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EVOLUTION TRENDS IN ORGANIC FOOD PRODUCTION IN POLAND

Summary

The production of organic food entails particular difficulties, which can be seen especially in the initial period of the implementation and improvement of the system. The success of the activities undertaken in this area can be measured by analysing the evolution trend of this kind of agricultural production, which is the aim of the present study. The trend was specified in relation to the number of organic agricultural producers and the size of the organic utilised agricultural area in the 2004-2014 period. The study used the method of least squares. In the analysed period, a clear linear trend can be seen in the shaping of the above mentioned parameters, with the trend being upward until 2013. As indicated by the defined trend functions, the number of organic agricultural producers in Poland may exceed 43 thousand in 2020, and the organic utilised agricultural area may reach 1.12 m. ha, assuming that no factors will occur that may seriously disrupt the functioning of the market.
***Key words**: organic food, evolution trend, trend function*

TENDENCJE ROZWOJOWE PRODUKCJI ŻYWNOŚCI EKOLOGICZNEJ W POLSCE

Streszczenie

Produkcja ekologicznej żywności wiąże się z określonymi trudnościami, widocznymi zwłaszcza w początkowym okresie wdrażania i doskonalenia systemu. Skuteczność i atrakcyjność podejmowanych w tym obszarze działań można ocenić na podstawie analizy tendencji rozwojowej tego kierunku produkcji rolnej, która jest celem niniejszego opracowania. Trend oszacowano w odniesieniu do liczby ekologicznych producentów rolnych oraz powierzchni ekologicznych UR w latach 2004-2014. W pracy zastosowano metodę najmniejszych kwadratów. W analizowanym okresie można zaobserwować wyraźny trend liniowy w kształtowaniu się powyższych parametrów - do 2013 r. z tendencją wzrostową. Jak wynika z wyznaczonych funkcji trendu, w 2020 roku liczba ekologicznych producentów rolnych mogłaby w Polsce przekroczyć 43 tys., a powierzchnia ekologicznych użytków rolnych osiągnąć 1,12 mln ha, przy założeniu niewystąpienia czynników silnie zakłócających funkcjonowanie rynku.
***Słowa kluczowe**: żywność ekologiczna, tendencja rozwojowa, funkcja trendu*

1. Introduction

The changing behaviour of food consumers and the growing attention paid by them to the issue of the safety of consumed products, as well as their own health, indicate that there exists a need to invest in the systems of food products quality protection and the development of organic agricultural production. As A. Kowalska [3] pointed out: "in Poland, where traditional farming was, and still is, underfunded, mechanization and the use of chemicals are limited and the unemployment rate is high, transition to an organic way of farming comes naturally and smoothly to a Polish farmer". However, some of more important, and for many farmers – the most important reasons for implementing the system of organic farming are those of economic nature, including the profitability of production and market competitiveness. Empirical research and the studies of the subject matter literature indicate that the production of organic food poses concrete difficulties which are visible particularly in the initial stages of implementing and improving the system, such as: lower yield, a higher production risk, higher production costs [2]. Hence it is necessary to undertake complex actions aimed at improving the functioning of the organic food market – both the whole system and its particular elements. *Framework Action Plan for Organic Food and Agriculture in Poland in 2014-2020* is aimed at carrying out projects to attain such goals as: increasing the competitiveness of organic farming, increasing the supply of organic food, diversifying and strengthening the channels of ecological products distribution, improving the level of the cooperation between the entities in the organic farming industry [9]. A number of activities are the continuation of the programme supporting the market of organic food established many years before and carried out by means of e.g. successive editions of *Rural Development Programme.* The value of the undertaken actions can be assessed on the basis of the analysis of the evolution trends in this sector, which is the aim of this study.

