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ECONOMIC EFFECTS OF VEGETABLE PRODUCTION AND PROCESSING ON THE AGRICULTURAL HOLDING[1]

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Abstract

As an agricultural holding in the form of legal entity, cooperatives have a significant role in the production, processing and trade of vegetables in the Republic of Serbia. In order to obtain safe and competitive agricultural products, cooperatives strive to provide greater flexibility to market changes and faster adaptation to occurred changes. Operating in this way has been imposed the need to achieve a higher degree of technological capacities utilization, to fine tune the optimal structure of production and obtain highly valorised products. In other words, cooperatives should invest in products obtained by processing, which will be valorised the most and which will achieve the highest prices (i.e. the maximum economic effect per invested financial unit). Along to previously mentioned, research is focused to the economic effects of a cooperative business operation which intends to organize environmentally friendly production of tomatoes and cucumbers, partly in the open field (on area of 3 ha) and partly in a protected area (greenhouses with total size of 3 ha and 60 are), while it applies modern agro-technic's and food safety production measures. Besides, wanting to approach to safe and continuous market realisation of tomatoes and cucumbers, cooperative will establish processing and sale of processed vegetables.

Key words: *economic effectiveness, investments, public grants, vegetables, agricultural holding.*

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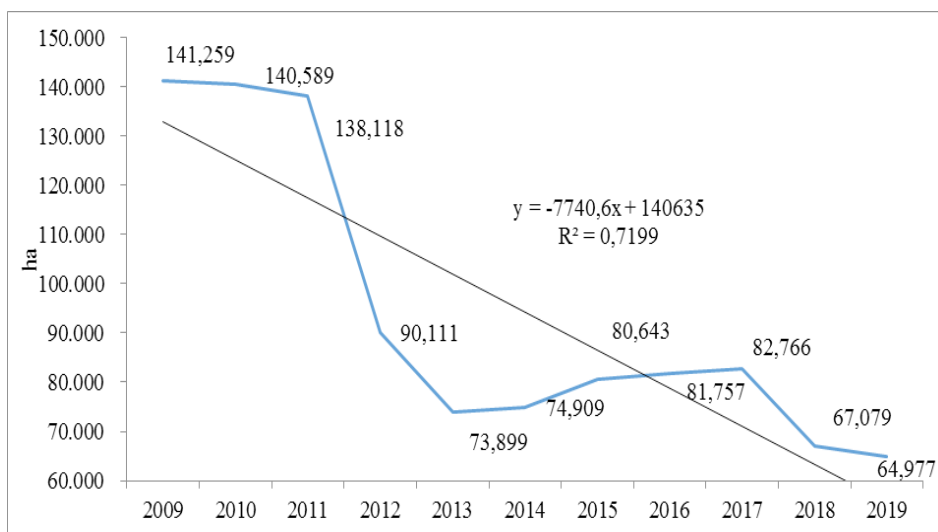
Introduction

Vegetables are one of the most intensive sectors of national agriculture, while Serbia represents the largest regional producer of vegetables. The value of totally produced vegetables in 2019 was 43.7 billion RSD, what is 8.7% of overall agricultural production (SEEDEV, 2020).

Serbia is achieving the surplus in foreign trade balance. In 2019, the export of vegetables was amounted around 116 million EUR, what is for 18 million EUR above the import in same year.

According to FAO data, the area under vegetables in Serbia covers 64,977 ha, representing around 1.9% of available utilized agricultural area (UAA). During the period 2009-2019., the area under vegetables was decreased for 54% (Figure 1.).

Figure 1. Areas under vegetables in Serbia in the period 2009-2019.

$y = -7740,6x + 140635$
$R^2 = 0,7199$

Source: FAOSTAT, 2019.

The key reasons for the decline in vegetable production in Serbia are (Roljević Nikolić, Paraušić, 2021):
- non-competitiveness of small producers that give up from veggies production;
- large fluctuations in market prices;
- significant impact of weather conditions on yields and incomes;
- lack of crop insurance.

