

# INCREASING THE COMPETITIVENESS OF THE REPUBLIC OF MOLDOVA THROUGH THE DEVELOPMENT OF THE HORTICULTURAL SECTOR

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## Abstract

Competitiveness represents an important notion, both at macroeconomic level as well as at microeconomic level, being measured by different economic indicators. The interest to this term increased very much in the last period, both nationally and locally at level of enterprises because economists all over the world try to understand why some countries register accelerated economic increase compared to others, trying in this sense to find out solutions.

The horticultural sector of the Republic of Moldova plays an important role in increasing the competitiveness of the country. In the horticultural sector are produced one third of the total agricultural production, it is high value added and the majority of the population is employed in the horticultural sector.

In this scientific article is analysed the role of the horticultural sector in increasing the competitiveness of the Republic of Moldova, the constraints the horticultural producers are facing during different stages of the value chain and are proposed measures to increase the competitiveness of the Republic of Moldova through development of the horticultural sector.

**Key words:** competitiveness, horticultural sector, agricultural enterprises, Total Factor Productivity, Revealed Comparativ Advantage

The success of a business in conditions of high competition between local and foreign companies cannot be described without taking in consideration the notion of competitiveness, which is a very popular term among politicians, scientists, and mass-media.

Analyzing the notion of competitiveness we can reveal that exists several levels of competitiveness: competitiveness of products, competitiveness of enterprises, competitiveness of branches of national economy, competitiveness of a country.

The competitiveness of the Republic of Moldova is determined by the competitiveness of the sectors of national economy.

Analyzing the horticultural sector of the Republic of Moldova we can reveal that it is a high value added sector, because of high value added products: fruits and vegetables; one third from the total agricultural production is represented by the horticultural production and the majority of the population from the rural area is employed in the horticultural sector of the Republic of Moldova.

Horticultural sector of the Republic of Moldova plays a special role in increasing the competitiveness of the country because

horticultural products represent high valued added products which generates higher profits for the agricultural producers compared to other agricultural products, such as cereals, for example, where the profits are much lower.

The development of the horticultural sector faces multiple constraints at different stages of the horticultural production value chain.

The basic purpose of this scientific research is to analyze the role of the horticultural production in increasing the competitiveness of the Republic of Moldova; to reveal the constraints the agricultural producers are facing while producing horticultural production; to analyze the competitive position of the Republic of Moldova in regional context and to find out solutions in order to overcome the existing constraints in increasing the competitiveness of the horticultural production.

## MATERIAL AND METHOD

In this scientific research were used data from the: National Bureau of Statistics of the Republic of Moldova; The Global Competitiveness Report 2016-2017 compile and/or collected by the World Economic Forum; Ministry of Agriculture and Food Industry of Moldova and other sources.

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The analyze of specialization of the Republic of Moldova is based on revealed comparative advantage, introduced by Balassa (Balassa B., 1965):

$$ACR_i^j = \left( \frac{X_i^j - M_i^j}{X_i^j + M_i^j} \right) \quad (1)$$

$$-1 \leq RCA \leq +1 \quad (2)$$

where: X – exports; M – imports; i, t – product or group of products;  $ACR_i^j$  – revealed comparative advantage.

This indicator can take positive or negative values. In case when this indicator will take positive values it is considered that the analyzed country has comparative advantage, but when it takes negative values it is considered that it doesn't exist comparative advantage.

