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Organic Farming: A Good Production Decision for Slovenian Small Size Farms and Farms in the Areas with Restrictions/ Limitations or Natural Obstacles for Agriculture?

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Abstract

The negative effects of intensive agriculture on the environment, human health, natural resources, etc. require the use of more sustainable farming methods. The decision for organic farming is based on various factors: the personal levels of development and consciousness of the operator of the farm and members of his family, the socio-economic and size structure of the farm, the type of area in which the farm is located, the availability of the market and the demand for organic products, etc. Organic farming in Slovenia appears to be particularly suitable for smaller farms, since it is more labor intensive, and payments from agricultural policy contribute to the economic efficiency of the farm, despite lower yields. Especially in protected areas, water protected areas, or less favored areas for agriculture, organic farming can be a more convenient farming method. The traditional farming practices that exist are already extensive and the available measures can contribute to farm income and compensate farmers for different services that they provide for the society. The multifunctionality of organic farming (and agriculture in general), i.e., ensuring also the environmental and social roles, is only possible if farming is economical at the same time.

Keywords: organic farming, sustainability, conversion, organic products, ANCs, Slovenia

1. Introduction

The world today faces many challenges globally. It is characterized by extremely rapid technological progress, changes in political and economic relations, increasing income disparities, increasing global climate change, and, consequently, environmental burdens and changes in the natural environment. All this has implications for agriculture and the countryside, the society's attitude to them, and views on food production, the methods and technologies used, and the safety and quality of produced food. Adequate habitat for humans, plants,

and animals, the quality of natural resources (soil, water, air, and ecosystems), and safe food are the basic conditions for living on the planet. Global trends are causing a decline in the quality and availability of natural resources that are being consumed by today's civilization. Trends and projections for population growth (10 billion people are expected to live on Earth by 2050 [1]) will also require increasing food needs. The current attitudes to agricultural production resources, social and climate changes, and increasing pollution of basic natural resources (soil, water, and air) require the strategic and economical management of these resources in order to enable the present and future generations to survive.

Agriculture faces many challenges as well as requirements related to natural resources, production technologies and methods, food safety, and quality. The society also has high expectations for rural areas. Agriculture is expected to be productive, competitive and economically attractive, resilient, and environmentally sustainable. The countryside, which is largely characterized by agriculture, is expected to be attractive to nonagricultural populations and to various economic activities. Food and the environment are becoming increasingly important areas of interest in modern society. Most countries are also increasing their emphasis, including in the light of their current experience, to ensure an adequate level of self-sufficiency in food products and to ensure food security. It should increasingly be based on locally produced food, with known and controlled origins, short retail chains, which also leaves a smaller environmental footprint while providing employment and adequate income for local growers.

Modern consumers are giving more attention to nutrition and changing eating habits. It is important that the food is healthy and safe, the supply is undisturbed, and the way in which the food is produced or processed is supervised, so the ethical aspects of food production are also becoming important. Developed countries are also becoming more aware of the problem of large quantities of discarded food, which requires a different attitude toward food, reducing quantities of discarded food, better management of food surpluses, and greater awareness among consumers, traders, and producers.

Agriculture can also have negative impacts on the environment and climate, such as greenhouse gas emissions, negative impacts on water quality and water resources, and on natural ecosystems and biodiversity.

Organic agriculture, on a global, European, and Slovenian scale, is gaining in importance. The number of organic farms, the share of organically cultivated agricultural land, the amount of organically produced food, and thus the market share of such food are increasing. In Slovenia, organic farming is one of the possibilities of producing safe and quality food, while fulfilling many other roles that agriculture plays beside the production of food.

Organic farming largely meets the expectations and needs of the society in terms of protecting the environment in food production, the production of quality, healthy, and safe foods with high nutritional value, and the sustainable management of nonrenewable natural resources and the livestock of adequate breeding. Usually, organic farms have mixed production that combines crop production and animal husbandry. This allows for efficient resource management, nutrient cycling, biodiversity, environmental protection, and animal-friendly breeding. In both crop and livestock production, prevention of problems rather than their treatment is emphasized. The use of chemically synthesized fertilizers and pesticides, growth regulators, and hormones and the use of genetically modified organisms are not permitted in organic farming. Organic farming is based on rational use of natural resources, crop rotation, production of intermediate crops allowing the binding of nitrogen from the air, animal fertilizers, green fertilization and compost, biotic control of pests, and varieties more resistant to diseases and pests.

Organic agriculture has a clear philosophical approach to farming, and the holistic approach focuses on working together with nature instead of against it [2].

Organic farming contributes significantly to the provision of public goods, in particular to maintaining a sharp improvement in biodiversity, preserving drinking water resources, creating jobs due to the increased need for labor and increased unit labor value, preserving the agricultural cultural landscape, and protecting the environment in general.

Organic and agro-ecological farming methods are based on four key principles: health, ecology, fairness, and care, enunciated by the International Federation of Organic Agriculture Movements (IFOAM) [3] and they guarantee healthy food production, assure environmental protection, and emphasize local resources and food systems [4]. Following these principles (included in various sets of standards, legislations, and production guidelines in different countries or for example on EU level) in practice enhances soil fertility and biodiversity, minimizing land degradation and erosion, chemical pollution, and other negative effects of industrialized agricultural activities.

2. Various aspects of organic farming

Agriculture to be sustainable should be environmentally and socially sensitive, but also economically viable. We can talk about economic, environmental, and socio-cultural aspects of organic agriculture.

2.1 Economic aspects

From an economic point of view, organic farming, as a more extension production method, has mostly higher production costs and lower yield that have to be covered with higher prices for consumers, price premiums, or subsidies [5, 6]. Organic farmers also sell their products through short distribution chains, mostly directly on farm, or on local street markets where they can achieve higher prices instead of supermarkets. They are able to achieve higher margins from the added-value if they processed their organic products at home or in cooperatives. Short food supply not only reduces negative environmental effects but, because of better efficiency, also brings down final prices for consumers and highlights the value of farmers' work.

2.2 Environmental aspects

Environmental aspects are one of the most important characteristics and benefits of organic farming with very positive effects on soil, water, biodiversity, and climate change [5, 8, 9]. The main objectives of organic farming in relation to soil are the maintenance and enhancement of soil life and natural soil fertility, soil stability, and soil biodiversity, prevention of soil compaction and erosion, and the nourishment of plants with natural nutrient circuit. High organic matter in organic soil can be maintained and improved through crop rotation, with crops that fix nitrogen from the air, with green cover, or with manure from livestock production. Strict rules do not allow using external nonorganic inputs (synthetic fertilizers) [5, 7–9].

Another problem of intensive conventional agriculture is water pollution. Organic farming, with strong restrictions in the use of chemically synthesized pesticides and mineral nitrogen fertilizers and lower animal stocking rates on farm, causes much less water pollution and helps to reduce leaching rates. With

timing tillage properly, farmers can achieve further benefits in order to reduce nutrient leaking.

