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FARM to FORK ACADEMY

МРЕЖА ЗА РУРАЛНИ РАЗВОЈ СРБИЈЕ

Participative consultations and dialogue

in order to strengthen the position of farmers in the value chain

THE CASE OF VEGETABLE GROWING AND WINERY SECTOR

NATIONAL REPORT OF SERBIA

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СРБИЈЕ

Content

1. Executive summary

The value chain in vegetable growing for small farms and young farmers provides opportunities for the farm to be economically sustainable, because vegetable production enables significant flexibility in combining types of vegetables, as it is mainly a one-year plant production. On the other hand, manufacturers face a series of problems that range from increasingly strict requirements related to meeting standards, through changes in the market, to changes in consumer habits.

With this in mind, two consultative meetings were held in central Serbia in two geographical regions, one in the protected area of the "Golija" Nature Park, and the other in the south of Serbia in the well-known vegetable region in Leskovac. Consultative workshops showed significant diversification in production, as well as in the challenges faced by producers. Challenges are present in all segments of the value chain, from primary production, through processing, to distribution. These challenges put farmers, especially small and young ones, in a situation where they have to solve them on the fly.

The key recommendations that were observed during the consultation process are: improving the processing and production of traditional products for which there is a market demand; using the good reputation of certain regions for protection as geographical indications and better market positioning of these products; work on sustainability and adaptation to climate change; introduction of modern technologies in production and processing; improvement of association and improvement of relations in the value chain, in order to improve the market position, as well as to improve the distribution of profits in favor of small producers and processors; continuous monitoring of market needs and adaptation of production to market requirements and market trends.

The value chain in winemaking is complex, as it requires significant engagement from small producers in all segments that follow the life of the product, from the production of raw materials, through processing into wine, to marketing and product placement. The global and domestic market provides opportunities, but also limitations for small wineries and winegrowers in Serbia.

During the consultative processes, key recommendations were defined: work on sustainability and adaptation to climate change; improve traceability in order to enable the consumer to know all the elements involved in the production of the product and all the stages of production it goes through; incorporating innovation in favour based on climate and tradition; development of premium products; the need for further networking and cooperation in the value chain; the need to develop organic production; taking advantage of digitization in the entire value chain; improving the use of mechanization and robotics in both primary production and processing.

2. Introduction

Brief history of agriculture in Serbia

Serbia has very favorable natural conditions for the development of diverse agricultural production, primarily cereals, industrial plants, grapes, fruits and vegetables, seed and planting material, medicinal plants, as well as large and small livestock. The development of primary agricultural production is also enabled by the appropriate level of development of the food industry, primarily conditor/ pastry, oil, sugar, beer, juice, vegetable, flour, meat and milk processing industries.

In Serbia, about 3.5 million hectares of land are cultivated, which represents a significant decrease compared to the previous period (estimates are that about 25,000 hectares of arable land are lost annually, mostly due to the construction of infrastructure). About 90% of arable land is privately owned by agricultural farms and companies. About 75% of the used agricultural land consists of arable land and gardens, dominated by grain production. They are followed by agricultural areas under pastures (10%), meadows (9%), orchards (5%) and vineyards (1%). The largest areas of agricultural land are located in Vojvodina (about 80% of the total arable land).

It is estimated that between 300 and 400 thousand hectares of arable land and meadows are not cultivated every year. Also, a small percentage of the used agricultural land is irrigated.

The GDP of the Republic of Serbia in 2022 amounted to EUR 60.427 billion, i.e. EUR 9,067 per capita. The share of agricultural production in the total GDP of the country is 6.5%. Structural changes in the economy have led to a continuous decline in the share of the agricultural sector in GDP, while the value of agricultural production is increasing with noticeable annual variations. Exports of agricultural and food products are growing, but their structure indicates that the sector is still primarily a supplier of raw materials, with an unfavorable ratio between imports and exports per unit value, as well as a deterioration in the ratio of import to export coverage. Primary agricultural products have a significant share in foreign trade, both in exports and imports.

According to official data, about 15% of the total labor in the country is engaged in agriculture.

The structure of agricultural production shows that crop production is significantly more developed than livestock farming. In this context, the most important agricultural products of Serbia are corn, wheat, sunflower, sugar beets, soybeans, potatoes, raspberries, apples, plums, grapes, pork, beef and poultry meat and milk. The data show that there is a big drop in livestock production in Serbia (725,000 cattle - 17.7% less than in 2018, 2.26 million pigs - 30.7% less than in 2018, about 150,000 goats - 31.5% less than in 2018). Livestock farming is dominantly present in the private sector, mostly in small farms that could not cope with fierce competition from large imported meat producers.

Domestic agriculture is still characterized by a low level of productivity, technological backwardness, low level of innovation, inflexibility, high extensiveness, as well as sensitivity to climatic conditions.

Despite everything, domestic agriculture is an important economic activity, because it ensures the food security of the country, the production of raw materials for industrial activities, as well as products for export. In addition, it has social and demographic significance.

The agricultural structure of the Republic of Serbia is dominated by small farms. The results of the 2023 Census of Agriculture indicate that in 2023 there were 508,365 registered agricultural farms, of which 99.6% were family farms engaged in their own agricultural production. The average agricultural holding owns 6.4 hectares of land.

The key products of small farms that are represented in the region contribute significantly and ensure the availability of food for their own households and the community. Traditional production technologies maintain diversity in rural economies, and also have an impact on the preservation of the environment.

According to the results of the 2022 census, the Republic of Serbia has 6,647,003 inhabitants and the number of inhabitants is continuously decreasing. In the Republic of Serbia, the urban population predominates (62.1%), while rural areas classified as "other settlements" comprise 37.9% of the population.