In the same time in this scientific study was used the global indicator of competitiveness - **Total Factor Productivity** (TFP), being calculated on the basis of the Malmquist productivity index, which consists of two components: the index of technological change and the index of technical efficiency change (Chaudhary S., 2012; Fare R., et. al, 1994; Knox Lovel C.A., 2003; Coelli T.J., 1996; Latruffe L., 2010):

$$M_0(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)} \left[ \left( \frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})} \right) \left( \frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^t, y^t)} \right) \right]^{\frac{1}{2}}$$

Where,

**Technical efficiency change:**

$$\frac{D_0^{t+1}(x^{t+1}, y^{t+1})}{D_0^t(x^t, y^t)}$$

**Technological change:**

$$\left( \frac{D_0^t(x^{t+1}, y^{t+1})}{D_0^{t+1}(x^{t+1}, y^{t+1})} \right) \left( \frac{D_0^t(x^t, y^t)}{D_0^{t+1}(x^t, y^t)} \right)^{\frac{1}{2}}$$

TFP may take the following values:

- TFP > 1, then in the period t (between the moment t and t+1) was registered an increase of productivity;
- TFP = 1, in this case wasn't registered changes at the productivity level;
- TFP < 1, then was registered a decrease of productivity.

The data processing was performed using the program DEAP version 2.1.

As research methods were used: analysis, comparative method, logical analysis, graphical method, Malmquist Index, RCA.

## RESULTS AND DISCUSSIONS

The notion of competitiveness implies static and dynamic components. At the macroeconomic level, the World Economic Forum (WEF) beginning with the 2005, performs the analyze of competitiveness of all countries of the World using the Global Competitiveness Index (GCI), which is an instrument which measures the basis of the microeconomic and macroeconomic competitiveness of countries. The WEF defined competitiveness as: „a set of institutions, policies, and factors that determine the level of productivity of an economy, which in turn sets the level of prosperity that the country can achieve” (Schwab K., 2016).

In this sense, the GCI represents the weighted average of variables which are grouped in 12 categories, called “competitiveness pillars”, which summarizes an ensemble of institutions, policies and factors which determine the level of productivity of an economy (Schwab K., 2016).

The basic pillars of competitiveness according to WEF are (Schwab K., 2016):

- **Basic requirements:** institutions, infrastructure, macroeconomic stability, health and primary education;

- **Efficiency enhancers:** higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, market size;

- **Innovation and sophistication factors:** business sophistication and innovation.

Analyzing the Global Competitiveness Report 2016-2017 edition, the countries are classified in three stages of development (table 1):

- **Factor-driven** (competitiveness is based on primarily unskilled labor and natural resources);

- **Efficiency-driven** (competitiveness is based on development of efficient production processes);

- **Innovation-driven** (competitiveness is based on innovations; business is based on sophisticated production processes).

According to the data of Global Competitiveness Report 2016-2017, Republic of Moldova is situated on 100 th place from 138 analyzed countries with the GDP equal to 1804.7 USD per capita, out of which we can reveal that Republic of Moldova is a factor-driven economy (GDP < 2000 USD) where competitiveness is based on primarily unskilled labor and natural resources.

Analyzing the basic pillars of competitiveness of the Republic of Moldova, according to the data of Global Competitiveness Report 2016-2017, we can reveal some of the weak points which negatively influence the

competitiveness of the country, where there is a necessity of improvement measures, namely:

- **Institutions** – Republic of Moldova is situated on 128 place out of 138 countries, which is lower than Romania which is located on 92 place or Russian Federation, which is located on 88 place. Republic of Moldova must improve the institutional system where all the members of society interact with each other.

- **Business sophistication** – Republic of Moldova is situated on 127 place out of 138 countries. The level of business sophistication in RM is very low because doesn't exist a well-developed business network, the companies doesn't apply strategies for penetrating new markets; doesn't exist branding strategies, strategies of producing unique and sophisticated products.

- **Innovation** – Republic of Moldova is situated on 133 place out of 138 countries which is lower than Romania which is situated on 93 place; Russian Federation – 56 place and Ukraine – 52 place. This is the lowest position occupied by Republic of Moldova from all analyzed competitiveness pillars. There is a need of investments in modernization of the production process in order to apply the scientific technical progress.

- **Market size** – Republic of Moldova is located on 124 place of 138 countries which is lower than the neighbor countries: Romania, which is situated on 42 place; Ukraine – 47 place; Russian Federation – 6 place. The local market is very small and there is a need to diversify the marketplace of agricultural production.