Organic farming contributes to high degree of biodiversity in terms of domesticated species and floral and faunal diversity on the surface and in the soil. Traditional varieties and breeds, adopted on local conditions, and crop rotation make the whole system even more resilient, especially regarding pest and diseases. The maintenance of natural elements in the landscape, such as hedgerows, strips, and field margins can help to establish the ecological balance and make conditions for the predators of crop pests.

Farming, organic and conventional, has some positive and negative climate effects. The positive effect is that agriculture has a positive impact on carbon dioxide (CO₂), acting as carbon sink. Plants use it for photosynthesis and store it in the soil's organic matter. Due to the high organic matter content in the soil, organic farming as also conventional can contribute to CO₂ reduction. Methane emissions from livestock production have negative effects. Due to the low stocking density, organic farming produces less methane on a hectare unit as conventional farming. There are still potentials to reduce methane emissions with improving manure management, ruminants' diet, or increased productivity that can improve methane emissions on yield basis and reduce production costs [5, 7–9].

2.3 Social aspects

Organic farming has positive effects also on human and animal health and animal welfare. Currently, the questions of food choice has become also an issue from the perspective of public health and motivation of the policy makers in developed economies to improve dietary patterns of the population [10]. Therefore, healthiness of the products in comparison to conventional food options is among the main reasons for organic food purchase. Food safety and well-balanced diet are important prerequisites for good health and well-being [5]. General rules on animal welfare are the same for organic and conventional farming. However, organic farming rules demand still higher level of animal welfare and an assurance of species-specific needs. On organic animal husbandry, animals must have free access to open air that can also interact among them. The number of animals must be adjusted to the available land and sticking density inside buildings and outside to ensure comfort and well-being of the different species. The use of antibiotics and hormones is strictly prohibited and good animal health can be achieved by the selection of appropriate breeds and building of immunological defenses of animals.

Organic farming has the potential to assure also some social aspects, as a kind of positive externalities of its operating, like job opportunities and other contribution to local and regional economies.

One of the characteristics of organic farming is also higher demand for labor in comparison with conventional agriculture [11], due to the need for more manual and mechanical work instead of chemical inputs. Some additional time is needed also to prepare products for market sale or for their distribution to consumers directly or for selling personally on local markets, for their processing at home, etc. On the other hand, this means a contribution to employment in rural areas and makes possible also to keep and operate small farms, which otherwise would not be competitive enough. Other social dimensions of organic farming, beside the influence on labor demand, are also connected with human health, democratic participation, resiliency, biological and cultural diversity, quality of life and human well-being, equity and ethics, and institutions (e.g., farmers' cooperatives and associations) [12]. Benefits for farmers and other local people result from diversification of activities and income on farms (e.g., processing of products and

tourism on farms) and through payments for ecosystem services that can have income and quality of life influence. Local residents gain human health benefits through access to fresh, traditional foods and access to landscape for leisure activities and have opportunities for direct relationships with producers. They can not only directly buy products but also help farmers with work as a kind of social gathering. Other wider social benefits can be in the field of democracy, gender perspective, resiliency, quality of rural life, and cultural conservation. Through the active engagement of producers, local residents, and visitors, democratic participation has improved. There are much more opportunities and need for cooperation between different stakeholders to build social capital, to preserve agricultural culture, knowledge, and traditions, to preserve some traditional production and processing techniques, etc.

3. Factors influencing the conversion to organic farming

Several studies in different countries tried to find out the factors that determine or have influence on farmer's decision to convert to organic farming [13–20]. In general, the determinants can be divided into economic and noneconomic factors [17], and most studies that analyzed the adoption or conversion to organic farming confirmed the relevance of both types of factors.

For the decision about farming system, farmers' objectives are important. Objectives can be summarized as economic, environmental, or sociocultural [17].

Factors that influence the decision to convert from conventional to organic farming in the reviewed studies are as follows:

- Farmers' characteristics (age, gender, education, experiences, entrepreneurial spirit, etc.)
- Farm structure (farm size, location, soil type, favorable or not favorable conditions for agriculture, available machinery, etc.)
- Farm management (input use, crop rotation, crop diversification, specialization, etc.)
- Exogenous factors (market prices, market size, available subsidies, information access, availability of advisors, support policies, etc.)
- Attitudes, opinions, and preferences (about the environment, life style, health, risk, acceptance within the rural community, etc.)

More authors [14, 15, 21] concluded that the availability of information sources is an important factor in conversion process. Conversion is always connected with some risk. De Cock [22] in his study confirmed that conventional farmers are more risk averse than organic farmers; similar are the findings of Sera et al. [23] and Gardebroek [24] that organic farmers are less risk averse as conventional farmers.

Kallas et al. [17] confirmed an expectation that for the adoption of organic farming location of farm can also play an important role. The location of farms in an unfavorable area for agriculture motivates adoption, and more likely to convert are also farmers who have second economic activity apart from agriculture and small family farms. Farm specialization also can have an influence; for example, farmers whose total farm income comes only from viticulture are less prone to convert. Conversion is more probable if the farm has diversified production or activities.

Organic farms in general usually diversify their activities to reduce all kinds of risks (yield loss, decreasing prices, natural catastrophes, etc.).

Older farmers are less willing to convert [15, 17, 20, 25], are mostly less educated, and are not so ambitious anymore. It is understandable that they are not so ready anymore for adjustments and changes, new learning, investments, new risks, etc. Their decisions are mainly based on economic variables, while the importance of the environmental over the economic considerations is a basic factor in the decision to convert to organic farming.

The results of the Norwegian study [18] did not differ much. Organic farmers in Norway, compared with conventional farmers, mostly have larger farms, are mostly oriented to crop production, are more educated, and are located closer to urban centers. Farmers have different goals for their farms that can differ between conventional farmers, organic farmers, and farmers that are planning to convert. In Norway, main goals of conventional farmers were economic: to “achieve stable and reliable income,” to “maximize profit,” and to “improve the farm for next generation.” Organic farmers rank “sustainable and environmental-friendly farming” in the first place, while conventional farmers put this goal after economic goals. After environmental goals, organic farmers ranked “producing high quality food” and “reliable and stable income.” Suitable income was one of the three most important goals by all three groups of investigated farmers (conventional, organic, and farmers that are planning to convert), and it is also seen as a strategy for risk avoidance. All three groups of Norwegian farmers as least important goals ranked “higher private consumption,” “increasing equity,” and “social contacts.” Among the motives for the decision for organic farming, organic farmers choose as most important to “produce high quality food,” “higher soil fertility and less pollution problems” as second, and “professional challenges” as third. As least important motives, they defined “natural conditions” and “more stable income.” Farmers that are planning to convert to organic farming ranked motives little different; for them, financial motives (“profitability” and “organic farming payments”) are most important, while “production of high quality food” and “ideological and philosophic reasons” were less important for them as compared to certified organic farmers. Main goals and motives for organic farmers in Norway are therefore still traditional environment, food quality, and philosophical concerns. On the other hand, financial considerations (“profitability” and “income stability”) are important for conventional farmers as well as important motives for conversion for the potential converters.

