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Transformation of the Organic Food Market in Poland Using Concentration and Dispersion

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Abstract:

Purpose: *This paper aims to isolate transformations that have been taking place on the Polish organic food market through the lens of cluster development with the intention to indicate the dynamics of organic food clusters – their concentration and dispersion.*
Design/Methodology/Approach: *The employed methodology is centred around location quotient as a measure of concentration which allows to pinpoint clusters. The narrative in the paper follows the development of structures as the Polish organic food market undergoes various transitions.*
Findings: *Organic farmland and organic operators in Poland are not evenly distributed regionally. The conducted study allowed the identification of development patterns of their regional concentration at NUTS-2 level. Throughout the analysed period certain regions have become specialised in organic farming and organic food processing.*
Practical Implications: *As organic producers and organic food processors undergo a process of geographic concentration and are located in proximity with each other the clusters that are formed should translate into an increase of the competitive advantage of the supply-side of the Polish organic food market. Given the necessity to compete not only among each other but with conventional farmers and food processors as well as distributors, organic producers and organic food processors should make use of the proximity advantage and cooperate with the aim of strengthening their position on the market.*
Originality/Value: *The authors undertook a study that goes beyond static analysis of the organic food market in Poland.*

Keywords: *Organic food market, concentration, clusters, location quotient, Poland.*

JEL Codes: *L66, R12, Q13.*

Paper Type: *Research article.*

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1. Introduction

Every year more and more consumers choose to fill their shopping baskets with organic products as awareness of sustainable consumption grows. Greta Thunberg, an environmental activist on climate change who was named Time's 2019 Person of the Year (Time, 2019) is a prominent example of voices of concern raised over current ecosystem issues. Moreover, new trends among consumers are emerging as they become more interested in food quality, protection of the environment and aware of what they eat.

According to a study conducted in 60 countries the most desirable food attributes among consumers are freshness, naturalness, and minimal processing (Nielsen Global Health and Wellness Survey, 2015). A review of the literature on consumers' perceived importance of food naturalness conducted by Romàn *et al.* (2017) confirms that food naturalness is crucial for most consumers. When it comes to food from organic agriculture, people tend to believe that it has healthier properties (Gomiero, 2018) but also that it tastes better than conventional food and is environmentally friendly (Gottschalk and Leistner, 2013). Interestingly, the evidence whether organic food significantly differs from non-organic food with regard to nutrition or health impact is not evident (Załęcka *et al.,* 2014).

Polish consumers have similar views on organic food. An extensive study of organic food consumption in Poland was carried out by Bryła (2016). In comparison with conventional food Polish consumers find organic food to be more expensive but healthier and more environmentally friendly. Moreover, they believe it has better quality and is subject to more strict controls, is produced in a more traditional way and is tastier. As to their perception of organic food its main attributes include healthiness and high quality.

Consumers follow different motives to buy organic food. At the same time, different barriers impede them from including organic food in their diet. As academic interest in the organic food market increases and new research is being carried out, the results of the analyses into the motives of organic food consumption seem to be different and have different relative importance. For example, according to Lillywhite *et al.* (2013) the essential motives include health, safety, taste, and environment. In Poland, a study by Żakowska-Biemans (2011) found sensory factors, price, and safety to be the most important purchasing motives for organic food consumers. Whereas according to Bryła's study (2018) the most important organic food selection motives include: healthiness, eco-friendliness, safety, taste, and quality assurance. Kushwah *et al.* (2019), through a systematic literature review on determinants of organic food consumption (both motives and barriers), found that they are "fragmented and contextualized" and because of this fact their results cannot be generalized.

Irrespective of the similarities and differences in consumers' motives, the demand for organic food has been constantly growing. Global sales in 2017 reached 97 billion USD (which translates into an increase of more than 300 percent since the beginning of the 21st century) but they are geographically concentrated. About 91 percent of global revenues are generated in Europe and North America (the US and Mexico). The US market is valued at 45.2 billion USD (it accounts for about 47 percent of the world market of organic food products) and is followed by the European market which is valued at 39.6 billion USD. Western European countries lead in organic food consumption but demand in CEECs is also increasing (Sahota, 2019).

The organic food market is undergoing constant development. However, certain barriers have resulted in the market arriving at a crossroads. From the consumers' perspective, these barriers mainly include higher prices of organic vs. conventional food but also problems with consumer confidence in organic products or lack of such (Aschemann-Witzel and Zielke, 2015). Moreover, consumers have trouble differentiating organic and conventional products. That fact brings confusion due to which some consumers resign from buying organic products (Gleim *et al.,* 2013).

Another key barrier of organic food market development is related to different dynamics of demand and supply growth. The main issue that may arise out of this discrepancy is a risk of organic food supply shortages. Moreover, these shortages may be amped up by the trade war between the US and China. Their trade disagreements have already brought repercussions that go beyond these two economic superpowers. Other changes of geopolitical nature that are unfolding right in front of our eyes (e.g., the UK leaving the EU) will not remain insignificant to organic food markets, although we should expect that their impact will be smaller than in the abovementioned case.

Upholding the growth of demand and supply on the organic food market is consequential for the organic food market to expand further. Given the current issues that impact the demand for organic products, necessary actions should be undertaken and these include, but are not limited to, developing and upholding regulations and institutions that will protect consumers and reduce their scepticism towards organic products as well as will allow them for an easier identification of organic products (labelling). The growth of the supply side of the market, as it has not been keeping up with the growth of the demand, is also crucial and research into organic markets is necessary in order to shed light on the current developments in organic farming and organic food processing. The transformations that have been occurring on this market are an important source of knowledge on available panacea that can prevent food supply shortages from happening.

All in all, the level of prices is the most important development barrier of the organic food market. In the case of Poland, it was affirmed by Mazurek-Łopacińska and Sobocińska (2010) and along with underdeveloped distribution network they were

identified as key reasons impeding further development of the organic food market. High prices predominantly arise from high margins obtained by distributors, not so much by operators (producers and processors). Their level can be associated, firstly, with organic food market being a niche and secondly, with the level of atomisation of organic producers and processors. Lowering these margins could take place as the market keeps expanding and consumers buy more organic food products. But before it materialises (and given it materialises) various potentially effective solutions should be considered. One of them requires a shift in negotiation powers between organic operators and their distribution channels and one of the keys to achieve this goal lies in a saying "there is strength in numbers". When a market is growing, new entrants assume their operations. Their locational choices are dependent on various factors and the market undergoes spatial transformation.