- **Goods market efficiency** – Republic of Moldova is situated on 107 place which compared to Romania is lower, which is situated on 80 th place. There is a need of business sophistication in order to satisfy all the customers' needs; the products must be more diversified and there must be created brand strategies in order to attract customers.

Analyzing in the regional context the most problematic factors of doing business, we can reveal that according to the WEF Executive Opinion Survey 2016 (table 2) the 5 most problematic factors of doing business in Republic of Moldova are: corruption, policy instability

government instability, inefficient government bureaucracy and access to financing.

As we can see from the table 2, the biggest common problematic factors of doing business for all the neighbor countries (Republic of Moldova, Ukraine, Romania, Russian Federation) are: corruption; access to financing; inefficient government bureaucracy. All of this problematic factors influence negatively the competitiveness of the country, but competitiveness of the country is determined by the competitiveness of the sectors of economy.

The agricultural sector contributes to GDP formation by 10-12%, depending of the year.

Analyzing the structure of the agricultural production for 2016 year we can reveal that the horticultural production constituted approximately one quarter from the total agricultural production. Horticultural products represent high value added agricultural products which generate demand, being the most important source of income for the majority of the population from the rural area (Golban A., 2013; Golban A., 2015).

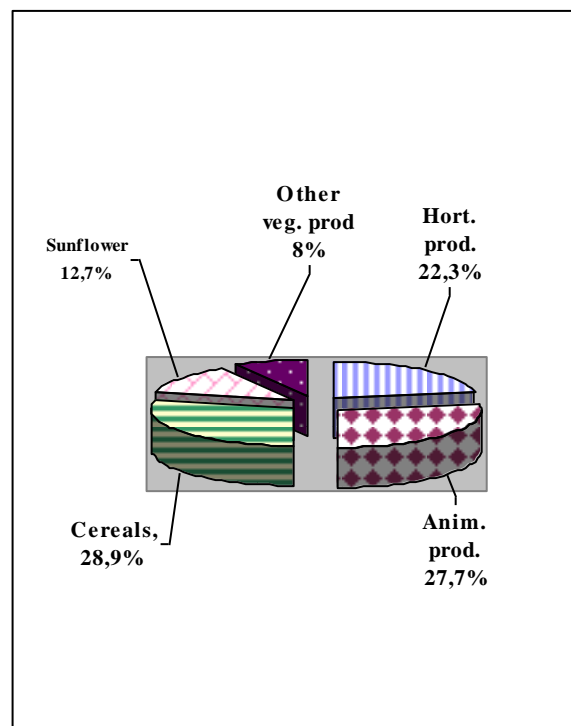


Figure 1. The structure of the agricultural production in all categories of households, 2016

Table 1

**The importance of factors and the income thresholds in ensuring competitiveness at different stages of economic development**

	Stage1: factor driven	Transition from stage 1 to stage 2	Stage 2: efficiency driven	Transition from stage 2 to stage 3	Stage 3: innovation driven
<b>GDP per capita (USD)</b>	<2,000	2,000-2,999	3,000-8,999	9,000-17,000	>17,000
<b>Basic requirements,%</b>	60	40-60	40	20-40	20
<b>Efficiency enhancers,%</b>	35	35-50	50	50	50
<b>Innovation and sophistication factors,%</b>	5	5-10	10	10-30	30

Source: Global Competitiveness Report 2016-2017

Table 2

**The analyze of competitiveness of Republic of Moldova compared to neighbor countries from the point of view of the most problematic factors of doing business, 2016-2017**