Studies in other European countries found higher density of organic farms in regions less favorable to agricultural production (e.g., in Austria, Switzerland, and Germany). Results of a study in Germany [26] show that the number of organic farms and higher percentage of organically managed land are negatively correlated to soil quality and positively influenced by organic grassland payments.

Darnhofer et al. [27] studied the reasons and constraints of farmers for converting to organic farming in Austria. They identified five types of farmers: “committed conventional,” the “pragmatic conventional,” the “environment-conscious but not organic,” the “pragmatic organic,” and the “committed organic.” For “committed conventional” farmers, conventional approach to agriculture is the only sensible way. Their focus is maximizing outputs and profit per hectare, minimizing production costs, intensive use of external inputs, the introduction of the new technologies that make this possible, specialization of the farm, etc. Organic farming for them is not more environmentally friendly than conventional farming and they do not see organic farming as technically and/or economically feasible. They do not even think to convert to organic farming. “Pragmatic conventional” farmers can be seen as potential converters. They are generally not against organic farming, but a conversion is too risky for them, and without tangible benefit of the conversion, they will

not implement it. Their main constraints are connected with the technical challenges and needed changes with farm organization, the uncertainty of price, and available market for their products. Some good examples of organic farmers' conversion in the area and available market for organic products can make them to be more open for conversion. Most farmers see economic viability as a necessary condition for conversion, but not a sufficient one. These farmers are more inclined to solutions that do not require conversion, for example, farm diversification or additional off-farm income. The third type of farmers is "environment-conscious but not organic." They are committed to environmentally friendly farming practices, but they do not receive any agri-environmental payments. Because they are not certified organic farmers, they are more flexibly and not subject to controls and are more independent of the regulations, although some of them follow organic standards very closely. The reasons are also bureaucratic demands and costs connected with certification, record-keeping, etc. Some of them are self-declared organic producers (without organic certificate) that have customers willing to pay premiums without organic certificate, because they trust them, as well as the quality of their products. There is no need for them to convert to organic methods. "Pragmatic organic" farmers were motivated to convert by good prospect for security income, mostly through the payments of agri-environmental programs. Financial motives were more important for their conversion as sustainability, health, or ethical aspects. Although financial motives are important for this group of farmers, income-maximization attitude for them is not necessary in the first place [15].

Compensatory payments enable them to "learn by doing." They like to learn and make experiments with new ventures. Their challenges are the diversity of task in organic production, need for the craftsmanship, and always new skill requirements. Organic farming for them is an alternative to conventional farming but close to the "farming economically" thinking [28].

The "committed organic" farmers follow a fundamental philosophy of organic farming: close nutrient cycles, no use of synthetic fertilizers and pesticides, crop rotation, and care for soil health. Organic farming for them is also a social movement and political statement and not only a production technique. Their first considerations are, beside the already mentioned basic principles, producer and/or customer health, ethical norms, and lifestyle; economic considerations are of secondary importance. These groups of farmers are really organic farming believers and mostly pioneers.

4. Organic farming today on global, EU, and Slovenian level

4.1 Organic farming on the global level

At the end of 2017, nearly 70 million hectares of agricultural land were involved in organic farming on a global scale. Comparing to the end of 2016, there is a growth of 20% [29]. The largest organic agricultural area was recorded in Australia with 35.6 million hectares; the second in Argentina with 3.4 million hectares and the third in China with 3 million hectares. Europe together had the second largest area in 2017 (14.6 million hectares). Organic-managed agricultural area increased globally in all continents and in 2017 presented 1.4% of total global agricultural land. Shares of organic agricultural area compared to total agricultural area differ between the countries and were the highest in 2017 in Liechtenstein (37.9%), Samoa (37.6%), and Austria (24%). The global market for organic food in 2017 based on estimations reached around 97 billion US dollars (approximately 90 billion euros). The leading market with organic products were in the USA (40 billion euros),

followed by Germany (10 billion euros), France (7.9 billion euros), and China (7.6 billion euros). Organic markets in 2017 showed a growth, in France for example by 18%. Country with the highest amount spent on organic food in 2017 was Switzerland (288 euros per capita), while Denmark had the highest organic market share (13.3% of the total food market). Countries differ also by numbers of organic producers. The total number of organic producers in 2017 has been estimated at 2.9 million. The highest number had India, followed by Uganda and Mexico. The number of producers between 2016 and 2017 increased by almost 5%. Organic land use structure in 2017 was the following: over two-thirds presented grassland or grazing areas (almost 48.2 million hectares), 17% (over 12 million hectares) arable land, and 7% permanent crops (nearly 4.9 million hectares). Arable land use had highest share for cereals and rice production (almost 38% of all), production of green fodder on arable land (over 23%), oilseed production (10%), and vegetables and dry pulses on the rest. Among permanent crops, the largest share belongs to coffee and olives (each with almost 20% of the organic permanent cropland), followed by nuts, grapes, and tropical and subtropical fruits.

4.2 Organic farming in Europe and European Union

At the end of 2017, organic farming in the whole Europe was carried out on 14.6 million hectares of agricultural land (2.9% of the agricultural area). Compared to 2016, organic farmland has increased by over 1 million hectares. The largest organic agricultural areas were in Spain, Italy, and France. Retail sales of organic products increased by 10.5% compared with 2016 and reached 37.3 billion euros in 2017. Germany had the largest market for organic products (10 billion euros), followed by France (7.9 billion euros) and Italy (3.1 billion euros) [30, 31].

Organic farming in European Union in 2017, by Eurostat data, was carried out on 12.6 million hectares of agricultural land in use in 28 member states, representing 7% of the total utilized agricultural area. The differences between member states are considerable. The largest shares of agricultural land in use for organic farming in 2017 had Austria (23.4%), Estonia (19.6%), and Sweden (19.6%). Since 2013, the number of fully organic agricultural holdings in the EU-28 increased by 30% and represented around 2% of total EU-28 agricultural holdings, while increase in organic area between 2012 and 2017 was 25% [30, 31]. Some member states increased their total organic area between 2012 and 2017 significantly (i.e., Croatia and Bulgaria for over 100%), and some decreased in smaller amount (Poland for 24.5%, the UK for 15.6%, Greece for 11.3%, etc.). Countries with the highest total¹ organic areas in terms of hectares are Spain, Italy, and France. These countries together with Germany in 2017 presented around 55% of the total EU-28 organic areas (**Table 1**).

