The Global Organic Agri-Food Market: The Current Trends and Development

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Abstract:
Nowadays, the organic market is growing more and more. Most people are having a preoccupation of what they eat, and the benefits of their eating habits. Growth domestic product means the total of money spent by businesses and consumers in given period. It is used by economic industry to measure the progress of a country. An economy that is developing and progressing has a higher growth domestic product. On the other hand, the interest of an individual that has already covered his primal needs tends to move towards its wealth, being more careful of what he eats than having concerns of whether it can afford food. At the opposed pole are the countries that have a lower growth domestic product per capita, where it is highly visible that the concern is inclined towards affording any kind of food and not towards food's provenience. This level of interest was mostly reached in countries that have a higher growth domestic product per capita and an educated population. The internal motivation of population sets the trends towards consumption, therefore looking into a country's growth domestic product's rate and wealth, it is visible that where its population has reached a certain level of wealth, the organic market tends to grow also as a response to a higher demand. Therefore, the wealthier a country is the higher the number of organic operators is. This paper aims to analyze this correlation between GDP and the number of organic operators.

Keywords:

market, organic, development, trends
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Introduction

Organic production is a complex agri-food production and management system focused on the implementation of sustainable production practices that enable both environmental protection and compliance with the preferences of a growing segment of consumers for products obtained strictly from natural processes because of the removal from the production process of all synthetic inputs (such as additives, pesticides, or genetically modified organisms). The orientation of the consumers shows that there is a significant number of people that are willing to pay more to get the BIO products (Laroche, et al., 2001). A relevant indicator for the pace at which the transition to sustainable production methods occurs is the number of agricultural producers active in the organic sector. Since the results of organic farming, both economically and in terms of reducing the environmental impact compared to traditional agriculture, depending on their efforts and investments, it is important that their numbers increase each year (Hamzaoui-Essoussi, et al., 2012). To be noted is that the demand for organic products is also mirrored by the number of the organic producers (Jones, et al., 2001). The nearly 3 million organic

farmers operate in 172 countries, practicing sustainable production methods at different stages of development. Over 80% of organic producers are found in Asia and Africa, with positive developments in the two regions. In Europe, in 2018, the number of producers registered an increase of 5.12% compared to 2017, totalling 418,610 thousand.

As can be shown in Figure 1, in 2018 there was a slight decrease in the number of organic agricultural producers totalling 2.79 million, 5% less than in 2017 when the total number of producers was 2.94 million.

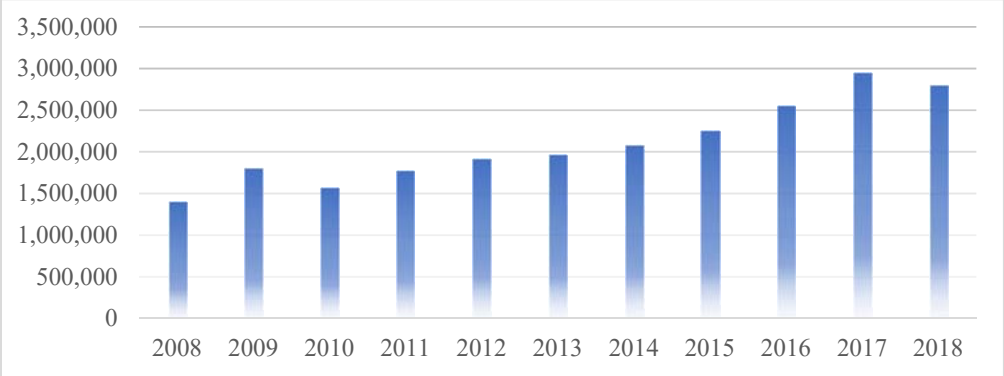

Figure no. 1. Evolution of the total number of global organic producers
Source: FiBL, 2019

Also, one can note the doubling of the number of organic producers in the period 2008-2018 and from the methodological point of view it is important to mention that, in the centralization of data, some states considered only sustainable agricultural enterprises, while others have reported including small farmers. In fact, some of the countries reported the number of companies, which is why it can be assumed that the real number of organic farmers is higher than the one that emerged from the calculations. (Winter and Davis, 2006)

As regards the market value of organic products, since 1999, when a first official assessment of global sales of organic products has been carried out, there have been spectacular increases at global level, but also at regional and state level. The positive development is confirmed by the statistical data provided by the Research Institute for Organic Agriculture (FIBL) according to which, at the end of 2018, the organic product market was assessed at almost 97 billion. The euro, an increase of 185.29% compared to the total value of EUR 34 billion in 2008. To analyse the global evolution of the organic products market, were used the data recorded during 2008-2017.