2. Methodology of research

The article presents an attempt to specify the evolution trend (the directions and intensity of changes) in the Polish market of organic agricultural products. For the sake of comparison, domestic data are presented next to the data concerning the EU-27. The trend was estimated on the basis of the number of organic agricultural producers and the size of organic utilised agricultural area. The analysis was based on the data concerning Poland in 2004-2014, and the EU-27 in 2004-2013. The study used the method of least squares, assuming that the trend is a linear function ($y = a + bt$). According to H. Mruk, a substantial majority of evolution processes can be presented by means of a straight line, and a linear function is a model more commonly used to analyse and forecast the development of a phenomenon in time [6]. The parameters of the trend function were defined based on the following formulae:

$$a = \frac{\sum y - b\sum t}{N}, \quad (1)$$

$$b = \frac{N\sum yt - \sum y \sum t}{N\sum t^2 - (\sum t)^2}, \quad (2)$$

where:
a, b – function parameters; *y* – empirical (actual) values of the phenomenon; *t* – period numbers; *N* – the number of analysed periods [6].

The evaluation whether the trend fits empirical values was based on the following measures [6]:
a) *coefficient of convergence*

$$\varphi^2 = \frac{\sum(y - \hat{y})^2}{\sum(y - \bar{y})^2}, \quad (3)$$

where: y – the values of particular terms of time series; ŷ – theoretical values obtained from the trend function; □ – arithmetic mean of the empirical values of the variable;
b) *coefficient of determination:*

$$R^2 = 1 - \varphi^2. \quad (4)$$

Output data for the research were acquired mostly from the reports and information made available by Agricultural and Food Quality Inspection, Central Statistical Office of Poland and the European statistics resources.

3. Results of the analysis

According to numerous researchers, organic farming is no longer a niche in the EU. Since 2008, the average growth rate has been 8%, the annual market turnover has increased to 20 billion euros, and in the last ten years over 500 thousand hectares of land a year have been converted into organic agriculture area [8].

Since 2004, an upward trend was seen in Poland in terms of the number of organic farms, however, the year 2014 was the first one when a downward trend occurred. (Table 1, Figure 1). However, it was a year when an increase occurred in the number of organic processing plants by almost 20% (407 in 2013, and 484 in 2014), as well as an increase in the average area of an organic farm by about 5% - from 25.2 ha in 2013 to 26.5 ha in 2014 [11].

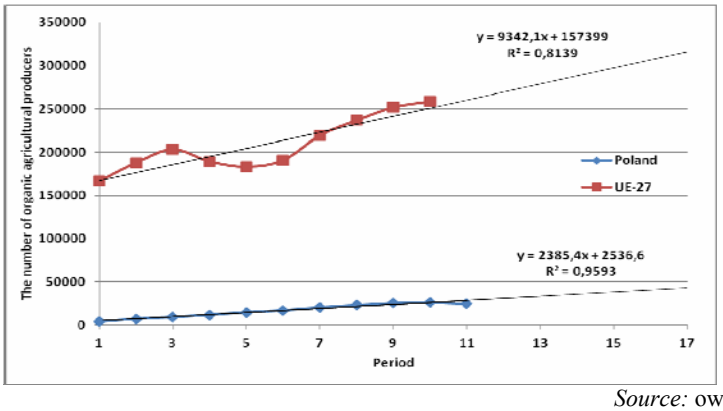
The rise in the population of organic agricultural producers in Poland was the most dynamic in 2005, when it grew almost twofold in comparison to the previous year. Undoubtedly, it was the result of Poland's joining the EU and the occurrence of a number of opportunities related to the subsidies available in this kind of agricultural production. In the subsequent years, the growth in the number of organic farms was substantially less dynamic - (20-30% a year in 2006-2008 and 2010, 10-15% in 2009 and 2011-2012, as well as 2.5% in 2013), to a fall in 2014.