This process leads to the emergence of geographic concentrations of market participants (e.g., producers and processors in the case of the organic food market). Proximity between them creates a certain type of environment where positive externalities arise which may lead to further development. This environment, through specialisation that occurs, can be characterised by e.g., increased productivity, high level of innovation, easier access to knowledge, extended pool of specialised staff, increased labour efficiency, increased competitiveness (Steiner, 1998; Lagos and Courtis, 2008; Popkova *et al.*, 2015; Grzybowska-Brzezińska *et al.*, 2017). Many advantages are generated at firm level. They include but are not limited to increased efficiency, increased capabilities, and easier access to resources (including human) (Ryzhkova and Prosvirkin, 2015).

In the case of the organic food market proximity between operators means that they have easier access to one another as they compete but also that they can more easily find someone to work together with (or in other words cooperate) and manage their relations (e.g., relations between producers and processors, producers and distributors, processors and distributors, and so on). This situation can be highly beneficial for them as they can join forces in achieving economies of scale or other positive effects.

A question arises as to how such cooperation can be organised and where the ground is most fertile for it to take place. Theory and practice equip us with different solutions in this regard. For instance, they include the option of forming cooperatives. Another solution would be to support cluster development (which in turn could include establishing cluster organizations). Cluster formation is a complex process and consists of concentration and dispersion patterns. Their identification is vital for understanding the phases of evolution of the market, especially now when various challenges for the future development have materialised. With this in mind, the main aim of this paper is to isolate transformations that have been taking place on the organic food market in Poland through the lens of cluster theory and the main characteristics of clusters – the geographic concentration of their participants. Following a methodology that

employs location quotient as a measure of concentration the authors are hoping to compile a set of recommendations that will benefit further development of the market.

2. Literature Review

Organic agriculture can be defined in various ways. IFOAM4 describes it as *"a production system that sustains the health of soils, ecosystems and humans."* According to USDA5 National Institute of Food and Agriculture organic agriculture is *"an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity, is experiencing growth."* On top of that FAO6 perceives organic agriculture as *"a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity."* In other words, organic agriculture aims at producing healthy and sustainable food using exclusively biological and ecological processes (Azadi *et al.*, 2011).

Globally, a rising tide of organic agriculture has been sustained in 2017. An all-time high of 69.8 million hectares of organic agricultural land (certified and in-conversion) was recorded and amassed to 1.4 percent of world farmland. Countries such as Australia, Argentina, and China were global leaders with 51 percent, 5 percent, and 4 percent of global organic agricultural land respectively. It was the same year that organic farmland increased by 20 percent. Moreover, an increase took place in all regions (7.6 percent in Europe) (Willer, Moeskops, Busacca and de la Vega, 2019).

Organic farming as we understand it today is a result of the evolution of different ideas which originated at the beginning of the 20th century. The science-based natural agriculture (the Land Reform movement) and the anthroposophic biodynamic agriculture were the two foundations of organic agriculture (Vogt, 2007). The latter movement originated in Germany where in 1924 Rudolf Steiner's Agriculture Course (Landwirtschaftlicher Kurs) in biodynamic farming was held in Koberwitz near Breslau in Silesia (now Kobierzyce, Poland). Today it is believed, although arguably, to be the first course in organic agriculture ever held. It most likely gathered 111 attendees, 30 of whom came from Poland if using current country borders (Paull, 2011). Historically, the first attempts at alternative agriculture in Poland date back to 1930 when biodynamic agriculture was introduced by Stanisław Karłowski in Szelejewo (a village located in what is today Wielkopolskie Voivodeship). The aftermath of the Second World War did not bring favourable circumstances to the development of organic agriculture in Poland. A shift came at the beginning of the 1980s when biodynamic agriculture was

[4] *https://www.ifoam.bio/en/organic-landmarks/definition-organic-agriculture*
[5] *https://nifa.usda.gov/glossary#O*
[6] *http://www.fao.org/organicag/oa-faq/oa-faq1/en/*

reintroduced and soon it became somewhat synonymous to organic agriculture. Beginning in 1984 various courses promoting the idea of organic agricultural production were organized for Polish farmers and in 1989 the Association of Organic Food Producers EKO-LAND was established. It later went to become the second IFOAM member from Eastern Europe (Duda-Krynicka and Jaskólecki, 2010). However, it was not until 1990 when first organic certificates were awarded to a group of 27 of them and not until 1998 when they could receive institutional financial support (Główny Inspektorat Inspekcji Skupu i Przetwórstwa Artykułów Rolnych, 2001).

Given its short history as well as when comparing Poland to other advanced economies, the organic food market in Poland is still at a relatively early stage of development. As such it undergoes constant transformations. Some of them originate from the fact that new players enter the market and choose different locations. It is a standard course of events that new industries spread unevenly in space. In some cases, the initial stimulus of their inception originates from pioneers who plant the idea behind it. Some locations are more willing to pick them up and at a certain point they end up specialising in it. The history of organic farming in Poland is an example of such pattern. However, with time, new locations pull up and industrial geographic distribution transforms. It is the location that matters, especially in the case of farming, which is highly dependent on specific resources.

Each location that hosts economic activity possesses a set of specific characteristics. At the same time, every economic activity has specific requirements for a potential location. At its earliest stage of development location theory (which deals with questions on what, where, and why economic activities are located) was focused on agricultural issues. The foundations of location theory are built upon works of e.g., von Thünen, Weber, and Christaler. However, with time it was noticed that because locations differ, certain industries tend to agglomerate in areas most beneficial for them at a certain moment in time and this fact results in the emergence of agglomeration effects. It was Marshall who presented the first theory of mechanisms leading to industry agglomeration (Lindqvist, 2009) when he coined the term of "industrial districts" (Marshall, 1920).