In the graphical representation of the data for the period 2008-2018 (Figure 2) you can see the increasing pace recorded globally.

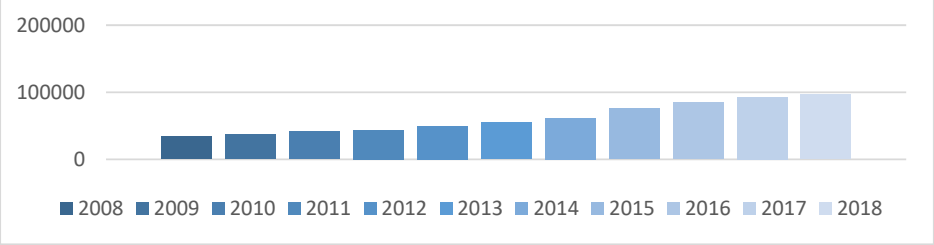

Figure no. 2. Evolution of Total Organic retail sales [Million €]
Source: FiBL, 2019

Although organic production is developed across all regions with significant increases across all continents, consumption is still highly concentrated in the US and Western Europe, although the two regions together only hold a quarter of the total area Organically grown agricultural (FIBL, 2019). Under these circumstances, ascending production in Asia, Africa and the rest of the regions is intended for export.

Review of the scientific literature

The organic market and its benefits are highly discussed (Martindale, et al., 2020), the argments are declaring organic market to be sustainable and providing economic growth. Besides that, it should be taken in consideration the fact that it doesn't only have impact on a macroeconomical level, but also at microeconomical level – even going to an individual level and health. It was proven that food has more health implicaitons and the concern of what a population eats it is one of the driving forces for the organic products market (Willet, et al., 2013).

Organic farming has a great contribution to long-term economic development and plays an important role in improving the condition of the environment, preserving the soil, improving water quality, bio diversification and protecting nature. Organic farming can move forward in the rural economy and make it viable by expanding high-value-added economic activities and generating jobs in rural areas (Toncea I., 2002)

A retrospective of the development of agricultural practices shows that organic farming has taken shape as an alternative to conventional agriculture aimed primarily at the continuous growth of agricultural production by using fertilizers in large quantities. Accentuating intensification factors has a negative impact on the environment and brings with it irreversible mutations on wildlife and immense damage with serious consequences on the balance of the environment and especially on human health. (Mitchell et al., 1997).

Organic farming promotes sustainable production systems, ensures the integrity of the biosphere and encourages the production of good quality products in order to improve the human environment and protect the environment as a whole.

Research methodology

This paper will use comparative methods with correlation. Based on the information available for the moment in terms of GDP and organic operators, trends of the market, population needs, the Pearson coefficient model will be used to establish the connection between GDP and the number of organic producers. The influences of those two variables are going to be analyzed and explained in regard with the global organic food market trends. The organic food production will not be taken in consideration only from a plastic point of view – it should be stated that the benefits for one's health must be mentioned also. (Rizzo, G., et al., 2020).

The main objective of this study is to analyze the evolution of the organic agri-food market as well as to identify the relationship between gross domestic product (GDP) and the number of organic operators.

Therefore, this paper presents a quantitative analysis of the organic market and wants to find conclusive answers to the question: Is there or not a relationship between gross domestic product (GDP) and the number of operators in the organic products market? To find the answer to this question, the specific tools used in calculating indicators were established based on Excel Data Analysis software in the Microsoft Office package.