Table 1. Data used to estimate the trend function for the number of organic farms and the size of organic utilised agricultural area in Poland and in the EU-27
Tab. 1. Dane wykorzystane do oszacowania funkcji trendu liczby ekologicznych gospodarstw rolnych i powierzchni ekologicznych UR w Polsce oraz w UE-27

Years (t)	No. of organic agricultural producers Poland (y_1)	No. of organic agricultural producers EU-27 (y_2)	Organic utilised agricultural area Poland (y_3)	Organic utilised agricultural area EU-27 (y_4)
2004 – 1	3705	166707	83730,0	5880478,0
2005 – 2	7183	187777	166299,7	6337829,0
2006 – 3	9189	203376	228009,1	6945479,0
2007 – 4	11870	189322	287528,4	7227303,0
2008 – 5	14896	183241	314921,2	7790643,0
2009 – 6	17091	190700	416261,4	8390000,0
2010 – 7	20582	219290	519068,4	9016093,0
2011 – 8	23449	236774	605519,6	9518234,0
2012 – 9	25944	251849	661687,3	9960521,0
2013 – 10	26598	258773	669969,4	9561717,0
2014 – 11	24829	b.d.	657902,1	b.d.

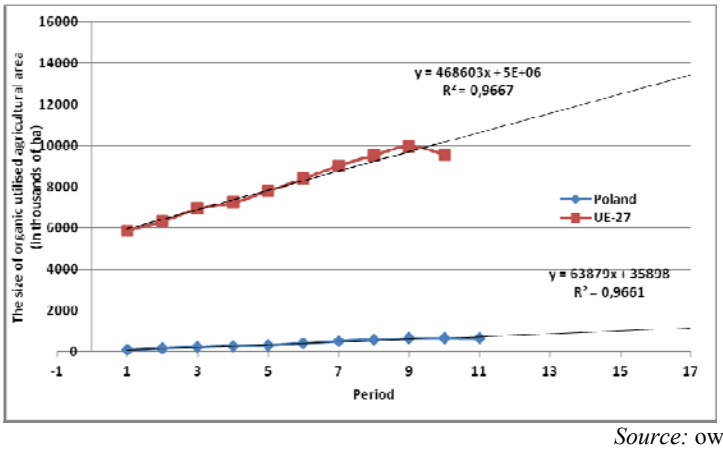
Source: own elaboration based on [5, 10, 4, 7, 1, 12,13]
Źródło: opracowanie własne na podstawie [5, 10, 4, 7, 1, 12,13]

In Poland, in the analysed period, a clear linear trend can be observed in the case of the number of organic agricultural producers, which is confirmed by the coefficients of: convergence – 0.0407, and determination – 0.9593. The coefficient of convergence represents the extent to which a trend function fits empirical data – the closer the value of the coefficient is to zero, the better the trend function fits the data. The coefficient of determination represents in how many per cent a function explains the variability of a dependent variable – in the case of the number of organic agricultural producers – it is in 96%. To compare, in the case of the EU-27, the linear trend function describes the analysed phenomenon in a slightly less accurate way. As can be seen in Table 1 and Figure 1, the increases in the numbers of organic holdings were more varied in particular years.



Source: own elaboration based on Table 1.
Źródło: opracowanie własne na podstawie tabeli 1.

Fig. 1. Evolution of the number of organic holdings in Poland and the EU-27
Rys. 1. Trend rozwojowy liczby gospodarstw ekologicznych w Polsce i UE-27



Source: own elaboration based on Table 1.
Źródło: opracowanie własne na podstawie tabeli 1.

Fig. 2. Evolution of the organic utilised agricultural area in Poland and the EU-27
Rys. 2. Trend rozwojowy powierzchni ekologicznych UR w Polsce i UE-27

There are a number of factors which influence the interest in organic production in Poland, but in the EU, with member states varying greatly in terms of their social-economic situation and consumer behaviour, the number of determinants is considerably higher. A strong organic food sector has been built in the EU for years, therefore its position is better established in the EU-15, which accounts for 83% of all organic farms in the EU. However, the number of organic farms in the member states which started joining the EU in 2004, the number of such farms rose tenfold in 2002-2011 [8].