Marshall concluded that the existing geographical proximity within an industry is a determinant of the occurrence of positive effects that can be beneficial for all entities belonging to this industry. In other words, an industrial district allows companies to acquire, develop, and consolidate skills and competences, and to use the existing economies of scale. His ideas on industrial districts were later picked up – either directly or indirectly – by researchers working on other concepts related to industrial agglomeration. Such was the case of Becattini who studied the phenomena behind industrial districts in Italy. Accoding to Becattini (2017) an industrial district is *"a socio-territorial entity which is characterised by the active presence of both a community of people and a population of firms in one naturally and historically bounded area. In the district, unlike in other environments, such as manufacturing*

towns, community and firms tend to merge." Another prominent author interested in industry studies is Porter. He introduced the concept of clusters as key drivers of competitiveness which he defined as geographic agglomerations of companies, suppliers, service providers, and associated institutions in a particular field, linked by externalities and complementarities of various types (Porter, 1990).

The relations that unfold between cluster participants – who compete and cooperate with each other – influence cluster structure and impact cluster performance. It is the pressure and challenges that companies located in a cluster face that shape their competitive advantages against their competitors. Strong competition between rivals and with suppliers but also demanding consumers shape the capacity of an industry to have positive impact on the region or nation within which it is located. The emphasis on these relations distinguishes clusters from other concepts of industrial agglomeration. At the same time clusters resemble Marshall's industrial districts due to their geographic concentration and the considerable number of participants.

Without fail, the cluster concept draws from theories and concepts dealing with enterprises' location and the effects stemming from geographic concentration. Clusters are structures organised in a sectorial way given their geographic boundaries. Since their introduction by Porter three decades ago research into clusters has been picked up by various authors, e.g., those looking for evidence of clustering effects. It was because of their findings that cluster-based approach to economic development has emerged and was picked up by policymakers. The idea that clusters are responsible for numerous positive effects has spread globally and ever since its inception has quickly converted from theory into practice through implementing the cluster concept into policy debates. It stems from the fact that clusters are believed to have a multifaceted impact on the economic environment (Kuberska, 2018).

The desire to duplicate the Silicon Valley in other latitudes and longitudes is common. That is why various governing bodies adopt the idea of *"growing"* or *"incubating"* clusters in their countries or regions either through supporting clusters and/or cluster initiatives (organisations). Cluster initiatives are organised, coordinated actions that bring together key actors whose aim is to support clusters. They can be defined as a *"formally organized effort to promote cluster growth and competitiveness through collaborative activities among cluster participants"* (Mills *et al.*, 2008). They may follow different objectives, e.g., they may choose to impact cluster expansion, innovation and technology, education and training, commercial cooperation, policy action, and research and networking (Sölvell *et al.*, 2003). Because of that supporting cluster organisations has become a popular cluster policy tool.

Undeniably, clusters are ecosystems of relations which take form of complex networks. Moreover, they can be responsible for desirable outcomes that are beneficial for many market participants. In the case of the organic food market in

Poland clustering can be a helpful circumstance in overcoming current development issues. Through further concentration of operators (regional specialisation) and assisted by cluster organizations (initiatives) that aim at improving clusters' competitiveness, the market could move forward and overcome its current obstacles. With that in mind it is essential to investigate concentration and dispersion patterns of organic operators in Poland. Identification these patterns can be helpful in establishing which areas lead the organic food market and due to intense competition but also cooperation may develop conditions for further expansion of the organic market in Poland.

3. Research Methodology

Boundaries of clusters as structures of geographically proximate groups of market participants do not align with administrative borders. Delimiting their area within these blurred lines remains a gruesome task. What makes research into cluster concentration and dispersion even more complex and challenging is data availability. Moreover, the quality of research output conducted in the area of cluster mapping is determined by the quality of data available. Researchers are not always able to access detailed data and remain dependent on more aggregate datasets. Cluster mapping becomes an even more daunting task when analysing cluster dynamics. The complications stemming from the abovementioned issues have contributed to the notion that clusters remain elusive.

Regardless of the abovementioned obstacles, this study is carried out by looking into the process of transformations that have been taking place on the organic food market in Poland through the lens of cluster theory. It is the intention of the authors to follow the transformation patterns (concentration and dispersion) of organic food clusters in Poland using location quotient (LQ). LQ is a measure which makes it possible to compare a local area characteristic to the national characteristic (Robinson, 1998). In other words, *"a location quotient is a way of measuring the relative contribution of one specific area to the whole for a given outcome"* (Moineddin *et al.*, 2003). Due to its attributes, it is particularly applicable when making comparisons between regions or countries. The location quotient for jth area is defined as:

$$LQ = \frac{x_{ij}}{x_j} \div \frac{x_i}{x} \tag{1}$$

where:
xij – the value of statistic x for industry i in area j,
xi – the value of statistic x for area j,
xj – the value of statistic x for industry i in the country,
x – the value of statistic x in the country.

Location quotient measures an area's industrial specialisation compared with a chosen larger geographic unit. In this paper the authors are analysing Polish NUTS-2 regions (voivodeships) and comparing them with country data. The procedure of computations is carried out by comparing an industry's share of a regional total for a chosen statistic and dividing it by that industry's share of the national total for the same statistic. The carried-out calculations include three types of the location quotient: one that illustrates specialisation patterns of organic agricultural land (LQfarmland) and two that illustrate specialisation patterns of organic operators (producers – LQorg prod and processors – LQorg proc).

As mentioned above, adequate data is not always available to researchers, especially those aiming to carry out a very detailed analysis. This occurs because certain types of data can be missing or the quality of gathered data is doubtful. Such is the case of the organic food market. The data for this study was collected from three sources. Worldwide and national data on the organic food markets comes from the Research Institute of Organic Agriculture (FiBL) database. Data on the organic food market in Poland was supplied by the Agricultural and Food Quality Inspection (IJHARS). IJHARS carries out control over organic farming in Poland under the Organic Farming Act. Its tasks include supervising certifying units, receiving applications from producers entering organic farming, authorising import and controlling organic products from third countries, and gathering, storing and providing information on organic farming. The employed data covers the following characteristics of the organic food market in Poland: organic farmland and number of organic operators (organic producers and organic food processors). Finally, the authors employed data from the Polish Central Statistical Office (GUS) which included: data on agricultural land, data on the number of agricultural producers in the register of producers, and data on the number of entities of the national economy in Section C – Manufacturing, divisions 10 (Manufacture of food products) and 11 (Manufacture of beverages) of the Polish Classification of Activities (PKD 2007) for 2009–2017 and Section D (Manufacturing), division 15 (Manufacture of food products and beverages) of the Polish Classification of Activities (PKD 2004) for 2005–2008.