Total organic area can be used as arable land (production of cereals, root crops, fresh vegetables, green fodder, industrial crops, etc.) or as permanent grassland (pastures and meadows as food for animals) or as permanent crops production (fruit trees, olives, and vineyards). In 2017, in EU-28, arable land represented 44.5% of the total organic crop area, permanent grassland 44.4%, and permanent crops 11%. There are significant differences between EU member states also in

¹ The total organic area is the sum of the “area under conversion” and the “certified area.” Before an area can be certified as “organic,” it must undergo a conversion process, which may take 2–3 years depending on the crop. For plants and plant products to be certified organic, the production rules must have been applied on the parcels of land during a conversion period of at least 2 years before sowing, or, in the case of grassland or perennial forage, at least 2 years before its use as feed from organic farming, or, in the case of perennial crops other than forage, at least 3 years before the first harvest of organic products.

	Organic area (ha)		Change 2012–2017 (%)
	2012	2017	
EU-28	10,047,896	12,560,191	25.0
Belgium	59,718	83,508	39.8
Bulgaria	39,138	136,618	249.1
Czech Republic	468,670	496,277	5.9
Denmark	194,706	226,307	16.2
Germany	959,832	1,138,272	18.6
Estonia	142,065	196,441	38.3
Ireland	52,793	74,336	40.8
Greece	462,618	410,140	−11.3
Spain	1,756,548	2,082,173	18.5
France	1,030,881	1,744,420	69.2
Croatia	31,904	96,618	202.8
Italy	1,167,362	1,908,570	63.5
Cyprus	3923	5616	43.2
Latvia	195,658	268,870	37.4
Lithuania	156,539	234,134	49.6
Luxembourg	4130	5444	31.8
Hungary	130,607	199,683	52.9
Malta	37	41	10.8
Netherlands	48,038	56,203	17.0
Austria	533,230	620,656	16.4
Poland	655,499	494,978	−24.5
Portugal	200,833	253,786	26.4
Romania	288,261	258,471	−10.3
Slovenia	35,101	46,222	31.7
Slovakia	164,360	189,148	15.1
Finland	197,751	258,672	30.8
Sweden	477,684	576,845	20.8
The United Kingdom	590,011	497,742	−15.6
Norway	55,260	47,042	−14.9
Switzerland	121,013	150,491	24.4

Data source: Eurostat (online data code: org_cropar [31]).

Table 1.
Total organic area in EU-28 and some other European Countries in 2012 and 2017 [31].

this structure: in 13 member states, permanent grassland covered more than 50% of the organic area (i.e., Ireland (95%), Czech Republic (85.5%), and Slovenia (81.4%)), while arable land represented more than 50% of the organic area in 11 EU member states (highly predominant in Finland (99.2%), Denmark (81%), and Sweden (77.9%)). Permanent crops were less presented in the total organic area, the highest shares in 2017 had Malta (48.8%) and Cyprus (46.7%) with

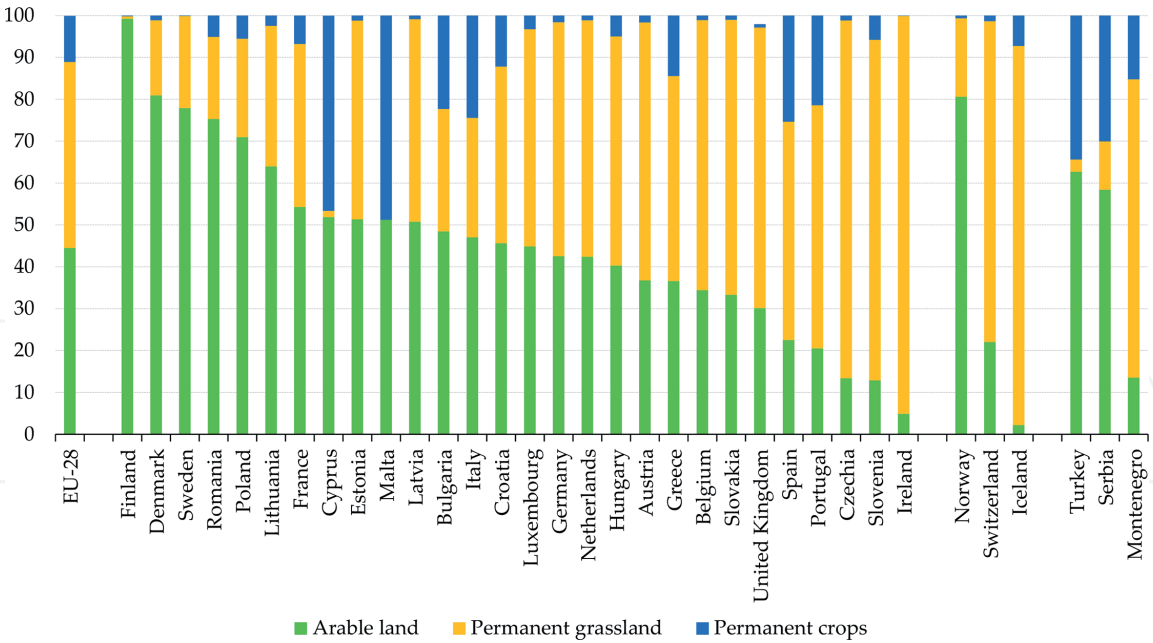


Figure 1. The structure of organic agricultural land in use by country in 2017 (% of total organic area—fully converted and under conversion). Data source: Eurostat (online data code: org_cropar [31]).

predominated olive trees, and the share was more as 20% in Italy, Spain, Portugal, and Bulgaria and between 10 and 20% in Croatia and Greece. In the rest of the 16 EU member states, permanent crops accounted less than 5% of the total organic areas (**Figure 1**).

The most popular species in organic livestock in EU member states in 2017 were bovines and sheep. The number of organic bovine animals was more than 4 million heads (around 5% of all bovines reported in 2017). The highest shares of organic bovines, dairy cows, and sheep and goats had Latvia (34.1% of total sheep and goat and 23.6% of bovines), Austria (21.7% of total bovines), and Sweden (21.2% of total bovines). The highest share of organic dairy cows in 2017 had Austria (21.2% of all dairy cows), followed by Sweden (16.4%) and Latvia (12.7%). Organically reared pigs had small share of the total reared pigs, and the highest share had Denmark with 3% [31].

4.3 Organic farming in Slovenia

In 2018, 3741 agricultural holdings were included in the organic farming control system (2.9% more than in 2017), of which 3320 were already organic agricultural holdings, with obtained ecological certificate, while the remaining 421 were still in conversion (**Figure 2**) [32]. In 2018, all agricultural holdings in the organic farming control system accounted for 5.4% of all agricultural holdings in Slovenia, and those that already reached the status of organic producers represented 4.8% of all agricultural holdings in Slovenia [32, 33].

In 2018, the area of ecological agricultural land in use increased by 1320 ha or 7% compared to 2017 (between 2016 and 2017, increased by 3996 ha or 11%). Organic production in 2018 was carried out on 47,848 ha of utilized agricultural area (on about 10% of all agricultural land in use). Permanent meadows and pastures occupied the largest share in the structure of organic agricultural land in use, over 81% (**Figure 3**). Compared to 2017, in 2018, the area of organic permanent meadows and pastures decreased by 1%, the area of organic vineyards increased the most (by 37% or 124 ha), orchards by 14%, and olive trees by 13%, while the area of organically produced vegetables increased by 11%.