Depopulation in rural areas is a consequence of low birth rates and intensive migrations from rural to urban areas or out of the country. Depopulation is more pronounced in the rural female population compared to the male population. Lack of employment opportunities, low salaries, underdeveloped infrastructure, limited access and low quality of education and health services, as well as access to financial social assistance, partially explain poverty and migration from rural areas. The share of the female population emigrating from rural areas, as well as the younger population (15–35 years old), is higher compared to the male population, which significantly affects the loss of the able and fertile population from rural areas and deepens further depopulation trends.

The average population density in the Republic of Serbia is about 90 inhabitants/km^2. In rural areas, the population density is 58 inhabitants/km^2, while in urban areas the population density is 399 inhabitants/km^2. The average age of the population is 43.9 years. The process of demographic aging of the population is manifested by the low participation of young people and the high and continuously growing share of the elderly in the total population. According to data for the Republic of Serbia, in 2023, the share of people aged 65 and over was 22.3%, and those under 15 were 14.4%.

Consequently, the average age of owners of family farms in Serbia is 60 years, while only one in 11 farm owners is younger than 40 years old. These data inevitably indicate a further aging trend of the domestic agricultural population, as well as a lack of labor in agricultural production.

Due to all of the above, a large part of the primary agricultural sector is excluded from the commercially oriented agri-food chain due to the small volume of production, considering that the producers cannot ensure uniform quality of products in sufficient quantities. In this sense, the big challenge for producers is to fulfill the mentioned requirements in order to keep as large a share as possible in the domestic market. Therefore, innovation and short supply chains need to build bridges between small farms and urban consumers.

For most small agricultural producers, direct sale is the most important market channel. Some of the channels of direct sales of products of small agricultural producers are as follows: green market, sale on farm , roadside sales, sales through tourism and hospitality, etc. The most important direct sales channel is the green market with a total turnover of agricultural and food products of about 20% of the total value of sales and purchases of agricultural and food products. In addition to the above, a special type of placement of agricultural products by small agricultural producers is barter transactions between participants in the value chain (food processing companies, cooperatives, buyers/traders, integrators) and the agricultural producers themselves. Under this system, agricultural producers who contract with processing companies, cooperatives or integrators receive necessary inputs in exchange for selling surplus crops after harvest. The value of this type of cooperation is estimated at at least EUR 100 million.

Producer organizations, producer groups and short value chains are still not regulated by national legislation, while cooperatives are defined as legal entities. A cooperative is a legal entity that includes a special form of organization of persons who realize their economic, social, cultural and other interests by operating on cooperative principles and who manage and control the operations of the cooperative. A member of a cooperative is a person who fully or partially operates through the cooperative, that is, who through the cooperative sells its products or services, acquires products or uses services necessary for the performance of its activities, or otherwise directly participates in the performance of the activities for which the cooperative was founded. Agricultural cooperatives can be general or specialized (agricultural, fruit, vegetable, vineyard, livestock, beekeeping, etc.).

Agricultural cooperatives in the Republic of Serbia support their members who mostly live and work in rural areas to do business successfully, by providing better working conditions. In addition to contributing to strengthening the economic position, agricultural cooperatives play a significant role in preventing depopulation in rural areas and improving the social environment.

The basic activities of agricultural cooperatives relate to the contracting of production with the members of the cooperative, which includes the procurement of raw materials, services, storage and joint sale of products. In addition to contracting production, a significant number of members also have their own agricultural production. Successful cooperatives have storage capacities, modern machinery, and some have processing capacities.

Over 5,000 cooperatives are registered in the Republic of Serbia, of which about 2,000 are active, of which 80% are agricultural cooperatives. In the total number of cooperatives, 35,000 founders and 100,000 cooperative members are registered.

Task objective

Task objective is to make a concrete analysis of the position of the value chain of agricultural producers in the process of consultation with young farmers and other interested parties with all the challenges identified during the analysis, as well as opportunities for improvement or growth of agricultural producers within the value chain.

Methodology for achieving goals

To achieve the objectives of the task, several methods were used.

Desk research

Based on available statistical data, the structure of agricultural production in the country was analyzed in order to identify specific value chains. The importance of the value chain and its market share, the position of local farmers, processors and traders within the value chain, the production and processing capacity, the profit potential for farmers, processors and

traders, as well as the environmental and social impact of the value chain were analyzed.

After a detailed analysis, 2 value chains were selected to be the subject of the consultative process: the vegetable sector and the viticulture and wine sector.

Consultative workshops with stakeholders

Five stakeholder workshops were organized for 2 selected value chains (vegetable production and wine production). The workshops were attended by small-scale agricultural producers, as well as other actors within the value chain (consolidators, processors, retailers, service providers and advisory services). During the discussion, the workshop participants presented their role in the value chain and outlined the problems they face in their business. In addition to the challenges, the participatory consultations also identified opportunities for improving the overall functioning of the value chain, with a special emphasis on improving the position of small and young producers (improving the production process, associating and acting together, adding value to products, negotiating, better market access, innovation, knowledge transfer, etc.).

Additional data collection - interviews

In order to involve more stakeholders in the process and thus obtain more comprehensive information on the value chains, additional data collection was carried out in the form of direct semi-structured interviews with stakeholders. The results of these interviews significantly contributed to the understanding of the situation within the value chain.

Based on the information obtained in direct consultations with workshop participants, as well as on the basis of information from the interviews conducted, SWOT analyses were conducted for the selected value chains, which identified challenges as well as opportunities for improvement or growth of small producers within the value chain.

Target groups

Young farmers, small agricultural producers and all other actors within the value chain (consolidators, wholesalers, processors, retailers, service providers and advisory services), competent ministries and state institutions, scientific and research institutions.

Report limitations

The report has its limitations related to the unavailability of fresh data during the desk research, as well as the limitation due to the organization of a limited number of consultative workshops with a limited number of young farmers, small farmers and other stakeholders. Both selected value chains are spread across the entire territory of Serbia, so an attempt was made to gain the widest possible insight into the issues of these value chains through organization in different geographical regions. Although significant efforts have been made, there remains a risk that the identified issues and the proposed recommendations have limited impact and are limited by regional specificities and the type of vegetable production.