In the classic approach the threshold for interpretation of the LQ which delimitates three intervals is 1.00. LQ=1.00 means that a region and the country are equally specialised in the analysed economic activity (industry). Values below this threshold account for lower and values above this threshold account for higher concentration. However, following Miller's *et al.* (1991) proposition, in this paper the authors distinguished five, not three intervals:

(1) very underrepresented industries (LQ less than 0.7);
(2) moderately underrepresented industries (LQ of 0.71 to 0.90);
(3) industries with "average" representation (LQ of 0.91 to 1.10);
(4) industries with moderately high representation (LQ of 1.11 to 1.30);
(5) industries with very high representation (LQ of 1.31 and more).

The adopted methodology is aimed at determining the transformation of the patterns of concentration and dispersion of organic food clusters within the 16 NUTS-2 regions in Poland in 2005–2017. By employing the above described methodology, through this paper and the comparative analysis of the results that it contains, the authors attempt to establish which regions have become centres of organic farming and organic food processing within the analysed timeframe.

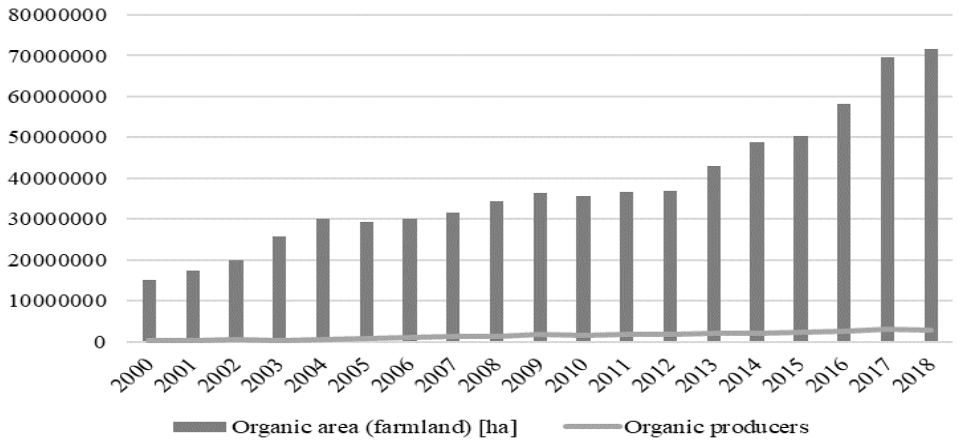
4. Results and Discussion

4.1. Organic Food Market from an Evolutionary Perspective

According to the World Bank database 7 the value added in agriculture, forestry, and fishing in 2017 accounted for 3.43 percent of global GDP compared to 3.76 percent in 2007 and 5.62 percent in 1997. During this time, agriculture became more organic and organic markets grew. The growth has been taking place in all regions and applies to all key indicators. In 2017 organic activities were conducted in 181 countries (93 of which had organic regulations) (Willer and Lernoud, 2019).

One of the key indicators illustrative of the size of the organic market is the area of organic farmland. In 2017 organic agricultural land accounted for 1.4 percent of total agricultural land (Willer, Lernoud and Kemper, 2019). In 2018 (71.49 million ha) compared to 2000 (14.97 million ha) organic farmland rose worldwide almost five-fold (Figure 1).

Figure 1. *Organic farmland and organic producers in 2000-2018*



Source: *Own study based on Research Institute of Organic Agriculture (FiBL) data*.

In 2000 Europe and North America accounted for 37.67 percent of organic farmland and in 2018 this value dropped to 26.53 percent. In 2018 organic farmland in Europe

[7] *https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS*

reached 15.64 million hectares out of which 13.79 million hectares were located within the EU. It translated to 3.12 and 7.71 percent of their agricultural land respectively.

Another key variable representing the changes on the organic food market is the number of organic producers which was 11 times higher in 2018 (2.77 million) than it was in 2000 (252.60 thousand). Both Europe and North America were home to 65.81 percent of organic producers in 2000 and only 15.83 percent of them in 2018. This change is attributed to the fact that other regions achieved considerable growth in the number of organic producers. In 2018 the number of organic operators in Europe exceeded 418 thousand producers and 75 thousand processors which translated to a ratio of 5.54 producers per processor. In the EU those numbers exceeded 327 thousand, 71 thousand, and 4.55 respectively. Compared to 2000 the number of organic producers rose by more than 167 percent in Europe and more than 141 percent in the EU[8].

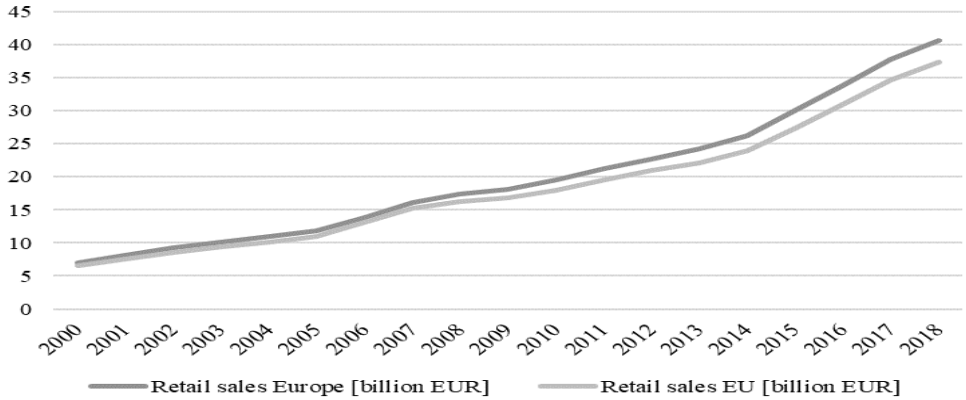
In the case of both organic operators and organic agricultural land their distribution among European countries differs significantly. In 2018 top 3 European countries by the number of organic producers were: Turkey (19 percent), Italy (17 percent), and France (10 percent) and in the case of organic processors: Italy (27 percent), France (22 percent), and Germany (20 percent). In turn, top 3 countries based on the area of organic farmland were Spain (14 percent), France (13 percent), and Italy (13 percent)[9].

The shares of Europe and North America in organic farmland and organic operators are decreasing. However, what strikes when analysing the demand for organic food is that in this regard, they are global leaders and other regions are falling behind them. Undeniably, the US is the largest organic market when considering retail sales. However, the demand for organic products (both retail sales and per capita consumption) in Europe and the EU has been steadily rising (Figures 2–3). In 2018 retail sales in Europe reached 40.73 billion EUR and 37.41 billion EUR in the EU. This translated to a rise of about 470% since 2000 in both cases.

