)	Costa Rica	1980 - 2013	Cointegration Analysis Granger Causality Tests	Export <= GDP
12	Tapşin (2015)	Turkey	1974 - 2011	Granger Causality Tests	EX <=> GDP
13	Ee (2016)	3 Developing Countries	1985 - 2014	Cointegration Analysis FMOLS DOLS	Export => GDP
14	Pegkas and Tsamadias (2016)	Greece	1970 - 2012	Cointegration Analysis VECM	Export <=> GDP: Long Run Export <=> GDP: Short Run
15	Umar (2016)	Indonesia	2007 - 2013	OLS	Export => GDP (-) effect
16	Bakari (2017)	Japan	1970 - 2015	OLS	Export => GDP
17	Bakari (2017)	Gabon	1980 - 2015	Cointegration Analysis ECM Granger Causality Tests	Export => GDP : Long Run (-) effect Export => GDP :Short Run
18	Bakari and Krit (2017)	Mauritania	1960 - 2015	Cointegration Analysis VECM Granger Causality Tests	Export <=> GDP
19	Bakari and Mabrouki (2017)	Panama	1980 - 2015	Cointegration Analysis VAR Granger Causality Tests	Export => GDP
20	Goh et al (2017)	11 Asian Countries	1970 - 2012	Cointegration Analysis Granger Causality Tests	Export => GDP (China, Hong Kong) Export <= GDP (India, Korea and Singapore) Export <=> GDP (6 Other Countries)

We monitored that most of the literature was centered on presenting total exports as a source of growth. Unfortunately, it is very surprising that empirical research on the contribution of agricultural exports to economic growth has been neglected in the literature and its role in the development process has long been recognized for agricultural economies. But various

economies argue that the increase in agricultural exports plays a crucial role in economic growth, such as Johnston and Mellor (1961); Levin and Raut (1997); Ekanayake (1999), Karp and Perloff (2002); Ardeni and Freebairn (2002); Schiff and Valdes (2002); Lopez (2002); Dawson (2005); Pingali and Kelley (2007); Kwa and Bassoume (2007); Nadeem (2007); Gollin (2010); Anderson (2010); Sanjuan-Lopez and Dawson (2010).

Table 1

No	Authors	Countries	Periods	Econometrics Techniques	Keys Findings
1	Sanjuán-López and Dawson (2010)	42 Developing Countries	1970 - 2004	Cointegration Analysis	Agricultural Export => GDP
				FMOLS	
2	Gbaiye et al (2013)	Nigeria	1980 - 2008	Cointegration Analysis	Agricultural Export => GDP
3	Gilbert et al (2013)	Cameroon	1975 - 2009	Cointegration Analysis	Agricultural Export (Banana) => GDP: Long Run
				VECM	Agricultural Export (Coffee) => GDP: Long Run
				Granger Causality Tests	Agricultural Export (Cocoa) => GDP: Long Run (-) effect
					Agricultural Export # GDP: Short Run
					Agricultural Export (Banana) <= GDP: Short Run
4	Ojo et al (2014)	Nigeria	1980 - 2012	Cointegration Analysis	Agricultural Export => GDP: Long Run
				VECM	
5	Ijirshar (2015)	Nigeria	1970 - 2012	Cointegration Analysis	Agricultural Export => GDP: Long Run
				ECM	Agricultural Export <=> GDP: Short Run
				Granger Causality Tests	
6	Shah et al (2015)	Pakistan	1972 -2008	Cointegration Analysis	Agricultural Export => GDP: Long Run (-) effect
				VECM	Agricultural Export # GDP: Short Run
				Granger Causality Tests	
7	Alam and Myovella (2016)	Tanzanian	1980 - 2010	Cointegration Analysis	Agricultural Export => GDP
				Granger Causality Tests	
8	Edeme et al (2016)	ECOWAS Countries	1980 - 2013	Fixed Effect Model	Agricultural Export => GDP
				Random Effect Model	
9	Mehrara and Baghbanpour (2016)	34 Developing Countries	1970 - 2014	OLS	Agricultural Export # GDP
10	Oluwatoyese et al (2016)	Nigeria	1981 - 2014	Cointegration Analysis	Agricultural Export => GDP: Long Run
				VECM	Agricultural Export # GDP: Short Run
				Granger Causality Tests	

III. DATA AND METHODOLOGY

1) Data

This research employs four variables: Gross domestic Product (GDP), Fixed Formation Capital, Vegetables Exports and Other Exports to examine the short run and long run impacts of Vegetables Exports on economic growth. The secondary data for period 1970-2015 is collected from Central Bank of Tunisia and converted into logarithm denoted by l in each variable to make the model linear and to avoid heteroskedasticity problem.