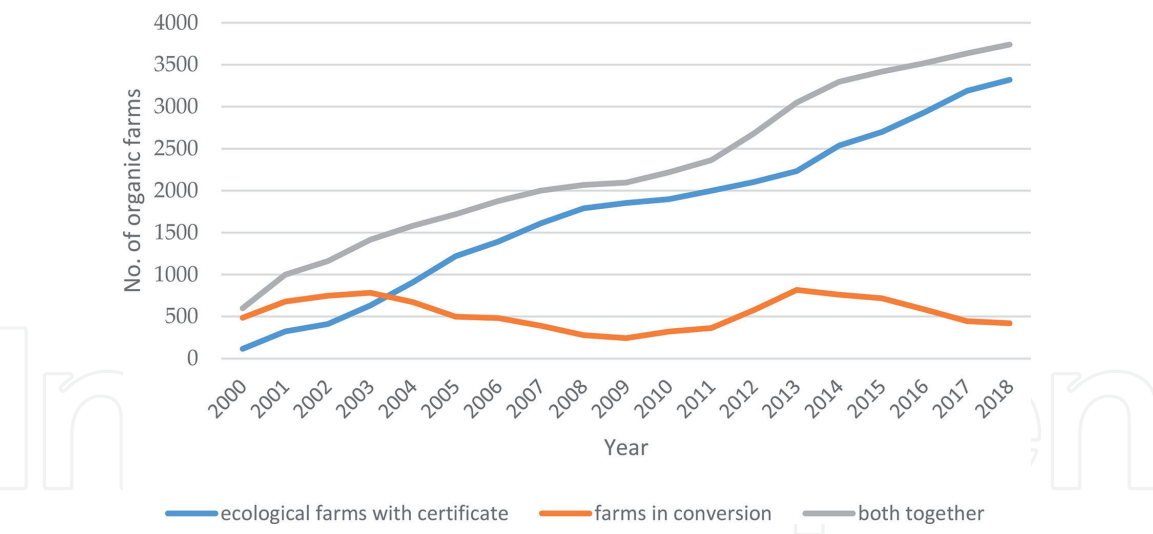


Figure 2.
Dynamic of growth of organic farms in Slovenia between 2000 and 2018. Data source: SiSTAT [33].

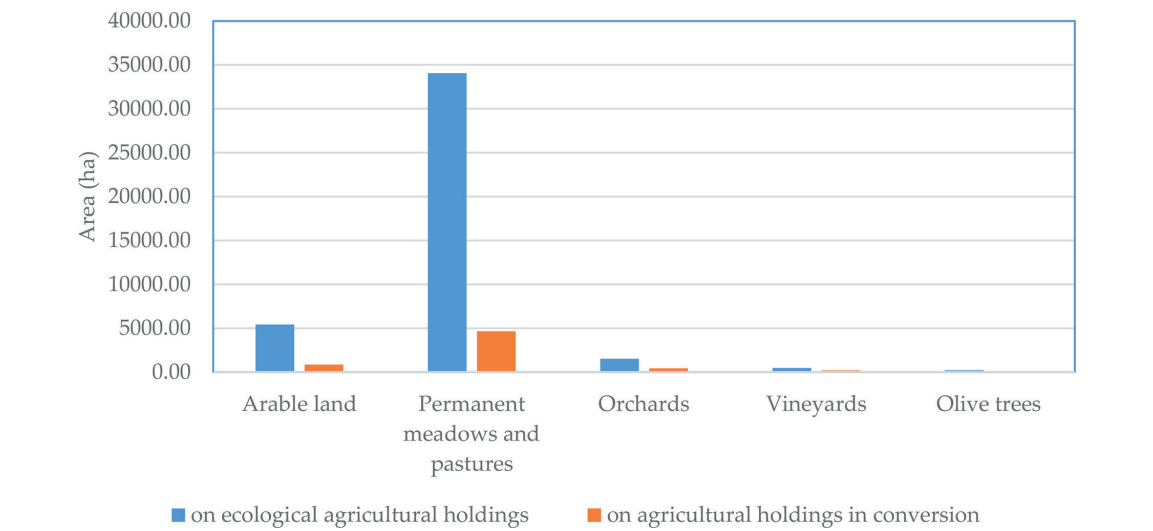


Figure 3.
The structure of organic agricultural land use in Slovenia in 2018. Data source: SiSTAT [33].

In 2018, fruit production was significantly higher than in 2017, almost by 6 times. Due to adverse climatic conditions (frost and hail), fruit production in 2017 was namely very low or even without any products, and also other plant production in 2017 was lower. Better production conditions in 2018 have made it possible to increase the total organic production in arable land and gardens by 27% and in vegetable production by 21%, while the output of organic vineyards' production was 15% higher and in olive groves by 31%.

Due to the large share of grassland, as well as the need for organic fertilizers for organic farming, organic farms usually also keep cattle. The number of individual species kept by organic farms varies, while poultry, cattle, and sheep dominated the number of animals. Between 2016 and 2017, the number of animals on organic farms increased by around 4%. The number of organic honeybees increased by as much as 20%, while the number of rabbits decreased by 11%. In 2018, the number of animals on organic farms decreased by 9%, probably because of worst climatic conditions for the production of animal feed. The only increase compared to 2017 was in the number of beehives by 31% (**Figure 4**). In 2018, the amount of organic products from animal production increased: the total weight of meat by 26% (cattle meat increased by 27%, pig meat by 19%, sheep meat decreased by 41%, and goat

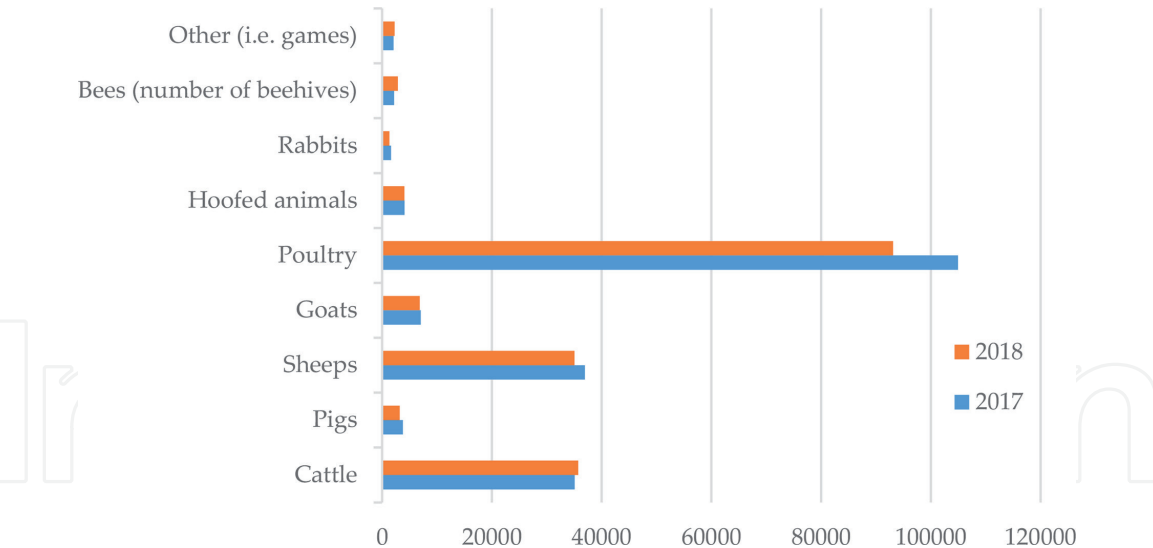


Figure 4.
The number of animals on organic farms in Slovenia in 2017 and 2018. Data source: SiSTAT [33].