Report structure

The report is designed in such a way that the first part deals with an analysis of the situation based on currently available data, the second part presents the findings of the SWOT analysis based on the experience of small farms and young farmers, as well as other stakeholders. Based on the analysis and consultations conducted, conclusions were drawn and recommendations were made.

3. Methodology

Analyzing available statistical data, based on many years of experience in working with different groups of producers in the field, as well as on strategic documents in the field of agriculture and rural development at the national level, Network for Rural Development of Serbia has selected 2 value chains that will be the subject of the consultative process, namely the vegetable sector and the viticulture and winemaking sector. The value chains were analyzed based on several criteria such as: contribution of the value chain, competitiveness, production and processing capacities, possibility of making a profit for small and young producers, development potential, sustainability of production and state support.

Analysis of the production value chain selection - vegetable growing

Serbia has good conditions for vegetable production (quality soil, climatic conditions, tradition in production, etc.) and in terms of the area under vegetable production, the Republic of Serbia ranks 67th in the world, and 10th in Europe. The share of vegetable production in total agricultural production is about 8%.

Irrigation of vegetable production is highly prevalent - more than half of total vegetable production is irrigated. Open field production is dominant in total vegetable production (62%) compared to indoor production (38%) and there are great opportunities for improvement.

Due to climate change, there is a trend of growing vegetables indoors under "controlled" conditions, and in recent years there has been significant support for indoor production from national and IPARD measures. In addition to the above, indoor production is intensive and imply higher yields on small areas of arable land. Also, the above types of vegetable production do not require excessive engagement of additional labor and at the same time enable the engagement of all gender and age categories of the population.

In Serbia predominate small family farms that are engaged in diverse production. According to data, about 1.5% of family farms specialize in vegetable production, but this number is significantly higher because a large number of households produce vegetables for their own needs

with certain market surpluses. With better organization and innovative solutions in the production value chain, these surpluses represent significant potential for growth in both quantity and quality.

Agricultural farms specializing in vegetable production are among the economically strongest and most vital agricultural farms. In the cost structure of vegetable production, investments are not too large, and revenues can be significant. The vegetable market in the Republic of Serbia has shown a stable growth trend in recent years, both in domestic trade and in exports.

The specificity of vegetable production is reflected in the fact that fresh products have a higher value than processed products, which represents a great potential for profit, but at the same time it is challenging in terms of organizing transport and logistics. Processing is usually seen as a process of creating additional value for products, however, when it comes to vegetable production, this is not the case. Fresh produce has a higher value, while lower quality produce is processed. In any case, this is an advantage over other forms of production, as the entire production can be marketed in some way.

Due to the short production cycle in the vegetable sector, timely response is of key importance, which primarily relates to the predictability and long-term stability of the overall economic policy.

With innovative solutions and improvements in terms of networking and cooperation, improved transport and logistics, food safety, marketing and the use of modern technologies, vegetable growing represents a dynamic production value chain that can be further improved.

In addition to the above, one of the key reasons for choosing vegetable growing as a production value chain is that small family farms throughout Serbia can engage in various forms of vegetable growing with relatively small investments.

Analysis of the choice of production value chain – viticulture and winemaking

There are traditional wine-growing regions with favourable conditions for grape production in Serbia. The grape production sector in the Republic of

Serbia is characterized by a large number of grape producers with small-scale vineyards. The total area under vineyards in the Republic of Serbia is about 23,000 ha.

The establishment of new plantations is characterized by large investments and problems with the procurement of certified seedlings of autochthonous, regional and domestic varieties, as well as problems with pronounced climate changes. A major problem is also the lack of active labor for vineyard work.

Despite all of the above, the winemaking sector in Serbia is recording a positive growth trend and achieving good business results. This is contributed by global demand for wine, a decrease in world production caused by climate change, as well as the good quality of wine from small wineries that have successfully positioned themselves on the market with specific autochthonous wine varieties. Wine production contribute with 8% of the total value of agricultural production in Serbia.

Production is mainly based on family wineries of micro, small and medium capacity. In the Republic of Serbia, wine production is carried out by over 500 wineries, which produce over 70 million liters of wine annually. The improvement of winemaking has been supported through national and IPARD measures (raising grapevine plantations, but also building and equipping wineries), as well as significant investments by private entrepreneurs.

Small wineries successfully market their wines on the domestic market (retail chains and restaurants), and some of them export their entire production (the problem is limited quantities).

Wine production is the process of creating added value through investments in the quality of raw materials, using the specific characteristics of the climate, protecting geographical origin and associating small producers.

Viticulture and winemaking is a specific and sophisticated production value chain that can be further improved in terms of increasing grape production and the benefits that small producers can achieve in the production chain. Increasing the primary production of quality wine varieties should contribute to the additional development of the winemaking sector, both in terms of volume and value.

Due to all of the above (good potential, growing demand for wine at the global level, etc.), but also due to the possibility of applying innovative solutions in grape and wine production, it is believed that this production chain can achieve additional growth and generate significant income for all participants in the production process.

Desk research based on available statistical data

Vegetable growing in Serbia

The average value of production of goods and services in the vegetable sector in the period from 2007 to 2018 was EUR 371.6 million, while in 2018 the value of production was EUR 334.2 million. The average share of the vegetable sector in the total value of agricultural production for the period from 2007 to 2018 was 8.7%, while in 2018 the share of vegetables in the total production of goods and services in agriculture was 7%.

The distribution of agricultural holdings specializing in vegetable production is equal by region, except for the Belgrade region which participates with 10%, while the other regions (Vojvodina, Šumadija and Western Serbia, Southern and Eastern Serbia) have approximately the same share of 30%.