The most of areas under the vegetables are in the South-Bačka district (13.3%), followed by the Rasina district 7.5%, Jablanica district 6.0%, North-Banat district 5.6%, while in other district there are considerable lower areas under the vegetable (Table 1.).

Table 1. Representation of areas under vegetables in different regions

Districts	Share of areas under vegetables	Districts	Share of areas under vegetables
Belgrade	4.3	Rasina	7.5
West-Babačka	4.1	Raška	1.7
South-Banat	5.1	*Šumadij*a	1.9
South-Bačka	13.3	Bor	1.9
North-Banat	5.6	Braničevo	1.9
North-Bačka	2.2	Zaječar	1.2
Central-Banat	5.5	Jablanica	6.0
Srem	5.5	Nišava	3.6
Zlatibor	4.5	Pirot	0.7
Kolubara	2.1	Podunavlje	2.1
Mačva	5.3	Pčinja	3.4
Moravica	5.2	Toplica	2.9
Pomoravlje	2.4		

Source: SORS, 2018.

Dominant production of vegetables is organized at the open field, around 92%, while production in green houses is carried out on only 8% of areas under the vegetables. There are 114,643 agricultural holdings, or 20.5% of the total number of agricultural holdings, that are engaged in vegetable production. A large number of farms involved in production of vegetables have mixed production. On the other hand, farms specialized in vegetables, floriculture and other types of horticulture (8,126 holdings) take 7.1% of the total number of farms engaged in vegetable production.

Specialized vegetable production is organized at the area of 19,060 ha, which is almost evenly distributed between the regions of Vojvodina (32.8%), *Šumadija* and Western Serbia (28.4%) and Southern and Eastern Serbia (30.6%). Economic size of farms specialized in veggies production in average values 10,583 EUR, ranking them as a third, after the farms specialized in pigs and poultry growing (12,432 EUR) and farms specialized in crop production (10,900 EUR), (SORS, 2018).

Methodology and data used

The main subject of research presented in this paper is gaining the safe and competitive agri-food products that are obtained by the processing of vegetables at the farm organized in the form of legal entity (cooperative). Accordingly, research activities were conducted within the rural area, more precisely in the village of Skobalj, which is located at the territory of Smederevo city, or in the Braničevo district.

Competitiveness and added value of the agricultural products can be achieved after the veggies processing done by the family farms joined in cooperative from Skobalj. Mentioned farms give a significant contribution to the overall agricultural production in the Braničevo district. In Serbia has been established a certain legislative that facilitates the general conditions for the crops and animal products processing at the farms. Despite the favourable legislation, a small number of farms are currently involved in the processing of agricultural products.

Vegetable production is among the most intensive sectors of agricultural production at the territory of Braničevo district. The volume of vegetable production is constantly growing primarily caused by the investments in modern equipment and mechanisation, use of quality raw materials and inputs, as well as by the increase in vegetable growing in greenhouses. Meanwhile, unprocessed and usually unpackaged fresh agricultural products have a much lower market price and cannot provide high profitability to the certain farm.

Achieving the secured and permanent sale of veggies at the national market requires to be ensured not only the variety of products, but also the establishment of processing activities and further realisation of processed products. In this context, the main goal of the research is adjusted to the strategic goals of the Strategy of Agriculture and Rural Development of the Republic of Serbia for the period 2014-2024.

In focus of the research goal is the knowledge transfer from the field of cooperatives importance for the production of agricultural products with added value (pointing out to the practical possibilities for establishment of processing capacities throughout the associations).

The research has special importance considering that in the village of Skobalj, as well as in the wider territory of the Smederevo city, there is domination of family farms that generally do not have enough economic strength to process and realize agro-food products by their own.