2) Methodology

First, we will determinate the degree of integration of each variable. If the variables are all integrated in level, we apply an estimate based on a linear regression. However, if the variables are integrated in the first difference we will look into the cointegration between the variables. In this step, if the cointegration test denotes the absence of cointegration relation, we will involve the model VAR. But, if the cointegration test elects the presence of a cointegration relation between the different variables studied, the model VECM will be applied.

3) Model specification

We will utilize the augmented production function, including domestic investment (Fixed Formation Capital), Vegetables Exports and Other Exports are uttered as:

$$\mathbf{GDP_t = f(Investment, Vegetables\ Exports, Other\ Exports)} \quad (1)$$

The function can also be represented in a log-linear econometric format thus:

$$\mathbf{\log(GDP)_t = \beta_0 + \beta_1 \log(Investment)_t + \beta_2 \log(Vegetables\ Exports)_t + \beta_3 \log(Other\ Exports)_t + \varepsilon_t} \quad (2)$$

Where:

- β_0 : The constant term.
- β_1: coefficient of variable (Investment)
- β_2: coefficient of variables (Vegetables Exports)
- β_3: coefficient of variable (Other Exports)
- t: The time trend.
- ε: The random error term assumed to be normally, identically and independently distributed.

IV. EMPIRICAL ANALYSIS

1) Correlation Test

To establish how forceful the nexus is between two variables, we can use the Pearson correlation coefficient value.

- If the coefficient value is in the negative range, then that indicates the relationship between the variables is negatively correlated, or as one value increases, the other decreases.
- If the coefficient value is in the positive range, then that indicates the relationship between the variables is positively correlated, or both values increase or decrease together.

Table 3: Correlation Test

	GDP	Investment	Other Exports	Exports of Vegetables

GDP	1	0.9935	0.9932	0.9350
Investment	0.9935	1	0.9896	0.9164
Other Exports	0.9932	0.9896	1	0.9459
Exports of Vegetables	0.9350	0.9164	0.9459	1

The results of the correlation test give us that all the variables studied are positively correlated, that is meant an increase in investment, exports of vegetables and the other exports directly lead to an increase in the gross domestic product and the reverse when Is a decrease.

2) Test for unit roots: ADF and PP

Consistent with the appearance of the curves [Log (GDP), Log (Investment), Log (Other Exports), Log (Exports of Vegetables)], we observe according to their general directions at the same time and the same movement, which place their stationary in level. For this reason, we are obliged to test the stationary of the variables used in our model, in order to check whether or not the stature of a unit root is the same, using the augmented Dickey Fuller test (ADF) and the Phillipps-Perrons (PP).

Table 4: Tests for Unit Root

Variable	**ADF**		**PP**		**Order of Integration**
	Test Statistic	Probability	Test Statistic	Probability	
Log(GDP)	6.567755	0.0000	6.567755	0.0000	I(1)
Log (Investment)	4.296551	0.0074	4.296551	0.0074	I(1)
Log(Exports of Vegetables)	7.234173	0.0000	7.234417	0.0000	I(1)
Log(Other Exports)	8.023627	0.0000	9.211330	0.0000	I(1)

From Table 4, it can be seen that for all variables the statistics of the ADF test and the PP test are lower than the criterion statistics of the different thresholds than after a prior differentiation, so they are integrated with orders I(1), then we can conclude that there may be a cointegration relation.

3) Cointegration Analysis

To check the cointegration between the variables studied, it is necessary to pass through two stages. First of all, it is necessary to specify the number of optimal delay which must be

suitable for our model. Then we will use the Johanson Test to specify the number of cointegration relationships between variables.

a) VAR Lag Order Selection Criteria

The choice of the number of the delay has a very important role in the design of a VAR model. Most VAR models are estimated to involve symmetric lags, he same lag length is exercised for all variables in all equations of the model. This lag length is frequently picked using an explicit statistical criterion such as the HQ, FPE, AIC or SIC.

Table 5: VAR Lag Order Selection Criteria

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-41.76244	NA	0.000104	2.179164	2.344656	2.239823
1	179.0853	389.1127*	6.05e-09*	-7.575491*	-6.748029*	-7.272193*
2	194.2983	23.90612	6.43e-09	-7.538014	-6.048583	-6.992079
3	202.7577	11.68206	9.75e-09	-7.178939	-5.027539	-6.390366
4	214.5190	14.00156	1.33e-08	-6.977097	-4.163727	-5.945886

The results of Table 5 show us that the number of lags has been equal to 1 since the criteria FPE, AIC, SC and HQ select that the number of lags is equal to 1.

b) Johanson Test

This method is profitable because it makes it possible to give the number of co-integration relationships that remain between our long-term variables. The sequence of the Johanson test involves discovering the number of cointegration relations. For this purpose, the maximum likelihood method is used and the results are explained in Table 6.