In 2018 retail sales of organic products in the EU were the highest in Germany (10.91 billion EUR, 26.8 percent of retail sales), France (9.14 billion EUR, 22.4 percent), and Italy (3.48 billion EUR, 8.6 percent). At the same time, the EU reached a level of per capita consumption of 73 EUR. Moreover, Switzerland and Denmark recorded the highest per capita consumption of 312 EUR, followed by Sweden (231 EUR) and Luxembourg (221 EUR)[10].

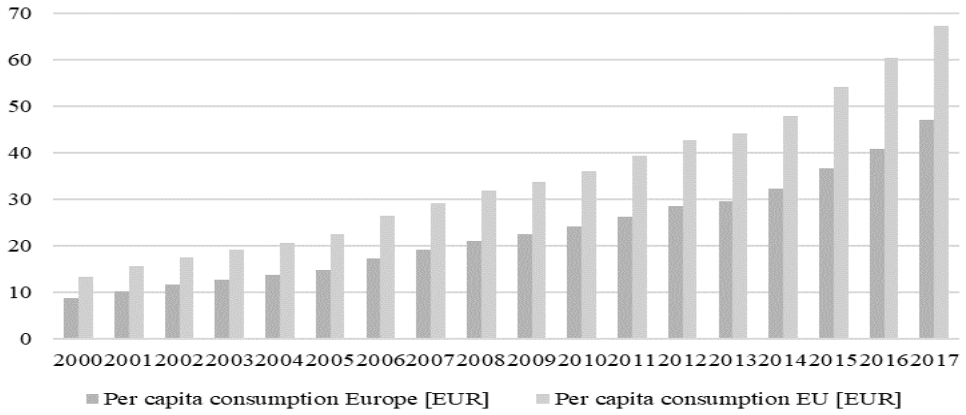
[8] https://statistics.fibl.org
[9] https://statistics.fibl.org
[10] https://statistics.fibl.org

Figure 2. *Retail sales in Europe and the EU in 2000-2018*



Source: *Own study based on Research Institute of Organic Agriculture (FiBL) data*.

Figure 3. *Per capita consumption in Europe and the EU in 2000-2017*

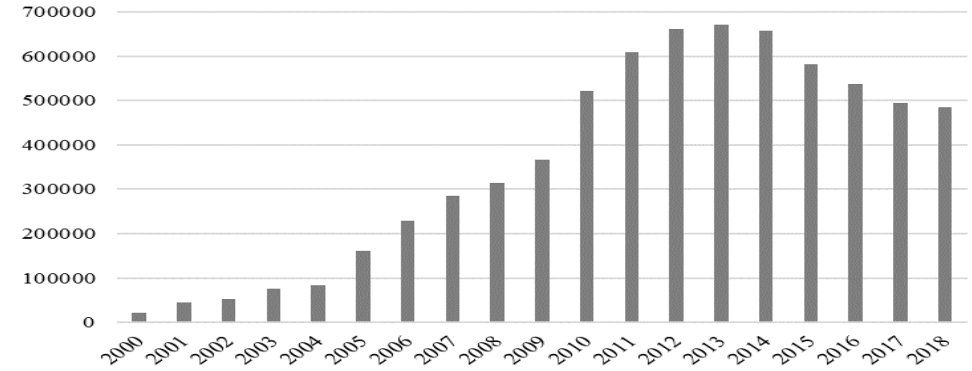


Source: *Own study based on Willer, Schaack and Lernoud 2019.*

4.2. Transformations of the Polish Organic Food Market

The Polish organic food market is undergoing various changes, several of which have been initiated after joining the EU. First of all, the organic area (farmland) has been following a path resembling an inverted U-pattern. Until 2013 organic area (farmland) in Poland was growing and reached the level of almost 670 thousand ha which meant that it constituted 4.65 percent of total farmland (Figure 4). However, since 2013 organic farmland has been declining and in 2018 its share of total farmland was 3.36 percent (484.68 thousand ha). In 2018 compared to 2017 organic farmland declined further by 2.08 percent and Poland was the 11th country in Europe by organic farmland (after Greece and before the UK). When compared to top 3 European countries, organic farmland in Poland constitutes 21.57 percent, 23.82 percent, and 24.75 percent of organic farmland of Spain, France, and Italy respectively.

Figure 4. *Organic area (farmland) in Poland in 2000-2018 [ha]*



Source: *Own study based on Research Institute of Organic Agriculture (FiBL) data*.

Another indicator – the number of organic producers – has also not been following constant growth throughout the last two decades. After an optimistic period between 2000 and 2013 (however with a slight decline in 2011), the growth trend has been interrupted. In 2018 19.21 thousand organic producers were located in Poland (which ranked Poland as the 8th in Europe and the 7th in the EU). However, within the same period (after 2000), the number of organic processors in Poland has been constantly rising (with the exception of 2011) and in 2018 there were 910 organic processors operating in this country (16th in Europe and 14th in the EU)[11].

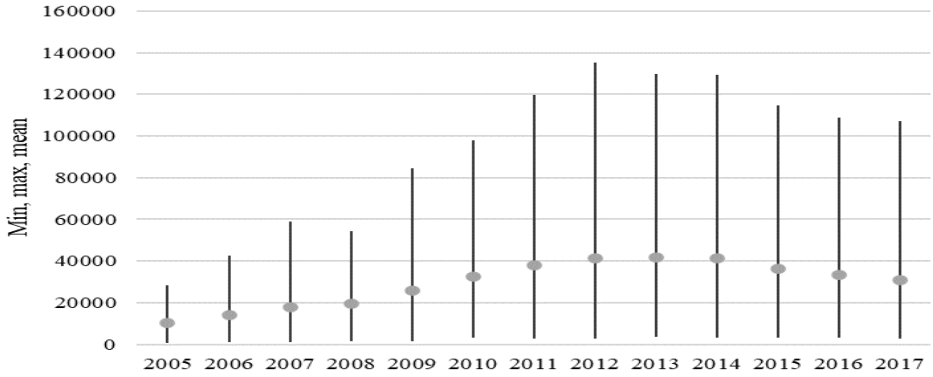
Organic retail sales in Poland reached 250 million EUR in 2018 whereas in 2004 they stood at 1.58 million EUR. That means that organic per capita consumption totalled 6.59 EUR and 0.04 EUR respectively[12]. The Polish internal market is therefore developing at a modest pace and falls greatly behind leading EU economies. The changes that have been taking place on the organic food market in Poland are also spatial in their nature as internally the country is industrially diverse. With this in mind, the remaining part of this section of the paper will address regional concentration and dispersion patterns occurring on the organic food market in Poland.