Factors	Countries	Republic of Moldova	Ukraine	Romania	Russian Federation
Corruption		20.6	14.0	10.1	10.9
Policy instability		15.2	13.2	3.5	6.7
Government instability		15.0	8.2	1.5	3.1
Inefficient government bureaucracy		8.0	11.4	15.9	6.0
Access to financing		6.2	11.2	16.6	10.7
Inflation		6.1	11.9	1.1	13.8
Tax rates		4.3	7.3	14.7	13.3
Inadequate supply of infrastructure		4.3	2.7	7.3	4.3
Foreign currency regulations		4.3	4.5	0.3	5.2
Tax regulations		4.0	6.8	7.4	7.7
Inadequately educated workforce		3.8	0.5	10.4	4.6
Restrictive labor regulations		2.4	2.5	2.6	2.7
Poor work ethic in national labor force		2.2	1.5	4.7	3.6
Insufficient capacity to innovate		1.5	1.6	2.4	3.6
Crime and theft		1.1	1.6	0.8	2.9
Poor public health		0.8	1.3	0.6	1.0

Source: elaborated by the author based on data from Global Competitiveness Report 2016-2017

The horticultural sector is represented by two sub-sectors:

- Sub-sector of fresh horticultural products
- Sub-sector of processed horticultural products.

The production of fruits and vegetables for the fresh products market offers the highest incomes for the agricultural producers being very competitive on the local and foreign markets.

The competitiveness of the horticultural products was determined using the Revealed Comparative Advantage (RCA) (Lafay G., 1992; Laursen K., 1998; Lasok D., 1998; Mahanta A.K., 2005; Liefert W., 2002).

Analyzing the table 3 we can reveal that the biggest revealed comparative advantage in 2016 was registered at cereals constituting 0.828, being followed by - oil seed, oleagic fruits, grain, seed, fruit – 0.719; edible fruit, nuts, peel of citrus fruit,

melons – 0.534; vegetable, fruit, nut, food preparations – 0.405.

The Republic of Moldova registered comparative advantage at horticultural production, because the value of RCA was higher than zero, being equal to 0.534 for edible fruit, nuts, peel of citrus fruit, melons and to 0.405 for vegetable, fruit, nut, food preparations.

From the analyze of the RCA of the products included in the group '08 – "Edible fruit, nuts, peel of citrus fruit, melons" for the period 2012-2016 (table 4) we can reveal that the biggest RCA was registered for fresh apples, pears and quinces which was equal in 2016 to 0.901; being followed by fresh/dried grapes, where RCA constituted 0.819, which represent an increase compared to 2015 by 0.74 and on the third place are fresh apricots, cherries, peaches, nectarines, plums & sloes with the RCA equal to 0.896, which also represent an increase compared to the previous

year by 0.677. Also positive values of RCA in 2016 were registered at dried fruits, where this indicator was equal to 0.808 and nuts, where RCA was equal to 0.777.

Table 3  
The analyze of the dynamics of the RCA of top 5 agricultural products from the Republic of Moldova during 2012-2016

Products \ Years	2012	2013	2014	2015	2016
Cereals ('10)	0,488	0,810	0,841	0,780	0,828
Oil seed, oleagic fruits, grain, seed, fruit, etc, nes ('12)	0,627	0,729	0,695	0,707	0,719
Edible fruit, nuts, peel of citrus fruit, melons ('08)	0,493	0,505	0,495	0,446	0,534
Vegetable, fruit, nut, etc food preparations ('20)	0,424	0,487	0,465	0,496	0,405
Animal,vegetable fats and oils, cleavage products, etc ('15)	0,519	0,189	0,504	0,560	0,380

Source: elaborated by the author under the base of data from [www.trademap.org](http://www.trademap.org)

According to the table 3 we can observe that there are lots of products where RCA took negative values, which reveals that Republic of Moldova has comparative disadvantage for that products. These products are not produced in the Republic of Moldova. They are imported (citrus, Brazil nuts, pineapples, etc.).