Table 6: Johanson Test

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Probability
None *	0.610017	77.38846	47.85613	0.0000
At most 1 *	0.415665	35.95579	29.79707	0.0086
At most 2	0.226093	12.31541	15.49471	0.1424
At most 3	0.023316	1.038038	3.841466	0.3083

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

To specify the number of cointegration relations, we must examine the following hypothesis:

- If the statistic of the trace is greater than the value criticized then one rejects H0 therefore there exists at least one cointegration relation.
- If the trace statistic is less than the critiqued value, then H0 is accepted so there is no cointegration relationship.

There are 2 cointegration relationships, so the error-correction model can be retained.

4) The Results of Estimation

a) Long run equation

The results of the estimation by the maximum likelihood method denote the following cointegration relation. The long-term equilibrium relation is presented as follows:

$$\mathbf{Log\ (GDP)} = \underset{\mathbf{(0.13437)}}{-\mathbf{0.761\ Log(Investment)}} + \underset{\mathbf{(0.11154)}}{\mathbf{1.388\ Log(Other\ Exports)}} + \underset{\mathbf{(0.02611)}}{\mathbf{0.007 Log(Exports\ of\ Vegetables)}}$$

Note: The values in parentheses represent the Student test.

The equation of the long-run relationship shows that all the independent variables {Log (Exports of Vegetables)} have a positive effect on the dependent variable {Log (GDP)}. To justify the robustness of the last result and to prove and affirm that this long-term relationship is fair or not, we must test the significance of these variables. For this reason, we will apply the Vector Error Correction Model (VECM).

b) Estimation of Vector Error Correction Model (VECM)

After estimating the long-run equilibrium relationship, we estimate the equation in the following form as an error correction model. The results of the estimate give the following relation:

$$\begin{aligned}\mathrm{D(Log(GDP))} = {} & \mathrm{C(1)} * \big(\mathrm{Log(GDP(-1))} + 0.761 * \mathrm{Log(Investment(-1))} - 1.388 * \mathrm{Log(Other\ Exports(-1))} - 0.007 * \mathrm{Log(Exports\ of\ Vegetables(-1))} \\ & - 4.246\big) + \mathrm{C(2)} * \mathrm{D}\Big(\mathrm{Log(GDP(-1))}\Big) + \mathrm{C(3)} * \mathrm{D}\Big(\mathrm{Log(Investment(-1))}\Big) + \mathrm{C(4)} * \mathrm{D}\Big(\mathrm{Log(OtherExports(-1))}\Big) + \mathrm{C(5)} \\ & * \mathrm{D}\Big(\mathrm{Log(Exports\ of\ Vegetables(-1))}\Big) + \mathrm{C(6)}\end{aligned}$$

The following table shows the results of estimating the equation. If the coefficient of the variable C (1) is negative and possesses a significant probability. This means that all variables in the long-term relationship are significant in explaining the dependent variables.

Table 7: Estimation of VECM

	Coefficient	Std. Error	t-Statistic	Probability

C(1)	-0.171179	0.053550	-3.196642	0.0028
C(2)	0.128490	0.228894	0.561353	0.5779
C(3)	-0.026846	0.090465	-0.296749	0.7683
C(4)	-0.108720	0.064361	-1.689224	0.0994
C(5)	-0.047811	0.021835	-2.189665	0.0348
C(6)	0.112694	0.021124	5.334941	0.0000

In our case, the correction error term is significant and has a negative coefficient. These prove that in the long run, 1% increase in Exports of Vegetables leads to an increase of 0.007% of GDP.

c) Wald Test

The objective of the WALD test is to determine that if there is a short-term relationship between the variables used.

Table 8: Wald Test

Test Statistic	Value	Df	Probability
t-statistic	-2.189665	38	0.0348
F-statistic	4.794633	(1, 38)	0.0348
Chi-square	4.794633	1	0.0285

The results in the table 8 show that the variable Log (Exports of Vegetables) has an effect on the variable log (GDP) in the short term.

5) Checking the Quality of Estimation

a) Diagnostics Tests

To verify the quality of our estimated model and the robustness of our estimation, we use a set of tests called diagnostic tests.