Results and discussion:

- ***Correlation between organic retail sales, total organic producers and GDP***

In order to establish the influence that the organic retail sales and organic certified producers can have on GDP, it is desirable to carry out an analysis using the Pearson correlation coefficient. The correlation

analysis shows the level of connection and intensity between two variables and how much they tend to change together. For available data, the Pearson correlation coefficient (rxy) shall be used. It is determined by the ratio of the sum of the products of deviations to the product of standard deviations and evaluates the meaning and intensity of the connection between the two variables. The sign of the coefficient indicates the direction, i.e. whether the variables are reported directly proportionally or inversely proportionally, and the value of the coefficient indicates the intensity, the closer the value to 1 (in the absolute value), the higher the intensity. The Pearson correlation coefficient is calculated by the formula:

$$r_{xy} = \frac{\operatorname{cov}(x,y)}{s_x s_y} = \frac{s_{xy}}{s_x \cdot s_y} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\left[\sum_{i=1}^{n}(x_i - \bar{x})^2\right]\left[\sum_{i=1}^{n}(y_i - \bar{y})^2\right]}}$$

Figure no.3 – Pearson correlation coefficient

where:

rxy - Pearson correlation coefficient

xi — individual values of the variable

$\bar{x}$— the average of individual values of x

yi — individual values of the variable

$\bar{y}$— the average of the individual values of y

With MS Excel's optional Data Analysis program, the correlation coefficients were determined between TOTAL Organic retail sales [Million €], TOTAL Organic Producers and Total GDP effect indicator. They are shown in Table 3 below:

Table no. 3. Calculation of total organic produceres and GDP

	Total Organic retail sales [Million €]	TOTAL Organic Producers	*Total GDP*
Total Organic retail sales [Million €]	1		
Total Organic Producers	0.969198869	1	
Total GDP	0.849669442	0.807251964	1

Source : Authors personal calculation

The direct link between the three indicators is noticeable, but the focus will be on direct link between the number of organic producers and the dependent variable (GDP), it can be seen that there is a correlation coefficient of 0.80 (in absolute value) which suggests that when one of the variables increases and the other increases.

Further, it will be determined the way of influence through simple linear regression, in order to measure the interdependence between the 2 variables, the number of organic producers and GDP.

This analysis model allows the dependent variable to be expressed as a function, depending on the independent variable. Depending on the number of independent variables, the function can be unifactorial or multifactorial, in this case the first form will be used, being of the form: Y = a + b*x + e, where: Y — dependent variable, x — independent variable, a — free term, b — coefficient of independent variable, e — the error. The regression model shall be determined by identifying variables, calculating function coefficients and testing the model, possibly and making forecasts. Before determining the model equation, the 1st order autocorrelation shall also be tested using the Durbin-Watson

test. This test allows the identification of the first order autocorrelation, i.e. whether the residual values are correlated with model variables. This test is carried out by determining the DW value and then comparing it with the tabular value DW, whereby it will be possible to determine whether there is autocorrelation (positive or negative), indecision or independence.

$$DW = \frac{\sum_{i=2}^{n}(\hat{\varepsilon}_i - \hat{\varepsilon}_{i-1})^2}{\sum_{i=1}^{n}\hat{\varepsilon}_i^{\,2}},$$

where:

DW – the value of the Durbin-Watson test,
$\hat{\varepsilon}$ – residual values of the econometric model

This value is compared with the values d1 and d2 in the Durbin Watson test table according to the level of significance and the decision can be determined according to the following rules.

• Rules of decision on the Durbin Watson test

0< DW<d1	d1 ≤ DW ≤ d2	D2≤ DW≤4-d2	4-d2≤ DW≤4-d1	4-d1<DW<4
Positive Autocor-relation	Indecision ←	Independence	Indecision →	Negative Auto-correlation

Figure no. 4. The rules of decision on the Durbin Watson test
Source : Wikipedia, 2021

In order to measure the interdependence between the number of organic producers and GDP, the following linear simple regression model will be used:

Table no. 2. Regression Statistics

Regression Statistics	
Multiple R	0.81
R Square	0.65
Adjusted R Square	0.61
Standard Error	4,766,058,300,105.73
Observations	11.00