The mentioned financial support for organic farming is crucial, but, as rightly observed by H. Runowski [15], an immensely important issue is a relative sustainability of agricultural systems, assessed on the basis of their accumulated efficiency. An increase in the efficiency of organic agriculture is limited by rigorous standards defined for certified production, and, as follows from various studies, consumers are reluctant to accept big differences in prices of conventional vs. organic products. There is also a danger that in the future taxpayers will not be willing to accept a high financial support drawn from the budget and given to organic farms which supply only a fraction of consumers (those who are wealthier and more aware). In the current budgeting period this problem is not visible yet – in *Rural Development Programme 2014-2020* there is even an activity: *Organic Farming* (before, it was in a form of an agro-environmental measure), emphasising the significance of organic farming for the development of rural areas.

The same trend as in the case of the number of organic farms was observed in the number of hectares of organic utilised agricultural area – it was growing until 2013, but in 2014, for the first time for several years, it fell by almost 2% (Table 1, Figure 2). The share of organic utilised agricultural area in total utilised agricultural area is approximately 4.5%. In the structure of the area of organic farms, in 2004-2014 there was a decrease in the share of the smallest entities with the size up to 10 ha (44% in 2004 and 37.8% in 2014).

A similar trend occurred in the case of farms with the area exceeding 100 ha – their share was 5% in 2004, but 4.7% in 2014 [11, 14]. Both in Poland and in the EU-27 a clear linear trend can be observed in the analysed period in the case of utilised agricultural area, which is confirmed by the coefficients of: convergence – 0.0339 and 0.0333, and determination – 0.9661 and 0.9667 respectively.

According to the specialists analysing the sector of organic farming, there are considerable opportunities for the development of organic agricultural production as the areas converted to organic agriculture so far account for only 5.4% of the total of the utilised agricultural area in the EU [8]. As follows from the trend functions, the number of organic agricultural producers may exceed 43 thousand in Poland and 316 thousand in the EU in 2020. Additionally, the size of organic utilised agricultural areas may reach 1.12 million ha in Poland and 12.97 million ha in the EU (Graph 1 and 2). Achieving the forecast values depends on many factors shaping the organic food market, including: consumers' demand and expectations, consumers' awareness and trust, the quality of organic food, the efficiency of the functioning of the market, regulations concerning certification and production of products, agricultural policy – both Polish and European, commercial policy, innovativeness and competitiveness of the sector, the possibilities for acquiring financial support.

4. Conclusions

According to the International Federation of Organic Agriculture, in 10 years, i.e. from 2010 to 2020, the sector of organic food in Europe has a potential to double the size of utilised areas, the number of entities, and the market share [8]. The evolution trend to date and the forecast made on the basis of the trend function do not seem to be so optimistic. Regardless of the pace of the development of organic farming and the scale of the growth of its basic indicators, any progress means a higher employment rate and a higher rate of income which can be provided by this sector.

Polish and EU organic farming policies seem to confirm the fact that the significance of this direction of activity is appreciated by the whole agriculture sector and by the economy in general. Documents such as *Framework Action Plan for Organic Food and Agriculture in Poland in 2014-2020, Action Plan for the future of Organic Production in the European Union,* or *Rural Development Programme 2014-2020* contribute to the quantitative and qualitative development of the organic food market and create conditions encouraging farmers to conduct activity in this area.

The key factors influencing decision of farmers to convert to organic farming undoubtedly include the certainty of demand for their products, good relations with customers, as well as a proper cooperation with suppliers and a good

cooperation with other farmers. These are the elements which allow them to gain competitive edge by means of increasing the quality of their products, increasing the scale of production, gaining attractive payment terms, finding more opportunities for investing and implementing innovations, exchanging experiences or undergoing trainings.

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