Agricultural holdings specialized in vegetable production have an average economic size of EUR 10,576, which, compared to other holdings, places them in third place among the economically strongest agricultural holdings. According to the 2012 Agricultural Census, holdings engaged in vegetable production had the highest average economic strength compared to the latest data. The division of agricultural holdings according to the legal status of the holder shows that family agricultural holdings, which are the main holders of vegetable production in the Republic of Serbia, have a lower economic strength (EUR 9,051) compared to legal entities and entrepreneurs (EUR 73,876).

Open field production remains dominant in total vegetable production with a share of 62%, compared to 38% for indoor production.

Table 1 Number of agricultural holdings specialized in the production of vegetables, flowers and ornamental plants

Type of agricultural farm production	Number of agricultural holdings by size of used agricultural land						
	< 1 ha	1,01 ha – 2 ha	2,01 ha – 5 ha	5,01 ha – 10 ha	10,01 ha – 50 ha	50 ha<	Total
Outdoor production	404	370	689	792	1,168	291	3.712
Indoor production	383	146	444	638	590	79	2.281
Total	787	516	1.133	1.430	1.758	370	5.993

Source: Republic Institute for Statistic

In the Republic of Serbia, vegetables are produced on about 120,000 ha (ten-year average), which makes up 3.5% of the total arable area.

The structure of vegetable production in the Republic of Serbia is dominated by tubers (potatoes) and fruiting vegetables (tomatoes, peppers, melons and watermelons and cucumbers), and leafy vegetables (cabbage and kale) also have a significant share. Production is stable and amounts to 1.7–1.8 million tons, and significant oscillations occur in years with extremely bad weather conditions (drought, floods and hail). The distribution by regions is balanced, with all regions having approximately the same shares, except for the Belgrade region. In recent years, there has been a pronounced professionalization of producers and concentration of production of certain types of vegetables in certain regions.

Vegetable production has been significantly improved in recent years, due to increased investments in mechanization and storage capacities (investments in mechanization predominate). Professional producers apply modern technologies, and the largest ones are at the level of leading EU producers.

Vegetable production in the Republic of Serbia, 2012–2018.

Vegetable	Annual production (000) t							Structure
	2012.	2013.	2014.	2015.	2016.	2017.	2018.	2012 – 2018 (%)
Total	**1.498**	**1.813**	**1.512**	**1.708**	**1.821**	**1.647**	**1.300**	**100.0%**
Potatoes	578	767	592	639	714	589	488	38,7%
Tomato	156	175	128	147	160	171	132	9,5%
Peas	33	32	21	44	41	38	29	2,1%
Cabbage and kale	304	304	261	289	290	263	209	17,0%
Onion	30	32	43	46	58	33	28	2,4%
Paprika	89	100	114	165	228	199	135	9,1%
Beans	10	13	11	13	13	13	11	0,8%
Melons and watermelons	190	255	228	242	208	247	199	13,9%
Carrots	47	65	50	64	49	31	22	2,9%
Cucumber	55	64	53	53	55	58	43	3,4%
Garlic	6	7	11	7	5	5	4	0,4%

Source: Republic Institute for Statistic

Processing industry

Business entities that are involved in the processing of vegetables most often also process fruit. According to available data from the Ministry of Agriculture, cold stores and facilities for canning and processing fruits and vegetables make up approximately 65%, while facilities for the production of fruit and vegetable juices make up 35% of all registered facilities. Vegetable processing has a share of less than 10%. According to data from 2018, active business entities registered for the processing of fruits and vegetables, as well as for the production of fruit and vegetable juices, employed 10,034 people.

Freezing facilities are mostly located in the Vojvodina Region, of which 24% are facilities for freezing vegetables only, while 75% of facilities also freeze fruit in addition to freezing vegetables.

In the total export of vegetables of the Republic of Serbia, the share of fresh vegetables is 37%, while the share of processed products is 63% (on average in the period from 2013 to 2018).

The growth of frozen vegetable exports was constant in the previous period, primarily driven by growth in demand in CEFTA countries. Growth in the consumption of frozen products is a general trend in the world, both in the consumption of fruits and vegetables.

Table 3 Number of companies registered for other processing and canning of fruits and vegetables and juice production in the fruit and vegetable processing sector according to eligibility conditions

Number of companies	Turnover greater than 50 mil. EUR	Turnover less than 50 million. EUR	Total balance (total assets) greater than 43 mil. EUR	Total balance (total assets) less than 43 mil. EUR	Number of employees greater than 250	Number of employees less than 250
Number of companies engaged in other processing and canning of fruits and vegetables	2	593	0	595	3	592
Number of companies engaged in the production of fruit and vegetable juices	3	34	2	35	2	35

Source: APR - Business Registers Agency

Market and trade

The total average export of vegetables in the period from 2013 to 2018 was about 134.8 million. EUR, while the contribution to the total export of agriculture was about 5%. In the area of agricultural production, the vegetable sector is the sixth export sector, after fruit, tobacco, cereals, beverages and oilseeds. Of the six sectors with the highest exports, vegetables are in the third position, with an average annual growth of 10%, after tobacco and oilseeds. The vegetable sector has undergone significant structural changes over the last decade, with producers specializing in the production of certain vegetable crops or groups of vegetable crops.

The export of vegetables from the Republic of Serbia has a stable growth trend in recent years, with an annual growth rate of 8.3%. Processed vegetables account for approximately 70% of the export structure, while fresh vegetables account for 30%. The export of fresh vegetables is increasing, with an average annual growth rate of 22%, while the annual growth rate of the export of processed vegetables is 4%. The export of vegetables has a stable growth trend in the last 10 years: in 2018, there was an 85% increase in exports compared to 2008. The highest export growth was recorded in cucumbers and gherkins - the average annual growth rate is 50%, followed by carrots with a growth of 39%, tomatoes with a growth of 29% and onions with a growth of 18%. Frozen vegetable mixtures have the largest share in the total export of fresh and processed vegetables with 19%, followed by potatoes with 14% and peppers with 11%.

The dominant markets for domestic vegetables are regional markets, as well as the markets of the EU and the Russian Federation.