When analysing organic farmland between 2005 and 2017 what strikes is that the dynamics of regional maximum values of organic farmland follow the pattern of total organic farmland in Poland (Figure 5 presenting max, min, and mean regional values). In 2005 top 3 regions accounted for 36.77 percent of total organic farmland (zachodniopomorskie, mazowieckie, and dolnośląskie). Twelve years later the market became more concentrated and top 3 regions accounted for 50.15 percent of total organic farmland (warmińsko-mazurskie, zachodniopomorskie, and podlaskie). The mean value of organic farmland stood at 10.39 and 30.94 thousand ha respectively (whereas the median value was recorded at 9.94 and 23.90

[11] https://statistics.fibl.org
[12] https://statistics.fibl.org

respectively). Within this period certain regions became highly specialised in organic farming when taking organic farmland as a measure of specialisation into consideration.

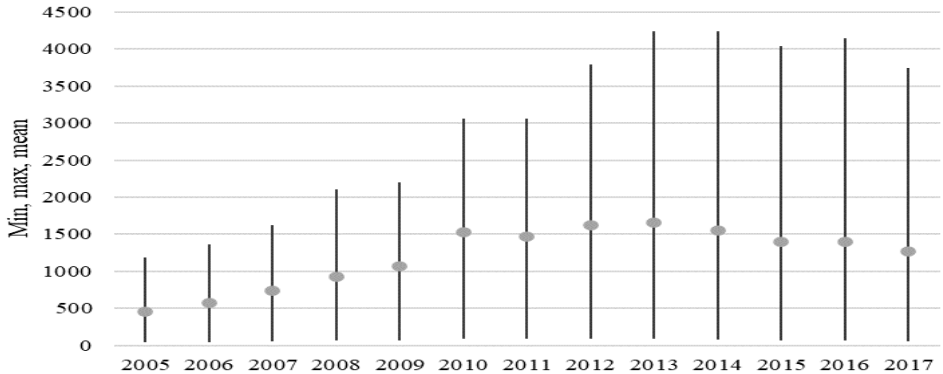
Figure 5. *Regional dispersion of organic farmland*



Source: *Own elaboration based on IJHARS data.*

A similar pattern can be observed among organic producers (Figure 6 presenting max, min, and mean regional values). After the EU accession their number was increasing consecutively for several years. However, for the past few years their numbers have been dropping across all regions. Early on certain regions became specialised in organic production (in 2005 małopolskie, podkarpackie, mazowieckie, świętokrzyskie, and lubelskie were home to 62 percent of all organic producers). Since then their position on the organic food market has changed. At the end of the analysed period top 5 regions by the number of organic producers (warmińsko-mazurskie, podlaskie, mazowieckie, zachodniopomorskie, and lubelskie) accounted for 65.36 percent of all organic producers. Mean/median regional values of the number of organic producers in 2005 and 2017 stood at 448.86/399.50 and 1266.06/837.50.

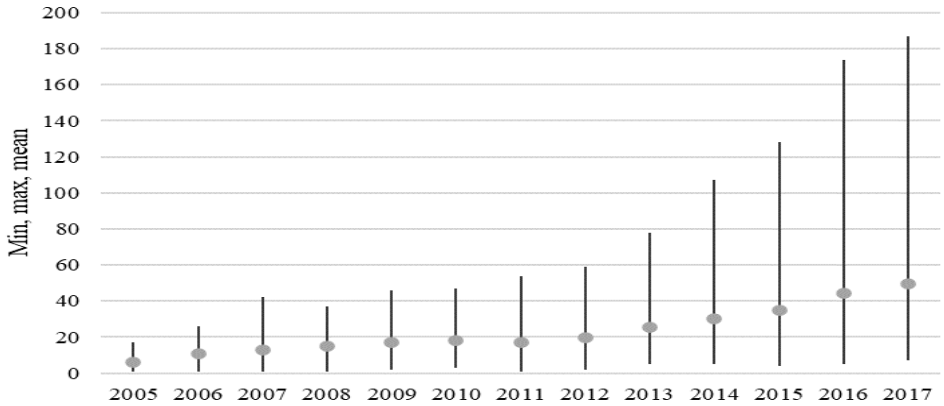
Figure 6. *Regional dispersion of organic producers*



Source: *Own elaboration based on IJHARS data.*

The number of organic processors in Poland between 2005 and 2017 increased eightfold. As opposed to previously analysed regional data, the number of organic processors grew in every region since 2005 (with only few exceptions when considering year-to-year dynamics). The dispersion between regions grew in time (Figure 7 presenting max, min, and mean regional values). Mean/median regional values of the number of organic processors in 2005 and 2017 equalled 6.19/6 and 49.69/37.50 respectively. Three regions with the highest number of organic processors in 2005 (40.40 percent; mazowieckie, lubelskie, and wielkopolskie) defended their positions in 2017 (46.04 percent; mazowieckie, wielkopolskie, and lubelskie).

Figure 7. *Regional dispersion of organic processors*



Source: *Own elaboration based on IJHARS data.*

Regional concentration and dispersion of organic farming as well as of the two types of organic operators in Poland underwent various changes within the analysed period. What is yet lacking in the analysis of their transformations is a relative measure that would represent how every region has been changing in comparison to other regions. With the aim of isolating those transformations the authors calculated location quotients for organic farmland ($LQ_{farmland}$), and the number of organic producers ($LQ_{org\ prod}$) and organic processors ($LQ_{org\ proc}$). Every region was then attributed a value of 1, 2, 3, 4 or 5 (1 – organic farmland/organic producers/organic processors very underrepresented in the region, 2 – moderately underrepresented; 3 – average representation; 4 – moderately high representation; 5 – very high representation). By employing data for the period of 2005–2017 it was possible to distinguish regional clusterisation patterns on the organic food market and as a result clusters were identified in certain regions (Tables 1–3).