Table 4  
The analyze of the RCA of '08 products group for Republic of Moldova during 2012-2016

Products \ Years	2012	2013	2014	2015	2016
Apples, pears and quinces, fresh	0,914	0,945	0,946	0,914	0,901
Dried fruit	0,739	0,845	0,759	0,832	0,808
Grapes, fresh or dried	0,620	0,568	0,702	0,745	0,819
Apricots, cherries, peaches, nectarines, plums & sloes, fresh	0,271	0,344	0,264	0,219	0,896
Nuts nes	0,869	0,833	0,802	0,755	0,777
Citrus fruit, fresh or dried	-0,756	-0,757	-0,841	-0,941	-0,966
Brazil nuts, cashew nuts & coconuts	-1,000	-0,845	-0,992	-0,990	-0,983
Dates, figs, pineapples, mangoes, avocados, guavas	-0,826	-0,486	-0,694	-0,377	-0,908

In this scientific research was analysed the data from 303 agricultural enterprises, which had horticultural function of production in order to determine the global index of competitiveness – Total Factor Productivity (TFP).

In this case the function for determining the competitiveness of the agricultural enterprises had the following form:

$$\left\{ \begin{array}{l} \min_{\theta, \lambda} \theta \\ -y_i + Y\lambda \geq 0 \\ \theta x_i - X\lambda \geq 0 \\ N1 \cdot \lambda \leq 1 \\ \lambda \geq 0, \end{array} \right.$$

Where:

$\theta$  - efficiency parameter;

$n$  – number of farmers

$Y$  – output vector, represented by the income from selling the agricultural products

$X$  – input vector,  $n^x 3$  dimensional, given by:

- Surface of the agricultural lands effectively seeded
- Costs for labour remuneration, thousands lei
- Other costs, which include: costs for seeds and planting material, thousands lei + costs for chemical and natural fertilizers, thousands lei + costs for auxiliary activities and indirect consumptions, thousands lei

$N1$  – is vector  $n$ - dimensional with 1 component;

$\lambda$  – variable of linear programming problem which would be solved.

The data was processed using the Data Envelopment Analysis Program 2.1 (Coelli T.J., 1996). In this context was defined the working file with the primary data: **hr303.dta** which contains the data of 303 agricultural enterprises and the file with the results of the calculations – **hr.out**.

The command file which define the matrix contains: number of enterprises – 303, number of outputs – 1, number of inputs – 3 were defined in the file **hr303.ins**

Table 5

**The command file hr303.ins of evaluation the competitiveness of the agricultural enterprises from the Republic of Moldova**

```
hr303.dta DATA FILE NAME
hr303.out OUTPUT FILE NAME
303      NUMBER OF FIRMS
5        NUMBER OF TIME PERIODS
1        NUMBER OF OUTPUTS
3        NUMBER OF INPUTS
1        0=INPUT AND 1=OUTPUT ORIENTATED
0        0=CRS AND 1=VRS
2        0=DEA (MULTI-STAGE), 1=COST-
          DEA, 2=MALMQUIST-DEA, 3=DEA (1-
          STAGE), 4=DEA (2-STAGE)
```

Source: elaborated by the author using the DEAP 2.1

Analysing the results from the figure 2 we can reveal that with the increasing of the share of the horticultural production sales income in total sales income of agricultural enterprises, the value of the average TFP is increasing, namely the enterprises are more competitive with the increase

of the share of the horticultural production sales income in total sales income.

In this sense, for the enterprises with the share of the horticultural production sales income in total sales income over 60%, the value of the average TFP constituted 1,074, which is more by 0.048, than at the enterprises with the share of the horticultural production sales income in total sales income till 20%.

In the context of the performed investigations the enterprises with the share of the horticultural production sales income in total sales income more than 20% were grouped by surface.

From the analyze of the figure 3, we can reveal that the majority of the agricultural enterprises where the share of the horticultural production sales income in total sales income was more than 20% have the surface till 100 ha, registering higher value of TFP, being equal to 1.101.