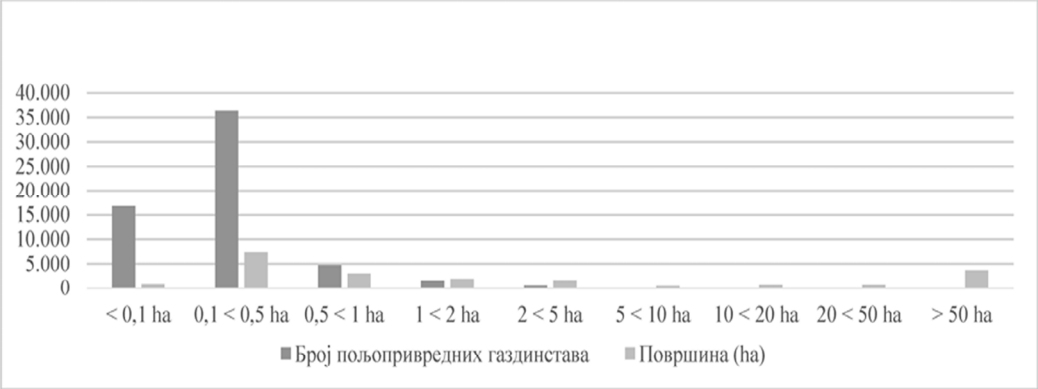
The most important legal acts regarding the fulfilment of food safety standards in the vegetable sector have been adopted, as well as implementing regulations and control measures.

Viticulture and winemaking in Serbia

Based on data from 2018, about 60,000 agricultural holdings own vineyards, which is almost 11% of the total number of registered agricultural holdings. The structure of viticulture and winemaking is quite heterogeneous, with the largest participation in the production of smaller family farms.

Approximately one third are represented by farms that own extremely small vineyards, the area of which is less than 0.1 ha. The largest group of wine-growing farms (about 60%) consists of producers who have vineyards of small areas, that is, vineyards of 0.1 to 0.5 ha. On the other hand, only 30 wineries in the Republic of Serbia had vineyards of 50 or more hectares.

Chart 1 Area under vineyards (ha) and the number of registered agricultural holdings with vineyards, 2018.



Source: Republic Institute for Statistic

Grape production

Based on Republic Institute for Statistic data, in the total amount of fruit and grapes produced, grape production takes about 10%.

The total area under vineyards is about 23,000 ha, of which about 22,000 ha are vineyards (Serbia used to have more than 100,000 hectares under vines).

According to data from the Winery Register, over 4,000 grape producers with over 20,000 vineyard plots are registered. About 7,000 hectares of vineyards, with a predominantly commercial orientation, are registered in the Vine-Grading Register.

In the period from 2009 to 2018, the average annual amount of grape production was 167,363 t.

Chart 2 Production of grapes in the Republic of Serbia (t), 2009–2018.

Source: Republic Institute for Statistic

The quality of production is predominantly at a low technological level. Fragmentation of viticulture plots, outdated vineyards, lack of certified clone seedlings of autochthonous, regional and domestic varieties, outdated machinery and equipment for modern viticulture production, as well as inadequate protection against diseases and pests, are some of the problems of viticulture production in the Republic of Serbia.

Processing industry

The Republic of Serbia has a long tradition in wine production, which in the previous period was based on large systems with significant capacities, while today production is mainly based on family wineries of micro, small and medium capacity. A significant number of state-owned grape processing facilities, with a few exceptions, were the result of an unsuccessful privatization process, or were not privatized, which led to a significant reduction in the area under vineyards in all wine-growing areas of the Republic of Serbia.

Based on data from the Wine Registry, in 2024, over 500 wineries (entrepreneurs and companies) produce wine in the Republic of Serbia, with

a total maximum processing capacity of about 200 million kg of grapes and a total maximum wine production capacity of over 70 million liters of wine.

The structure of wine producers in the Republic of Serbia is similar to the structure of grape producers, with the predominant representation of wineries with small capacities for wine production. Namely, more than half of the wineries have limited capacities for wine production, below 20,000 l. More than 100 wineries have larger capacities for wine production (from 20,000 to 40,000 l), but still insufficiently large capacities for competitive wine production.

The largest capacities for wine production are within 50 wineries that have a maximum individual wine production capacity of 100,000 l and more, of which 15 wineries have an annual production capacity of 1 million and more liters of wine per year.

Production quality level

In the Republic of Serbia, there is legal compliance regarding the categorization of wine products and geographical indications (GI). The share of production of high-quality wines with geographical origin (PDO/PGI wines) is unsatisfactory. Inadequate conditions and capacities for the production of high-quality wines, i.e. older equipment and vessels at individual wineries, in addition to other technical and administrative obstacles, affect the limited production of wines with geographical indications.

Table 4 Production ratio of wines without geographical indications and wines with geographical indications, 2016–2018.

Wine quality categories	Year		
	2016.	2017.	2018.
Wines without geographical indications	92%	85%	85%
Protected Geographical Indication (PGI)	3%	7%	8%
Protected Designation of Origin (PDO)	5%	8%	7%

Source: Ministry of agriculture forestry and water management

Market and trade

The supply of the market of the Republic of Serbia with domestic wine is not sufficient, so the import of wine is twice as large as the export, both in terms of quantity and value of wine.

The free trade agreement with the EU and the CEFTA agreement enabled the export of wine to those markets, but the Republic of Serbia cannot quantitatively meet the demands of these markets.

According to Republic Institute for Statistic data, in the period from 2009 to 2018, the Republic of Serbia exported a total of 12 million liters of wine, worth 13 million. EUR. In the same period, the total import of wine was 25 million liters with a total value of 25 million. EUR, which resulted in a negative balance, both in terms of quantity and value.

According to RZS data, for the mentioned period, a positive foreign trade balance was achieved with EU countries in terms of the quantity of wine (798,100 l), but a negative average annual balance in terms of the value of wine (3,384,700 EUR).