Throughout the analysed period only three regions (lubuskie, warmińsko-mazurskie, and zachodniopomorskie) were always assigned a value of 5 when it comes to the degree of their specialization in organic farmland. It means that in these voivodeships organic farmland had by far the highest share in total agricultural land

when compared to other regions or the country in general. Podlaskie region followed a path of a steady growth of its location quotient while three regions (dolnośląskie, małopolskie, and podkarpackie) noted the biggest decline. However, when looking at regions' shares in total organic farmland in Poland in 2017 it was warmińsko-mazurskie (21.63 percent), zachodniopomorskie (17.70 percent), and podlaskie (10.82 percent) that lead the way, whereas lubuskie had a share of 7.66 percent (5th position in the country).

Table 1. *Concentration and dispersion patterns of organic farmland in Poland*

Region	Year												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
dolnośląskie	5	5	4	5	5	4	4	3	2	2	2	2	2
kujawsko-pomorskie	1	1	1	1	1	1	1	1	1	1	1	1	1
lubelskie	2	3	2	2	2	2	1	1	1	1	1	1	1
lubuskie	5	5	5	5	5	5	5	5	5	5	5	5	5
łódzkie	1	1	1	1	1	1	1	1	1	1	1	1	1
małopolskie	5	5	4	5	3	3	2	2	1	1	1	1	1
mazowieckie	2	1	1	1	1	1	1	1	2	1	1	1	1
opolskie	1	1	1	1	1	1	1	1	1	1	1	1	1
podkarpackie	5	5	5	5	5	5	4	4	3	2	2	2	2
podlaskie	2	2	2	3	3	4	4	4	4	5	5	5	5
pomorskie	2	2	2	2	3	2	3	3	2	2	2	2	2
śląskie	1	1	1	1	1	1	1	1	1	1	1	1	1
świętokrzyskie	4	3	3	3	2	2	1	1	1	1	1	1	1
warmińsko-mazurskie	5	5	5	5	5	5	5	5	5	5	5	5	5
wielkopolskie	1	1	1	1	1	1	1	1	1	1	1	1	1
zachodniopomorskie	5	5	5	5	5	5	5	5	5	5	5	5	5

Note: *1 – very underrepresented; 2 – moderately underrepresented; 3 – average representation; 4 – moderately high representation; 5 – very high representation.*
Source: *Own elaboration based on IJHARS and GUS databases.*

When it comes to cluster structures on the organic food market when taking the number of organic producers into consideration and comparing it to the data on the number of agricultural producers in the register of producers, the highest values of the location quotient throughout 2005–2017 were recorded in the voivodeships of lubuskie, podlaskie, warmińsko-mazurskie, and zachodniopomorskie. Again, in some cases regions became declusterised (most notably dolnośląskie, małopolskie, podkarpackie, and świętokrzyskie). In 2017 the top 3 regions with the highest share of the number of organic producers were: warmińsko-mazurskie (18.49 percent), podlaskie (15.85 percent), and mazowieckie (10.93 percent). Again, lubuskie did not make the cut to the top 3 as its share stood at 4.68 percent (7th position in the country).

Table 2. *Concentration and dispersion patterns of organic food producers in Poland*

Region	Year												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
dolnośląskie	4	4	4	5	5	5	4	4	3	3	2	2	2
kujawsko-pomorskie	1	1	1	1	1	1	1	1	1	1	1	1	1
lubelskie	2	3	3	2	2	2	2	1	1	1	1	2	2
lubuskie	5	5	5	5	5	5	5	5	5	5	5	5	5
łódzkie	1	1	1	1	1	1	1	1	1	1	1	1	1
małopolskie	5	5	5	5	4	3	2	2	1	1	1	1	1
mazowieckie	2	2	1	1	1	1	1	1	1	1	1	2	2
opolskie	1	1	1	1	1	1	1	1	1	1	1	1	1
podkarpackie	4	5	5	5	4	3	3	2	1	1	1	1	1
podlaskie	4	4	4	5	5	5	5	5	5	5	5	5	5
pomorskie	3	2	2	3	3	4	4	4	4	4	4	3	3
śląskie	1	1	1	1	1	1	1	1	1	1	1	1	1
świętokrzyskie	5	5	4	4	3	2	2	2	2	1	1	1	1
warmińsko-mazurskie	5	5	5	5	5	5	5	5	5	5	5	5	5
wielkopolskie	1	1	1	1	1	1	1	1	1	1	1	1	1
zachodniopomorskie	5	5	5	5	5	5	5	5	5	5	5	5	5

Note: *1 – very underrepresented; 2 – moderately underrepresented; 3 – average representation; 4 – moderately high representation; 5 – very high representation.*
Source: *Own elaboration based on IJHARS and GUS databases*.

Finally, when it comes to organic food processors, the concentration and dispersion patterns of regional clusters have again, quite visibly, divided the voivodeships as the organic food market undergoes spatial transformation. First and foremost, lubelskie is the only region that could be identified as an area of very high representation of this type of activity when compared to entities specialising in manufacture of food products and beverages in every year of the analysed period. When looking at its share of organic food processors it held 3rd position in 2017 (after mazowieckie with 23.52 percent of organic food processors and wielkopolskie with 13.21 percent of organic food processors). Other regions highly specialised in organic food processing based on the values of the location quotient are: mazowieckie, podkarpackie, podlaskie, and zachodniopomorskie.

Cluster's main characteristic is the geographic concentration among its constituents. Companies within an industry, being physically proximate among themselves but also close to research institutions as well as companies in related and supporting industries, can draw benefits from such proximity. However, positive externalities arise only after a long enough course of time. In the case of the organic food market in Poland, given its relatively short history, clusters that have so far emerged might still be at an early stage of their cluster life cycles as regions either become more or less clusterised or do not change their relative position.