Table 9: Diagnostics Tests

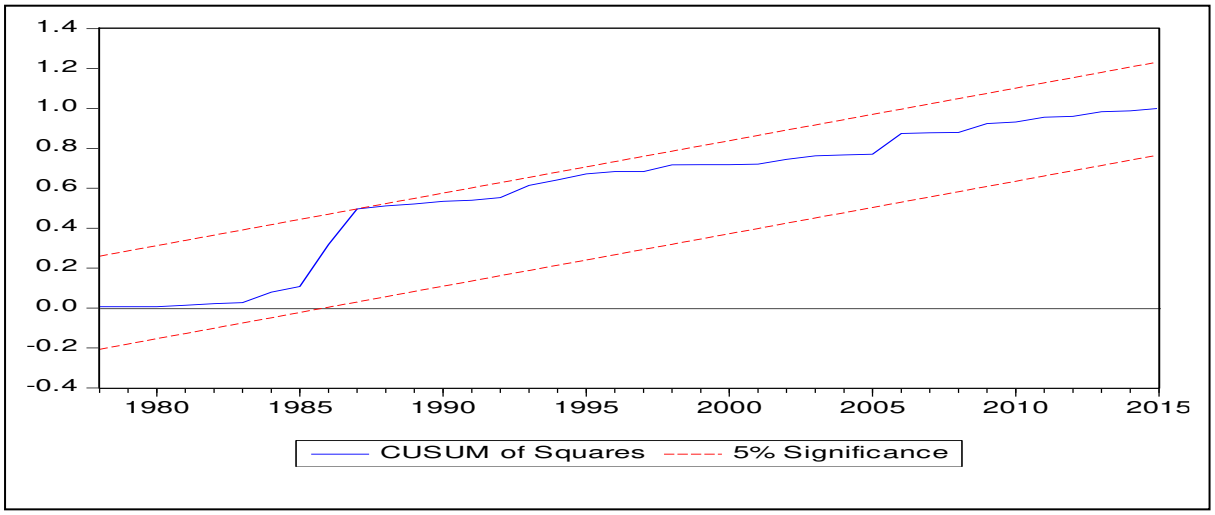
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.125651	Prob. F(1,37)	0.7250
Obs*R-squared	0.148917	Prob. Chi-Square(1)	0.6996
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.685628	Prob. F(8,35)	0.7011

Obs*R-squared	5.961239	Prob. Chi-Square(8)	0.6516
Scaled explained SS	10.29916	Prob. Chi-Square(8)	0.2447
F-statistic		4.062509	
Prob(F-statistic)		0.004728	
Durbin-Watson stat		1.986787	

Diagnostic tests indicate that the overall specification adopted is satisfactory. The tests performed to detect the presence of Breusch-Pagan-Godfrey in the estimated equation did not reveal any problem of heteroskedasticity at the 5% threshold. The Durbin Watson is acceptable, because, it is between 1, 6 and 2, 4 (1, 986787). Otherwise the probability of Fisher is less than 5%, which indicates that our model is well treated.

b) VAR Stability

Finally we will apply to use the test CUSUM of Squares, this test makes it possible to study the stability of the model estimated over time.



The test results of the stability VAR (CUSUM of Square Test) shows that the Modulus of all roots is less than unity and lie within the unit circle. Accordingly we can conclude that our model the estimated VAR is stable or stationary.

V. CONCLUSION

In this paper, we have examined the relationship between vegetables exports and economic growth in Tunisia by using times series data from 1970 to 2015. This study uses correlation analysis the ADF and PP unit root tests, Johansen cointegration analysis, Vector Error Correction techniques to investigate the long run relationship between variables. From the above study, it can be concluded that vegetables exports are positively correlated with gross

domestic product and that ADF and PP unit root test show that all variables series become stationary when first difference are considered. The empirical result proves that in the long run, 1% increase in Exports of Vegetables leads to an increase of 0.007% of GDP. On the other hand, empirical analysis proves also that in the short run term, exports of vegetables cause economic growth. The reason that exports of vegetables have a positive effect in the short term is the speed of productivity of its plants. Since tomatoes, potatoes Onions, garlic and pepper need and only require a period between 3 and 6 months to give their profits. On the other hand, the positive effect of vegetable exports for long-term economic growth is explained as a follow-up. The increase in the number of warehouses and cold stores has facilitated the sale of these vegetables outside of their season with student prices. Since, the types of these vegetables are in great demand in all the countries of the world. Despite the fact that their contribution to the gross domestic product is too low for the Tunisian case because they share in agricultural exports in 2015 is 8% and 0.376% of total exports. Tunisia has the chance to increase its economic growth by means of sector by applying best management of the agricultural lands since to can loan of 80% of the agricultural land in Tunisia are not used, and by applying means and techniques more modern way to have a more profitable productive in the vegetable sector.

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