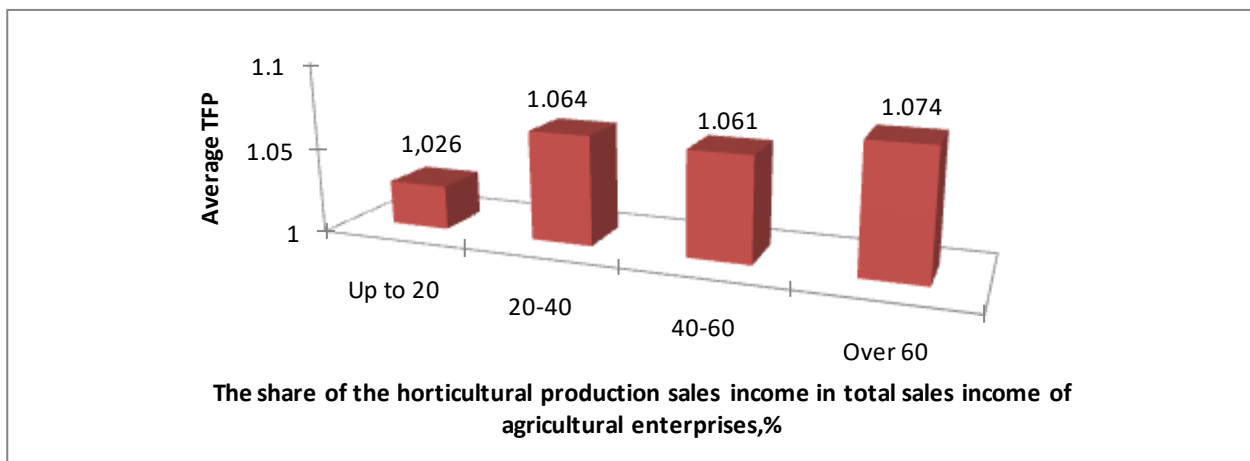


Figure 2. The dynamics of the TFP depending on the share of the horticultural production sales income in total sales incomes of enterprises

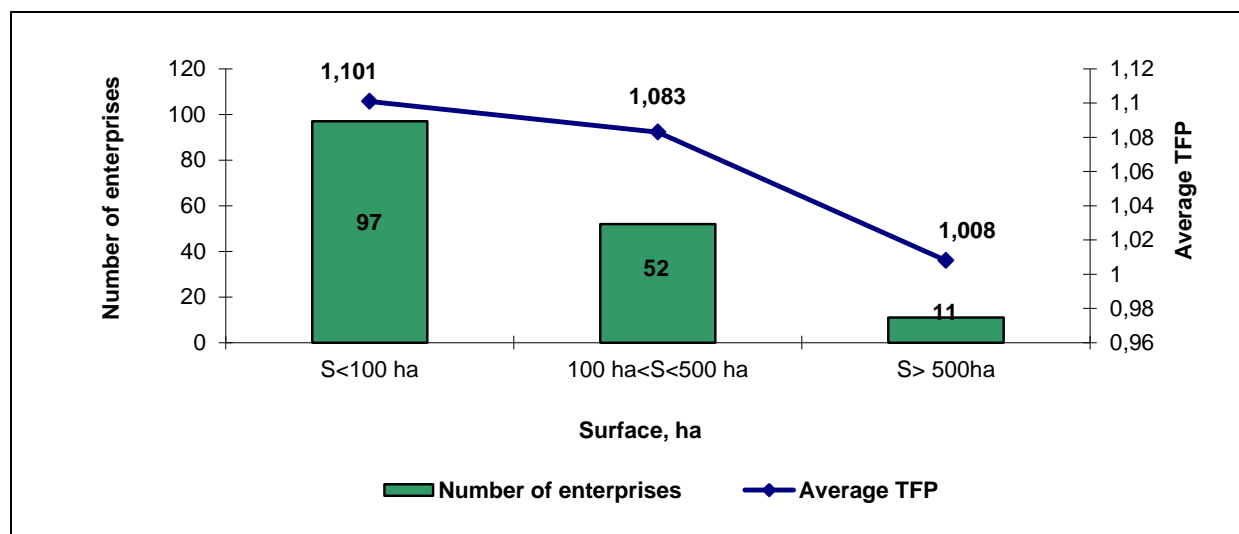


Figure 3. The analyze of the average TFP depending on the surface of the agricultural enterprises which have the share of the horticultural production sales income in total sales incomes >20