Source: Authors own calculation

ANOVA

Table no. 3. ANOVA calculation

	df	*SS*	*MS*	*F*	*Signif-icance F*
Re-gres-sion	1.00	382,446,563,668,110,000,000,000,000.00	382,446,563,668,110,000,000,000,000.00	16.84	0.00
Re-sidual	9.00	204,437,805,480,060,000,000,000,000.00	22,715,311,720,006,700,000,000,000.00		
Total	10.00	586,884,369,148,170,000,000,000,000.00			

Source: Authors calculation based on The WORLD BANK DATA, 2021

Table no. 4.ANOVA calculation

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Inter-cept	47,760,101,039,139.00	6,531,406,187,882.72	7.31	0.00	32,985,033,748,075.60	62,535,168,330,202.40	32,985,033,748,075.60	62,535,168,330,202.40
X Vari-able 1	12,489,063.36	3,043,713.97	4.10	0.00	5,603,704.00	19,374,422.72	5,603,704.00	19,374,422.72

Source: Authors calculation based on The WORLD BANK DATA, 2021

Residual Output

Table no. 5. Residual Output

Observation	*Predicted Y*	*Residuals*
1.00	65,150,097,664,482.00	(1,343,573,549,179.79)
2.00	70,326,926,828,694.40	(10,008,420,503,179.60)
3.00	67,297,342,327,934.50	(1,269,027,962,558.77)
4.00	69,942,201,231,895.40	2,472,761,347,589.67
5.00	71,692,281,191,442.50	4,447,882,101,051.89
6.00	72,280,715,900,703.40	4,976,518,489,282.37
7.00	73,653,276,453,010.10	3,139,974,018,200.36
8.00	75,775,043,427,208.60	1,580,815,027,577.98
9.00	79,594,261,447,956.00	(3,693,918,765,941.30)
10.00	84,539,256,129,020.20	(3,625,724,876,518.03)
11.00	82,684,567,774,771.30	3,322,714,673,675.23

Source: Authors calculation based on The WORLD BANK DATA

For this model there was a correlation coefficient (Multiple R) of 0.807, which led to a close and positive relationship between the evolution of the number of organic producers and GDP values, respectively when one variable increases, the other increases.

At the same time, the coefficient of determination (R Square) was calculated, with a value of 0.651, which indicates that the dependent variable (GDP) is explained by the independent variable (organic producers) at the rate of 65.1%.

Conclusions

In the ANOVA table, which assumes variance analysis, the following indicators determining the validity of the model can be observed. The value of the statistical parameter F may or may not reject the null hypothesis, i.e. the validity of the model, comparing it with the value of the critical F. Thus, in the case of the model the F value is 16,83 and the critical F value of 0,002 thus, it is assessed that the value of F versus the critical F is significantly higher, and in conjunction with the fact that the significance level recorded by F (Significance F) is less than 0,05 it can be stated that the model is valid.

The coefficients table will consider whether the null hypothesis can be rejected, i.e. whether the function coefficients will be different from 0 for the model to be valid. To test this will be analyzed statistical parameter t (t Stat), which again will be compared with the critical t value to be able to exclude the null hypothesis. The critical value of the parameter t is 4,10. As can be seen, both coefficients of the regression equation record a value t greater than the critical value, the significance level (P-value) is below the threshold of 0.05, and the confidence intervals do not contain the null value, thus the null hypothesis is rejected. Finally, the residual values will also be tested to eliminate the possible first order correlation with the Durbin-Watson test. Calculating using the formula presented, a DW value of 1.23 was determined and according to the decision rules presented above, we are in a situation of indecision

tending to positive autocorrelation. With all these assessments, related to the rejection of the null hypothesis and the validity of the regression model, one can write the regression function:

GDP = 12489063.36* Total number of Organic Producers + 4.77601E+13

From this function it is highlighted that the value of the coefficient X (Total number of Organic Producers) is 12489063.36 respectively when the number of organic operators increases by one unit, the GDP value will increase by 4.77 units. Furthermore the analyis reaches a certain conclusion, when the population is wealthier – meaning a higher GDP will increase the number of the organic operators. The viceversa applies, when the number of organic producers grows, the growth domestic product raise as well. The trends of the organic market are aligned with the level of wealthiness, hence the individual preocupation for its health. To conclude, the intrinesec need of oneself for a healthier life and the circumstances of wealthines are a force that impacts the growth domestic product.

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