Table 3. *Concentration and dispersion patterns of organic food processors in Poland*

Region	Year												
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
dolnośląskie	3	4	1	2	1	1	1	1	1	1	1	1	1
kujawsko-pomorskie	5	3	2	2	2	2	2	3	2	2	2	1	1
lubelskie	5	5	5	5	5	5	5	5	5	5	5	5	5
lubuskie	1	1	3	3	1	1	3	2	1	2	1	3	2
łódzkie	1	1	1	1	2	1	1	1	1	3	3	2	3
małopolskie	2	2	1	2	2	3	3	2	2	2	3	3	2
mazowieckie	4	3	5	3	4	3	4	4	4	5	5	5	5
opolskie	1	1	1	1	1	1	1	1	1	1	1	1	1
podkarpackie	5	5	5	5	5	5	5	5	5	5	5	4	4
podlaskie	5	5	5	2	2	2	3	1	5	4	5	5	4
pomorskie	1	1	1	2	2	2	2	3	2	3	3	3	3
śląskie	1	2	1	1	1	1	1	1	1	1	1	1	1
świętokrzyskie	4	4	3	5	2	3	3	3	3	2	4	3	3
warmińsko-mazurskie	3	3	4	5	4	4	3	4	5	3	2	2	3
wielkopolskie	2	2	2	4	4	3	5	4	4	3	3	3	4
zachodniopomorskie	5	5	5	3	5	5	4	5	5	5	5	3	4

Note: *1 – very underrepresented; 2 – moderately underrepresented; 3 – average representation; 4 – moderately high representation; 5 – very high representation.*
Source: *Own elaboration based on IJHARS and GUS data.*

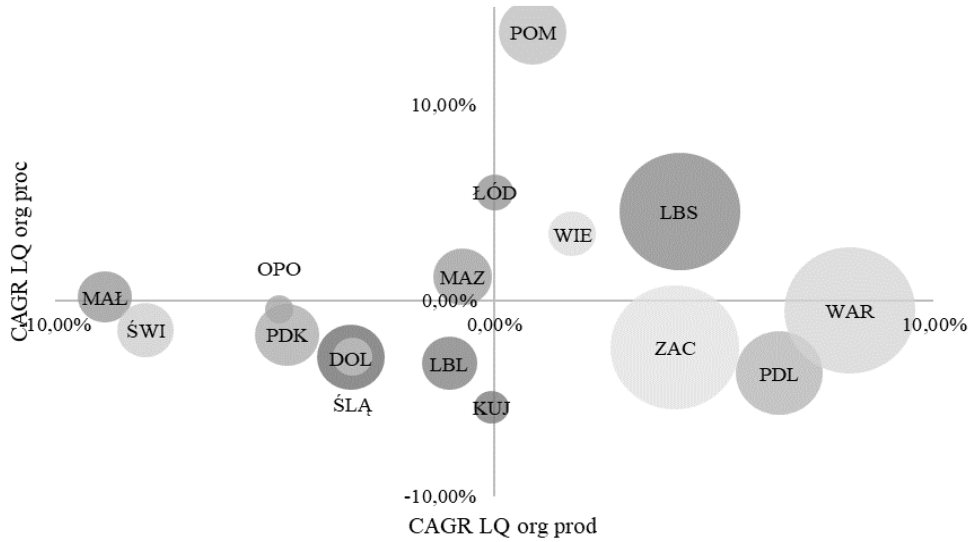
When analysing the transformations on the organic food market from the perspective of regional shares and location quotients many patterns can be identified. Overall, organic farmland as well as organic operators are present in every region but they are not evenly distributed. As time progresses, different locations undergo various changes as to their position on the organic food market (Figure 8). Taking the values of compound annual growth rates for two location quotients (LQ org prod – organic producers on axis X and LQ org proc – organic food processors on axis Y; the size of the bubble represents the 2017 values of the LQ for organic farmland) into consideration, we can see how certain regions between 2005 and 2017 have become more or less specialised in these two types of activities. The results obtained clearly confirm the existence of transformation patterns of cluster structures on the organic food market in Poland.

5. Conclusions and policy Recommendations

The distribution of organic farmland and organic operators (producers and processors) in Poland is uneven when taking regional perspective into consideration and the obtained results pinpoint several cluster locations. Certain voivodeships are at the forefront when it comes to either their shares or location quotient values. Identifying these structures is aimed at indicating the areas where positive

externalities could facilitate market development through the agglomeration of competitors but also an increase of cooperation opportunities with other market participants.

Figure 8. *LQ transformations on the organic food market in Poland*



Source: *Own elaboration based on IJHARS and GUS data.*

Clusters extracted from the set of employed data could become innovative networks of organic producers and organic food processors. The effects that could arise from them could generate positive effects which, coupled with the scope of operations that certain regions benefit from due to the high number of operators and processors, could convert until now dormant potential stemming from cooperation into measurable benefits.

However, the organic food market in Poland is at a crossroads as its structural problems have become difficult to overcome. Its future development depends on the ability of the organic producers and organic food processors to gain and uphold their competitive advantage. This will only happen if certain conditions are met. One of them is connected to the ability of the regions in which they are located to provide them with an environment full of positive stimuli and location incentives. As every economy is characterised by a set of unique characteristics a necessity exists to design suitable policies that will lead to growth and development. Through carefully considering the results of the conducted study the authors would like to propose two sets of recommendations that should benefit further development of the market. The first set of recommendations is addressed to the group of organic operators and contains the following ideas that could be beneficial for them while further transformations on the market take place. It is recommended that they should:

(1) analyse their vicinity and actively look for opportunities to learn from competitors, especially those located in close proximity;
(2) set a benchmark for their business based on the actions of competitors;
(3) redefine their position within the supply chain;
(4) establish and manage relations with other cluster participants;
(5) consider cooperating with cluster participants e.g. through B2B, networks, associations, cluster organisations.

The second set of recommendations is directed at various institutions, mainly governing bodies, from whose support organic food clusters and cluster organizations could greatly benefit. What should be however underlined is that managing market development is highly debatable as it leads to certain types of market interventions. If actively pursuing cluster-led development policies, the governing bodies could act as a facilitator by:

(1) allowing access to data necessary to conduct detailed cluster mapping and identify clusters on the organic food market;
(2) developing and upholding regulations and institutions that foster cluster development;
(3) promoting the ideas behind organic farming as well as organic consumption;
(4) following a "bottom up" rather than a "top-down" approach when engaging with market associations (e.g. cluster organizations);
(5) financing actions stimulating the development of the organic food market.

Future development of the organic food market will depend on many factors and will be limited by various barriers. It could be invigorated by undertaking actions that support clusters and/or cluster initiatives and this paper was aimed at analysing the concentration and dispersion patterns on the organic food market whose results would facilitate choosing the right locations to do so. If and when undertaking any action based on the results of this study one should take the following into consideration: the market will continue to transform spatially.

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