Once with the increase of the cultivated surface with the horticultural production over 100 ha, it is revealed a decrease of the TFP namely: for the enterprises with the cultivated surface with horticultural production between 100-500 ha, the value of TFP constituted 1.083, and for enterprises with the cultivated surface more than 500 ha, the value of TFP was equal to 1.008. The decrease of the TFP depending on the cultivated surface with horticultural production is explained by the fact that the majority of the agricultural enterprises have subunit values of the technological efficiency, which reveals that are necessary investments in the park of tractors in order to modernize the production process and in conditions of transition to a competitive agriculture (Golban A., 2015).

In case of enterprises with surfaces less than 100 ha, the value of TFP is high (1.101), which reveals that the level of insurance of enterprises with tractors is high, being used more efficient and respectively the enterprises are more competitive compared to the enterprises with higher surfaces, but where the park of tractors is insufficiently used or the tractors are characterized by high degree of use, which determines high consumptions for a unit of surface.

In the same time, one of the reasons of a smaller TFP at the enterprises with surfaces more than 100 ha is the fact that the majority of the surfaces of enterprises are cultivated with cereals – low value added products, which determine lower incomes at a unit of surface, compared to horticultural products, which are high value added products.

## CONCLUSIONS

The horticultural sector is very important for the economy of the country, the horticultural products, being rich in vitamins and high value added products.

The share of the horticultural products in total agricultural products constitute approximately one quarter.

In Republic of Moldova, according to the performed investigations, the horticultural products registered supraunitary values of Revealed Comparative Advantage during 2012-2016 years, which means that this products are competitive on the market, generating demand.

The highest values of RCA, in 2016, was registered at apples, pears and quinces, fresh – 0.901, being followed by apricots, cherries, peaches, nectarines, plums & sloes, fresh – 0.896, and on the third place were situated grapes, fresh or dried – 0.819.

According to the data of Global Competitiveness Report 2016-2017, Republic of Moldova is a factor-driven economy (GDP < 2000 USD). The competitiveness in Republic of Moldova is based on primarily unskilled labor and natural resources.

The most problematic factors of doing business for the Republic of Moldova and for the neighbor countries are: corruption; access to financing; inefficient government bureaucracy, which influence negatively the competitiveness of the country.

Analysing the competitiveness of agricultural enterprises using the TFP, we can reveal that with the increase of the share of the horticultural production sales income in total sales income of agricultural enterprises (more than 20%), the value of the average TFP is increasing. In this sense the competitiveness of enterprises is increasing.

In the same time, was registered that at the majority of the agricultural enterprises where the share of the horticultural production sales income in total sales income was more than 20% and which had the cultivated surface till 100 ha, registered higher value of TFP, the average value of TFP being equal to 1.101.

Once with the increase of the cultivated surface with the horticultural production over 100 ha, it is revealed a decrease of the TFP, which can be explained by the fact that the majority of the surfaces of enterprises are cultivated with cereals – low value added products, which determine lower incomes at a unit of surface, compared to horticultural products, which are high value added products and determine higher incomes at a unit of surface.

In the context of the mentioned above, we can reveal that horticultural sector has a high importance for the economy of the Republic of Moldova. The horticultural products, are high value added, once with the increase of the share of the horticultural production sales income in total sales income more than 20%, the enterprises will be more competitive on the market., registering higher values of TFP.

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