meat by 57%). The increase was significant also in the weight of poultry meat by 29% and in the weight of other animals’ meat (i.e., games) by 238%. The increase compared with 2017 was evident also in the production of cow’s organic milk by 20%, while sheep’s and goat’s milk decreased (by 2 and 13%). Honey production in 2018 was 41% higher than in 2017 and egg production 26% higher [32].

Despite the growth in number of organic farms in Slovenia, the current development of organic farming is not in line with the expectations and goals set in the Action Plan for the Development of Organic Agriculture in Slovenia by 2015. Problems in the field of organizing and linking producers have been identified as the most problematic [34]. There is still insufficient volume and supply of organic foods, there are not enough qualified organic crop advisers and poor knowledge transfer, in animal products from organic farming it still happens that organic products go into conventional processing, etc.

The Ministry of Agriculture of the Republic of Slovenia will strive to achieve these goals in the future, since organic farming will be an important part of the agricultural development strategy in Slovenia after 2020. “The society expects quality food and smart management of natural resources. Consumers are increasingly putting in front their health and the healthy environment in which they live. Organic farming present also a good entrepreneurial opportunity for farmers, and the ministry intends to continue to raise awareness among consumers of healthy food and the environment, and to encourage the demand for local, organic foods, and, on the other hand, promote the integration and participation in the food production chain” said the Minister of Agriculture of the Republic of Slovenia Dr. Aleksandra Pivec [35].

5. Organic farming and the areas with restrictions/limitations or natural obstacles for agriculture

Organic farming, due to its production characteristics, can be a good choice for farming in areas such as “areas facing natural or other specific constraints” (ANCs), before in the EU called “less favored areas” (LFAs), protected areas (national, regional, or landscape parks), Natura 2000 areas, and water protection areas. Such areas are precisely spatially defined, based on criteria defined by the European or Slovenian legislation.

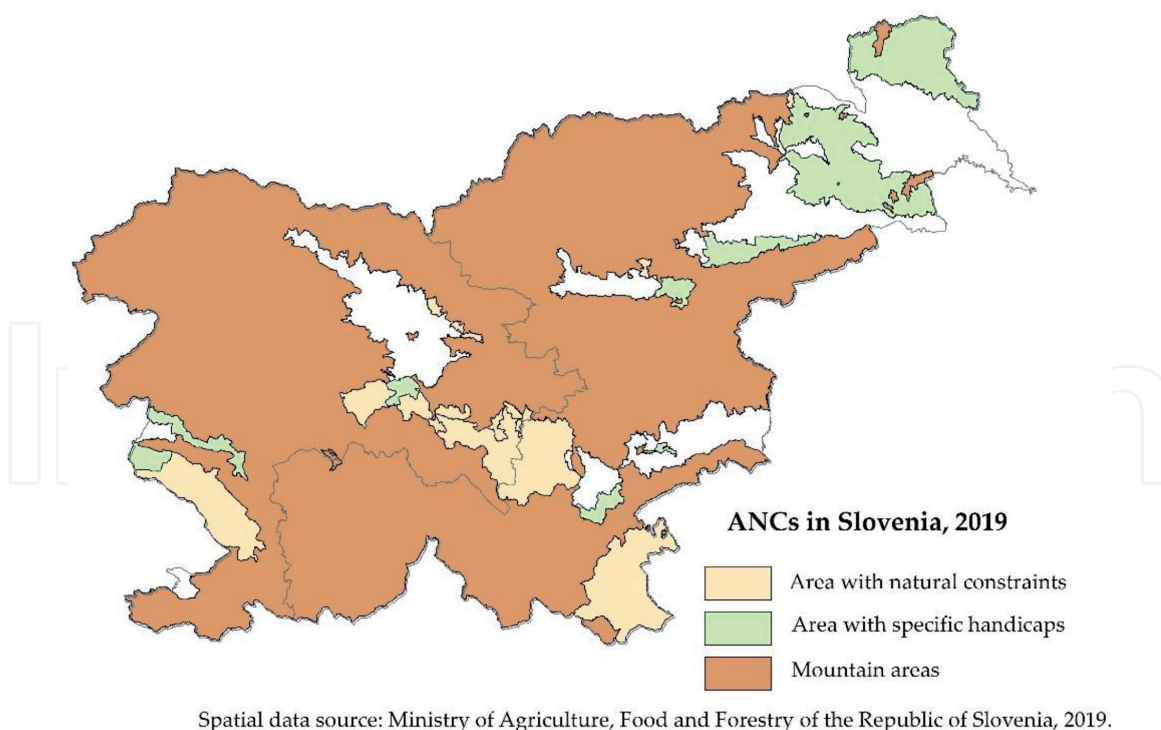


Figure 5.
Areas facing natural or other specific constraints in Slovenia.

5.1 Areas facing natural or other specific constraints (ANCs)

Many farmers in Europe are located in areas that are less favored for agriculture. They are facing natural constraints such as difficult climatic conditions, steep slopes, worst soil quality, and other natural handicaps. Farmers in such areas face many difficulties and have higher production costs but are very important from the viewpoint of sustainability. Most developed countries are paying them to mitigate the risks of land abandonment and thus a possibility of desertification, loss of biodiversity, valuable rural landscape, and other multifunctional roles that farmers play in such areas. ANC's are designated by member states based on EU Regulation 1303/2013 where objective biophysical criteria for the designation are declared. EU Member States have possibility to designate three different categories of ANC's: (1) mountain areas; (2) areas, other than mountain areas, facing natural constraints; and (3) areas affected by specific constraints [36]. In Slovenia, 86.9% of the country area is declared as ANC's or 76.2% of all agricultural land (**Figure 5**) [37]. Farmers with agricultural land in ANC's are eligible to receive compensation payments that are calculated on the basis of differences in costs or income as resulting from natural constraints and in comparison to areas not suffering from those natural or specific constraints.