A significant part of the wine trade takes place with other countries. In the observed period, the Russian Federation is the only country with which the Republic of Serbia achieves a positive foreign trade balance of wine, both in terms of quantity (4,444,300 l) and value (4,486,500 EUR).

Modernization in the viticulture and winemaking sector is necessary, especially in areas where wine grape varieties are grown with the most suitable climatic, soil and topographical conditions.

Agricultural farms engaged in the production of grapes have a need for modernization and renewal of machinery in order to more effectively perform agrotechnical and amphelotechnical measures in modern viticulture, which aim to reduce the use of pesticides and therefore improve the quality of grapes and wine. Also, investment in storage capacity is needed to improve the competitiveness of primary grape producers.

When it comes to the production of vine seedlings, it is necessary to increase the volume of production and improve the quality of the seedlings.

It is necessary to work on improving the quality of wine in the sense of a better analysis of wine quality and the establishment of a geographical indication of wine.

SWOT analysis

SWOT analyzes for both selected value chains were prepared during five consultative workshops, and the participants were presented with research findings.

SWOT analysis of vegetable growing

STRENGTHS	WEAKNESSES
• Existence of experience and tradition in vegetable production • Good agroecological conditions for vegetable production • Quality warehouses for long-lasting types of vegetables • The existence of long-term cooperation in the supply chain of potato production • Adaptability of the producer to market conditions • Availability of sales channels • Availability of raw materials • Good regional distribution of advisory services • The processing of vegetables into traditional products enables sustainability for small farms • Experience with product branding within the GI scheme • The existence of a good reputation for local products (Lokošnica pepper , potatoes from Golija and Javor, Leskovac ajvar...), facilitates product marketing	• Fragmented production and small production units affect the sustainability of small farms • Inadequate facilities for storage and handling of sensitive vegetables • Unstable market and for part of the production there are no buyers known in advance • Green markets are losing their function as places where local vegetable growers sold their products • Lack of labor • Lack of producer organizations • The Chamber of Commerce does not represent small producers • Advisory services are dysfunctional (insufficient number; they offer more administrative than professional support) • Insufficient equipment with machinery • Low level of vegetable processing, which reduces flexibility in selling vegetables • Small producers do not use modern technologies in production • Lack of practical scientific studies on modern farming methods that are applicable for small producers

STRENGTHS	WEAKNESSES
	• Weak supply of quality seed material (mainly imported, lower quality, often infected...) • Lack of professional support for crop protection (insufficient number of experts, protection products are offered with a higher margin - the approach is more commercial and less protective) • Irrational management of crop residues in primary vegetable production as well as residues in processing • Sensitivity of production to climate changes and weather conditions • Low level of product with geographical protection • Low purchasing power conditions the demand for cheaper products, endangering small local producers
OPPORTUNITIES	**THREATS**
• Availability of financial subsidies to improve production and implement climate change adaptation measures • Increased demand for local products (short supply chains) • Development of internet sales and portals for the sale of small farm products • Innovative technologies in indoor vegetable production • Innovative technologies in vegetable production (production under controlled conditions, "urban gardens", "underground greenhouses"...) • Innovative technologies in marketing and distribution (self-service vending machines, producer "niches" of small farms within supermarkets...) • Increased demand for quality vegetables on the national and international market	• Growing requirements regarding phytosanitary and other standards • Lack of labor • The open market and import of vegetables creates additional pressure on small producers • Climate change threatens production and the quality of products

SWOT analysis for viticulture and winemaking

STRENGTHS	WEAKNESSES
• Tradition in production • Increasing interest in the production of quality and autochthonous wine grape varieties by farmers • The existence of local varieties, which enable better market positioning • Good quality of raw materials as a prerequisite for wine quality • Availability of raw materials • A climate that provides good conditions for production, but also the marketing of products based on the area (French term Terroir) • Young people in the viticulture and winemaking sector • Young people are being educated to work in the wine sector, so they are the bearers of change in small family wineries • Indigenous wine varieties allow the development of authentic wines at small wineries	• Fragmented production and small production units • Insufficient networking of small producers and processors (lack of producer organizations...) • Lack of labor in the grape harvesting phase, which jeopardizes the quality of processing • Weak marketing of small wineries and wine regions themselves • Small wineries do not currently have the ability to cover all market needs (e.g. the demand for cheap wines...) • Lack of certified planting material (indigenous varieties) • Low level of technology in the vineyards • Low level of use of the protection of geographical indications of wine • Strict national procedures for the protection of geographical indications of EU wines • High production costs • Lack of mechanization in certain production phases in viticulture (expensive mechanization, and production is fragmented) • Low level of education in the tourism and hospitality sector about the importance of promoting and using domestic wines, especially those of indigenous varieties • Insufficient representation of domestic wines at tourist events in Serbia

OPPORTUNITIES	THREATS
• support for the implementation of climate change adaptation measures • Increasing consumer demand for domestic products • Support measures for the viticulture and winemaking sector • Increased demand for ecological products • Facilitated communication on the global market gives small producers a chance to market their wines to "distant" markets (e.g. Agatija winery from Levač sell its wines in Brasil)	• Growing requirements regarding phytosanitary and other standards Negative demografic trends which are enlarging threat of insufficient working labor • Climate changes have a negative impact on production (shortening of the pruning period, grape quality is at risk...) • Importing cheap wines limits small wineries' access to the domestic market • Consumers in Serbia find it harder to accept new domestic wines • The absence of a reference national laboratory enables unfair competition with domestic wines • The insufficient level of control does not reduce the risks of fraudulent actions in the wine sector.

4. Results and discussion

During the consultative workshops, two main models of organizing value chains in vegetable growing were singled out:

- the one where vegetable production is organized in order for direct sale to a direct customer, intermediary or processor. In this value chain model, for some of the vegetable crops (e.g. tomatoes, peppers...), products of lower quality or part of the unsold production are processed into traditional products, but certainly this is not the main goal of production, but a solution for selling part of the products.