5.2 Protected areas

In Slovenia, 269,475 ha or 13.3% of the national territory of Slovenia is defined as a protected area characterized by a rich and heterogeneous natural and cultural heritage. Such areas have not only economic but also environmental and social potential; thus, all aspects and prerequisites should ensure sustainable development. Protected areas in Slovenia are represented by one national park (Triglav National Park), three regional parks, 44 landscape parks, and several smaller protected areas such as nature reserves (57) and natural monuments (1164) [38].

In the Nature Conservation Act [39], protected areas are defined as areas of nature with a great abiotic, biotic, and landscape diversity and high density and diversity of natural values.

5.3 Natura 2000 areas

The main objective of the Natura 2000 network in the European Union is to conserve valuable biodiversity for future generations [40]. Slovenia is one of the EU Member States with well-preserved environment and with very rich biodiversity. Great biodiversity is not only the result of different geo-morphological and climatic conditions but also a result of human activities in space. Natura 2000 areas in Slovenia in total encompass 7684 km² or approximately 37% of the country territory [41], one of the highest among EU member states. Two thirds of Natura 2000 sites in Slovenia are forested, a substantial part consists of areas with little vegetation above the tree line in the mountains (rock walls), and there are notable grassland areas. A quarter of the total Natura 2000 sites in Slovenia are protected areas (Triglav National Park, regional and landscape parks, nature reserves, or natural monuments).

Implementing of appropriate farming practices in Natura 2000 sites is a prerequisite for the conservation of certain plant and animal species and habitats. The use of agricultural land within Natura sites is regulated by EU regulations and allows farmers to obtain direct payments for farming. There are also certain restrictions, such as prohibiting the plowing of rich grasslands and need for maintaining landscape features (e.g., preserving vegetation zones along watercourses, smaller basins, dry walls, terraces, and tree groups). An instrument for directing the agricultural use of such areas is the agri-environment-climate payments under the CAP (i.e., KOPOP measures in Slovenia), which represent one of the most important ways of directing agricultural activity to a more sustainable way in Slovenia and in the EU. Farmers decide for such measures voluntarily, but they have to implement it on the area covered for at least 5 years. In addition to these measures, some other payments (e.g., ANCs, support for organic farming) that contribute to land cultivation and, in particular, the prevention of grassland overgrowth in Natura 2000 sites can contribute to the achievement of sustainability objectives in Natura 2000 sites. Other CAP Measures such as Cooperation, CLLD, Knowledge Transfer, and Counseling also contribute to the achievement of the conservation objectives of the sites [42].

5.4 Water protection areas

Water protection areas in Slovenia cover about 17% of the country's territory [43]. They are located mainly in the plains, where agriculture is the most intensive. The burden on water and its quality comes not only from agriculture but also from disorderly sewage, wild waste landfills, transport, industry, etc. In Slovenia, groundwater accounts for as much as 98% of all drinking water supply for residents, making efficient protection of groundwater quality of great importance for the health of the population [44]. Most water protection areas in Slovenia are covered by forest (61.1%), followed by grassland (13.6%) and fields (10.9%) [43]. Despite the fact that ecological farming is the most suitable due to the protective objectives on these areas, the share of ecological areas in water protection areas is less than 2%. The reason is likely that these areas are in plains where intensive farming is dominant. In addition, the farm cannot farm organically on water protection areas and conventionally in the remaining ones at the same time. By regulation, only the whole farm can be converted into organic. Due to restrictions on farming, farmers are achieving lower yields on such land. Environmental legislation in the fields

	Utilized agricultural area (UAA) (ha)	Share of utilized agricultural area (%)	Area in organic control (ha)	Share of area in organic control (%)	No. of organic farms	Share of organic farms (%)
ANCs (LFA)	449,000	72.4	28,198	94.5	1922	93.0
Natura 2000 areas	142,067	22.9	6820	22.9	369	17.9
Protected areas	66,293	10.7	1487	5.0	124	6.0
Water protection areas	95,768	15.4	4913	16.5	263	12.7
Data source: [45, 46].						

Table 2.
Utilized agricultural area, area in organic control, and no. of organic farms in different types of areas.

of water protection areas and agriculture are consistently implemented and controlled, but on the other hand, the state does not pay farmers yet for a loss of income at the expenses of the restrictions it imposes on the legislation. There is much dissatisfaction among farmers and therefore probably less readiness for organic farming on water protection areas.

The data in **Table 2** show the organic farms by type of area with restrictions/limitations or natural obstacles for agriculture (situation in 2011).

The majority of Slovenian organic farms (93% of all) were in 2011 in areas facing natural or other specific constraints. This is not particularly surprising since such areas make up as much as 85% of the country's territory. Farms in such areas have less favorable conditions for agriculture, so the conversion to organic farming is one of the strategies to survive and improve the economic situation. Due to the high proportion of permanent grassland in ANCs, high share of organic farms in such areas specializes in livestock husbandry [46]. Such a distribution of organic farms indicates that organic farming is more interesting for farms with poor conditions for cultivation and with already extensive farming practices that do not need some special adjustments. Subsidies contribute to their farm efficiency. In 2011, approximately 23% of total area in organic control in Slovenia and 18% of total number of organic farms were located in Natura 2000 areas. This indicates that more incentives to increase a share of organic farming in areas with high biodiversity are needed. Only 13% of organic farms were located in 2011 in water protection areas, and only 16% of the farmlands were organically cultivated.

6. Determinants of organic food consumption

Organic producers depend on the demand for organically produced products. The proportion of consumers purchasing organic food on a regular basis remains low, although consumers have mostly positive attitudes toward organic food as proved in many studies. Decisions about organic food consumption are influenced by different factors. Aertsens et al. [47] made an overview of different studies and exposed the following determinants:

- *Values* such as security (e.g., health is often the strongest motive for purchasing organic food), hedonism (good taste, fun, and enjoyment), stimulation (excitement, novelty, and challenge in life), universalism (understanding, appreciation, tolerance, and protection for the welfare of all people and for

nature), benevolence (the desire to do good to others with whom one is often in personal contact), self-direction (choosing, creating, and exploring; e.g., some consume organic food to differ from others and to make a positive self-image and identity), conformity (comply with the expectations of others and violate social expectations or norms), and power (social status, prestige, control, and dominance over people and resources)

- *Attitudes* (e.g., beliefs about health, taste, and environmental consequences)
- *Cognitive and affective components of attitude* (cognitive = thinking, affective = feeling; feelings often tend to predominate in forming personal attitude toward organic food)
- *Emotions* (positive: happiness, love, contentment, and pride; negative: sadness, fear, anger, shame, guilt, empathy etc.)
- *Attitude influencing intention* (attitude toward buying organic food and the intention to buy)
- *Subjective norm or social norms* (subjective norm = social pressure for a person to engage or not to engage in a behavior, social norm = information about what behavior is most appropriate or beneficial)
- *Personal norm and moral norm* (personal norm = an individual's conviction that acting in a certain way is right or wrong; moral norm = morally relevance of a situation)
- *Perceived behavioral control* (people's own perception about the ability to perform a given behavior), perceived barriers (price, availability, lack of trust, and product appearance), and perceived abilities (income impact on the performance of behavior)
- *From intention to behavior* (positive correlation between intentions of buying organic food to behavior)
- *Socio-demographic factors* (gender, age, education, and children in family)
- *Macro-level factors* (the differences between the regions in the world and in the development of their organic markets, the functioning of institutions, the environment people are living in (rural or urban), general knowledge about and trust in organic food, cultural differences, economic and technological factors, etc.)

One of the strongest motives for purchasing organic food is connected with food safety and healthiness (values). Organic consumers believe that organic food tastes better than conventional and also curiosity often stimulates purchase. From universalism point of view, organic farming is mostly perceived by consumers to be more environmental friendly as conventional farming. Some people may consume organic foods that make them different from others and feel some positive self-image and identity. Beliefs about health, taste, and environmental aspects have strong influences on attitude toward buying organic food. Consumer response and behavior are often emotionally conditioned (e.g., fear of contaminated meat determines purchasing behavior of organic meat). All kind of norms (social, personal, and moral) influence purchasing organic products as well and there

are some barriers too such as high prices, availability of products, lack of trust in organic certificates, and financial abilities. People with low income have limited or no possibility to buy organic products despite the fact that they want and believe in such products. Socio-demographic characteristics of consumers have less influence on organic food purchases as values [47]. From a gender perspective, more women than men have positive attitudes toward organic food; women generally also concern more about health and healthy food. The age was not recognized as a very significant factor; some studies found the differences between age groups, but more of them did not. The differences are probably influenced by other factors (e.g., macrolevel factors). Families with children are more likely to buy organic food products, while education seems not to play an important role in organic food consumption.

Slovenian consumers purchase mostly in supermarkets or discount stores. One of the latest studies [48, 49] on purchasing habits of Slovenian consumers showed that 28% of interviewed customers often buy organic products, 34% of them occasionally, and 34% very rare or never. There are no significant differences between the groups of customers buying conventional or organic products, except that among customers of organic products share of women is higher. Buyers of organic food are not different by region and type of settlement, but they have higher income. Regular organic food buyers are more likely to buy organic food directly from the farmer, on farm, or on local street market, and to a lesser extent from supermarkets and discount stores. Customers see the supply of organic products in supermarkets as too narrow and mostly not Slovenian origin. One of the strongest motives for purchasing organic food is customers believe that such food is fresh, healthier, of higher quality, and of better taste. Over 40% of organic food buyers believe that such food is completely free of pesticide residues.

The main obstacle for those who do not buy organic food and products is too high price; they also do not trust that organic food is of better quality, healthier, or tastier as conventionally produced food. They even do not trust in their origin and food labels.

The origin of the product is very important for Slovenian buyers in general, so they expect it to be clearly marked on the product, with a clearly defined country of origin (e.g., Slovenia, Austria, etc. and not only as EU origin). Over 80% of customers most trusted in organic products from Slovenia, followed by organic products of Austrian and German origin. Slovenian organic food buyers least trust organic products from Israel and Turkey. They believe that by buying Slovenian food they support Slovenian farmers and contribute to the development of the local food market, to protect the environment, and to the maintenance of cultural landscape and vital countryside.

Buyers of organic food are most attracted to the Slovenian origin, the label “Chosen quality of Slovenia” and the specific indication of the farm where the food comes from. Attractive are also some special offers and lower prices. The highest share of the purchase decision explains the product origin (63%) and the price is slightly more important than the production method. Interesting finding of survey is that Slovenian consumers are ready to pay also 80% higher price for food of Slovenian origin as for comparable foods from abroad. They are even ready to pay more for conventional food with Slovenian origin as for certified organic food from Austria or Italy [48, 49].

7. Conclusions

In terms of the preservation of agricultural production in the entire territory of Slovenia, the preservation of rural settlements and biodiversity, to which the appropriate farming method contributes, areas with limited factors for farming are

very important, not just flatlands with the best conditions for agricultural production. In these areas, the promotion of sustainable ways of farming, such as organic farming, is very important and should be supported by appropriate agricultural policy measures and support payments in the future. Data on the volume of organic farming show that the number of farms and the volume of agricultural land in organic production are growing too slowly, especially the share of arable land and permanent crops. The target set by the 2015 organic farming action plan was not achieved. Several farms have also withdrawn from organic farming due to some reductions in payments.

Data on available quantities of Slovenian organic food and consumer needs indicate that demand for this type of food is much higher than supply. Slovenian organic producers can provide only about 20% of the demanded quantities for organic products. The market supply of organic products from Slovenia can, therefore, and should be increased. Direct support to organic producers, support for adaptation and investment for organic farms, farm modernization, greater integration of producers for joint market entry, and more research and knowledge transfer, can contribute to increase the supply of organic products.

The resolution “Our Food, Rural Areas and Natural Resources after 2021” [50], which represents a strategic framework for the development of Slovenian agriculture, food processing, and rural areas, gives organic farming and areas with natural handicaps for agriculture notable attention, which should be followed by agricultural policy measures in the new programming period beyond 2020.

To increase the share of organic farms in Slovenia, as well as in other countries, it is important to know the reasons, objectives, and motives that influence the decision to convert to organic farming. When preparing some effective support policies, it is important to take into account the findings of different studies. General findings are that financial motives are very important to attract potential converters. However, many other factors as well influence farmers’ decisions. However, if farmers are only economically motivated for conversion, short-term benefits through policy payments may go out of the scheme as soon as economic conditions are not so favorable anymore. That has happened in Slovenia as well.

Natural conditions for agriculture, farm and farmer’s characteristics, demand for organic products among consumers, yield loss, price premiums, market prices, consumers’ purchasing power, and other factors that influence the decision about farming system must be well understood. As conversion is a strategic decision of farmer and his/her family, it is necessary that support policies are long-term oriented and provide the conditions for the success of the farm business. Adoption of organic farming is not only economically motivated but also different noneconomic factors were found as important. The probability of conversion to organic farming is influenced also by the farmers’ attitudes to the environment, food quality and health, lifestyle, and other ideals. This should also be taken into account when promoting organic farming and encouraging farmers to convert.

Decision for organic farming in areas with natural handicaps or restrictions seems appropriate, especially on farms where grassland predominates. The readiness for conversion increases if the level of payments for organic farming also increases and there are already successful organic farms in the area [51]. Farms can improve the economics of farming through higher direct and rural development payments for organic farming and the implementation of agri-environment-climate measures. Another possibility is linking organic farming with tourism or processing of products on the farm and sold them direct on the farm or in the local environment to local people, visitors of tourist farms, and local institutions (schools, kindergartens, hospitals, etc.). Indeed, ensuring the environmental and social role of organic farming is only possible if farming is economic at the same time.

We can agree with Meemken and Qaim [8] that “organic farming is not paradigm for sustainable agriculture and food security, but smart combinations of organic (especially in less favored, water protection, and protected areas) and improved conventional methods could contribute toward sustainable productivity increases in global agriculture”.

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