- the one in which vegetable production is organized in order to provide raw materials for processing. As an example, we have the production of peppers for Leskovac ajvar or Lokošnica peppers for spicy paprika or peppers for filling.

In both cases, these small producers deal with the entire organization from production to sale of their products, because there is no safe placement and contracted purchase of vegetables, except in some cases. As an example, we can single out potatoes from Golija and Javor. In this case, there are several private companies that organize cooperative production with the obligation that the farmers deliver a part of their production on behalf of the purchased raw material (seeds, fertilizer...). These companies buy most of the produced potatoes but that quantity varies and depends on market trends. So that even in this case, almost all farmers are exposed to dynamic changes in the market, so for part of their production they look for solutions to selling directly on farm, in small stores or via intermediaries.

Table 5 Presentation of direct participants in the value chain of vegetable growing

Part of the value chain	Participants
Vegetable production	• Nurseries • Producers (sellers) of artificial fertilizers • Producers (sellers) of pesticides and other protective agents • Manufacturers (sellers) of machinery for processing • Manufacturers (sellers) of equipment • Seasonal labor • Agricultural pharmacies • Storekeepers • Advicors
Vegetable processors	• Technologists • Labor force • Manufacturers of specialized equipment (dryers, mixers...) • Authorized laboratories for quality testing
Packaging	• Manufacturers of packaging • Manufacturers of packing equipment • Manufacturers of cardboard packaging
Distribution	• transport companies • Distributors of vegetables and processed products on the local, regional and international markets
Marketing	• Marketing houses • Portals • Printing houses • Media houses • Specialized shows and newspapers
Tourism	• Tourist organizations (thematic routes) • Manifestations • Rural tourist households
Consumers	• Hotels, restaurants and other catering establishments • Wine houses • Individual buyers • Green markets • Retail • Wholesale

The value chain in the viticulture and wine sector, which includes young farmers and small producers, has elements of short value chains.

Short value chains are characterized by the direct sale of products and a small number of intermediaries (according to the European Commission, up to two intermediaries).

Small producers, including young ones, in the viticulture and wine sector are simultaneously producers of raw materials, producers of wine based on their raw materials, and they also deal with sales, including product promotion. Sales channels are diverse, and most often combined. Combined sales channels include: direct sales (in the winery itself, placement in restaurants, online sales...), wholesale sales (including export of wine to distant markets, such as Japan and Brazil for example) and sales through shops (e.g. specialized wine stores). We should certainly mention sales through tourism, and above all through organized wine tours and tourist and wine events.

Table 6 Direct participants in the value chain of the viticulture and wine sector

Part of the value chain	Participants
Grape production	• Producers of planting material • Producers (sellers) of artificial fertilizers • Producers (sellers) of pesticides and other protective agents • Manufacturers (sellers) of machinery for processing • Manufacturers (sellers) of equipment • Seasonal labor • Agricultural pharmacies • Advicors
Wine production	• Technologists • Manufacturers of vessels for fermentation and aging • Manufacturers of specialized equipment for wine production • Authorized laboratories for testing the quality of wine and other products
Packaging	• Manufacturers of glass bottles • Manufacturers of stoppers, closures and caps • Manufacturers of fillers and labelers • Manufacturers of cardboard packaging
Distribution	• transport companies • Distributors of wine and processed products on the local, regional and international markets
Marketing	• Marketing houses • Portals • Printing houses • Media houses • Specialized shows and newspapers
Tourism	• Tourist organizations (wine routes) • Manifestations • Rural tourist households
Consumers	• Hotels, restaurants and other catering establishments • Wine houses • Individual buyers • Retail • Wholesale

5. Conclusions

For small farms and young farmers who are part of the value chain, it is necessary to work on further support in order to:

- Increasing the capacity of processing units in the field of vegetable processing (quality improvement, safety control), marketing (branding and packaging) and financial management.

- Better equipped with equipment and storage space, as well as the availability of cold stores, equipment and materials for processing. In processing, the possibility of using solar energy should be considered where possible.

- Providing stronger decision-making support for small farms and young farmers, through continuous economic analyzes that contribute to easier decisions on the most profitable vegetable crops and the optimal number of diverse crops that have the potential to supply local markets on a long-term sustainable basis.

- Facilitate and support innovation in vegetable production systems through the development of the most profitable crops and cropping systems that small producers can sustainably manage while taking into account environmental concerns (production under controlled conditions, "urban gardens", "underground greenhouses"...).

- Support to small producers by introducing sustainable cultivation methods (organic production, indoor cultivation, cultivation of more resistant varieties, old varieties, reduction of the use of chemicals, rational irrigation systems, conservation of water, soil and biodiversity, use of residues in primary plant production as well as residues in processing...)

- Encourage indoor crop diversification by increasing row spacing and intercropping with other lower-risk crops.

- Support for existing experiences of introducing gradual planting of products, which expands the offer and extends it over a longer period of time.

- Systemic support in order to ensure the necessary number of experts for crop cultivation and protection and their support to small producers.

- Support to groups of vegetable producers with the aim of reducing production costs, as well as better positioning in the value chain and on the market.

- Encouraging vegetable producers to invest in sustainable solutions and adaptation to climate change; For example, supporting investments for rainwater harvesting where other water sources are not available, in order to increase the availability of fresh water.

In all future development activities, it should be borne in mind that the viticulture and winemaking sector in Serbia has a long tradition and currently partially used potential. Grape vines can be successfully grown even on poor soils in hilly and mountainous areas, like in central Serbia, and therefore can significantly contribute to the rural development of these areas. To improve the value chain in the wine production sector, it is necessary to implement a series of initiatives and activities, both at the national level, and at the local level and at the producer level.

Grape producers suffer from uncertain market conditions and unfavourable involvement in the chain. The low price of grapes discourages grape production of top category and quality. The high added value of the most expensive wines is obtained through production and marketing, not with the help of better quality raw materials. On the contrary, in the wine chain of developed European countries, the highest price and the largest share of added value are obtained thanks to top category grapes produced in certain clearly defined geographical areas.

The problem is also the labor deficit, especially during the grape harvesting. This implies more research on the division between large producers and wineries on the one hand, and small producers and external producers of grapes in the lower segments of the chain, where work is more informal. Research can point to possible models for solving the problem of labor shortages. It is certainly necessary to look at the possibilities of improvement in the use of mechanical harvesting, which would include the association of producers in the corresponding systems, for example. machine ring.

When considering a strategy for the future of the small wineries value chain, it is important to note that the chain is heterogeneous and has diverse needs. Along with the strategy of advancing wineries in premium segments and increasing the average unit price of exported wine, we should also think about creating opportunities for smaller wineries in the segment of "domestic" wines that are produced with little mechanical and chemical intervention. In both strategies, increased attention should be focused on the area (terroir) and the quality of grapes, as well as on the quality of work in smaller enterprises, especially in the production of wine grapes.

In order to improve small farms and wineries managed by young people, it is necessary to intensify support at all levels and implement the following activities:

- Support the improvement of production capacities in primary production through: improvement of technical equipment, using innovative solutions in production, planting of autochthonous vine plantings, as well as planting of high-quality wine varieties that provide quality raw material for the production of wine based on the specifics of the climate (French Terroir) of the vineyards in Serbia.

- Support for networking winemakers and agricultural farms that do not have a registered winery, but produce or want to produce grapes.

- Support for producers who do not have a registered winery in the procurement of wine production equipment.

- Improvement of marketing and promotional activities of small wineries and young people, including support for joint marketing.

- Improving the tourist product through wine tours and wine events.

- Networking of wineries and tourism actors, including categorized rural tourist households.

- Improvement of wine events that promote young winemakers and small wineries.

- Systemic support is necessary in order to ensure the necessary number of technologists and their support to small wineries.

6. Recommendations based on SWOT analysis

For the vegetable value chain, and when it comes to young farmers and small producers, the following recommendations are:

1. Improving the processing and production of traditional products for which there is a market demand (ajvar...).

2. Using the good reputation of certain regions for protection as geographical indications and better market positioning of these products.

3. Work on sustainability and adaptation to climate change, through better management of resources and the use of renewable energy sources.

4. Introduction of modern technologies in production and processing, which improves product quality and increases flexibility in product placement.

5. Improvement of association and improvement of relations in the value chain, in order to improve the market position, as well as to improve the distribution of profits in favor of small producers and processors.

6. Encouraging networking and cooperation (advisory support on formal and informal models of association and cooperation - business associations or producer organizations, cooperatives, social enterprises, local action groups, clusters...) within the sector, as well as with other complementary sectors.

7. Application of innovative technologies in marketing and distribution (self-service vending machines, producer "niches" of small farms within supermarkets, visits to rural households...).

8. Continuous monitoring of market needs and adaptation of production to market requirements and market trends.

Recommendations for the wine value chain:

1. Work on sustainability and adaptation to climate change; In the winemaking value chain, this means producing grapes in a way that respects the environment, minimizing the use of chemicals and adopting agricultural practices that care for land and water resources while ensuring the survival of small wineries.

   This not only preserves the quality of the product, but also responds to the growing consumer demand for wines that reflect ethical and environmentally friendly values.

   Grape producers and wineries should adopt innovative measures to optimize the use of resources in all stages of production. For example, when it comes to the use of water for irrigation, they should strive to implement rainwater harvesting systems, reuse treated wastewater and adopt more efficient irrigation technologies.

2. Traceability; Traceability is a tool that allows us to know all the elements that are involved in the production of the product and all the stages of production.

   This approach allows the consumer to have complete and reliable information about the production process, to make a clear decision about selection of the product, as well as to avoid wine imitations and illegal trade. Modern data identification and tracking technologies help ensure that data, as well as quality labels: local, natural, organic, etc.

3. Innovation in flavors based on area and tradition; The trend of taste innovation in wines change experience by offering a variety of wines and typicality related to vineyards.

   This approach can respond to the global trend that reflects the growing demand for innovative and creative consumer options, as well as the adaptation of small producers to changing consumer tastes.

4. Development of premium products; The popularity of autochthonous grape varieties is growing in Serbia. This trend should be focused on premium wines that stand out with their recognizable character and unique origin. There is an increasingly pronounced trend that consumers are looking for wines that have an exceptional taste but also history and tradition.

5. Networking and cooperation; Small producers and wineries face significant challenges from the production of raw materials, through processing, to the placement of the final product, in the meantime dealing with all elements of business, from mechanization, through human resource management, to marketing and placement. Bearing in mind the limited resources that small wineries have, good association practices should certainly be considered and implemented, either through cooperatives, business associations or producer organizations according to EU good practice examples.

6. Development of organic production; Organic food production or organic agriculture is an ecologically sustainable production system that is in trend with contemporary consumer demands. In this sense, organic wines are natural products without insecticides, herbicides, fertilizers, chemicals and which are not genetically modified; controlled during the entire process of production, processing, packaging and marketing.

7. Digitization; In the agricultural value chain, various devices can be remotely controlled in real time, such as valves, tractors, pumps, weather stations and computers.

   Internet solutions (IoT) for collecting data from sensors and including systems for visualization and control of data, enable the control of production parameters, such as temperature, light and soil humidity in the vineyard.

   In this sense, IoT enables remote monitoring of crop conditions and infrastructure, which helps reduce field time, physical effort and resources used, allowing farmers to have greater control of crops

8. Robotics; There has been a significant growth in the development of agricultural robots with a wide range of use. Spraying, soil sampling, research and transport are areas with potential applications for robotics, especially for high-value crops such as vineyards.

9. Agricultural robotics brings great benefits related to improving human resource management, reducing the need for field supervision, improving pest detection thanks to artificial control, reducing losses due to poor handling, etc.

7. References

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