The selected agricultural farm, which is organized in the form of a legal entity (cooperative), was decided to establish ecologically acceptable production of tomatoes and cucumbers (gherkins) what comes from previous business idea "Obtaining safe and competitive agricultural products gained by processing of vegetables". The production will organize partly in the open field, while partly in protected area (greenhouse), by applying of all required contemporary agri-technic measures and measures turned to production of health and safe food products. In order to provide a secure and long-lasting realisation of tomatoes and cucumbers (gherkins) on the local market, there will be established the processing and selling of processed veggies.

The facility that has to be built and equipment that will be installed represent the pinnacle of existing technology. On the one hand, this represents a requirement from the demand side of the market, while on the other hand it enables high productivity, lower production costs in the long run and higher level of protection standards and better working conditions.

In addition to creation of conditions for much faster development of selected farm in the form of a legal entity (cooperative), as well as to decrease in required time for the investment return, we are emphasizing the intention and necessity to promote the cooperative model, not only at the territory of Smederevo city, but also in entire Branicevo district.

With this research and successful accomplishing the business idea, we want to provide a good example to other farms that interest joining into the cooperatives is necessary and quite a useful.

The benefit that relies on primary production and processing will be expressed through the model of cooperatives, which would serve into the process of training other farmers about the cooperative principles and way of cooperatives functioning, possibilities to increase the incomes, reduce the unemployment and achieve overall social well-being.

Accordingly, the planned organization of the production and processing activities is turned to the following (IAE, 2019):

-   Tomato production will be organized in the open field (on 3 ha), as well as in protected area (in greenhouse, on the surface of 3 ha and 60 ar). In the first case, it was expected the yields of 80 t/ha (240 t in total). The plan is to sell the 30% of total yields as fresh veggies at the market, while the rest of 70% will be processed. In the second case, it was expected the

average yields of 141 t/ha (507.6 t in total). Quantities gained in green-house would be, depending the class of fruits, either directly realized on the market in fresh condition (75% of I class), or will be processed (25% of II class) and later realized on the market as processed tomatoes (grind veggies filled in glass bottles).

- The production of cucumbers (gherkins) will be also organized on the open field (on 3 ha), as well as in protected area (greenhouse, on 3 ha and 60 ar). In the first case, average yield of 50 t/ha is expected (150 t in total). It was planned to process complete yields and later realize on the local market (pasteurized gherkins in the jar). In the second case, average yield of 125 t/ha is expected (450 t in total). All quantities produced in greenhouse would be also processed and later realized on the local market as a pasteurized gherkin in the jar.

- Regarding tomatoes, it is planned to get processed grind tomatoes which is packed in 1 litter glass bottles. The utilization of tomatoes in processing is 60%, so the final production involves around 355,680 l of processed toma-toes. For this purpose, it is planned to purchase a line for tomatoes processing (grinding of fruits and gaining the squeezed tomato juice). Unlike the tomato processing, related to cucumber (gherkin) processing, it is planned the pur-chase of fruit calibrator, while for packaging and pasteurization could be used the line for production of tomato juice.

- All previously mentioned agri-food products are linked to adequate level of local and regional demand that guarantee manoeuvring space for products selling. So, there is a fact that with the exception of large quantities, realiza-tion of processed products is not a problem for the agricultural cooperative from the village of Skobalj.

In practice, regardless the business conditions, evaluation of economic efficiency of investments has to be generally linked to strict quantitative and qualitative provisions that will define and carry out the precise directing of cash expendi-tures, i.e. the investment in the most effective business alternative (Rajnović et al., 2016). Accordingly, the main aim of evaluating the economic effects of production and processing at the farm should be potentially the highest rate of realized effects per the unit of invested money.

For the purposes of assessing the project idea effects, in this research was used both static and dynamic methods for assessment of economic effectiveness of in-

vestments. Besides, there was also used the method for assessing the effects of business activities realisation in the conditions of risk and uncertainty.

Methods for expressing the economic effectiveness of investments are so important not only in the field of agriculture, but generally in the defining and carrying out of sustainable development of any legal entities at the micro level. So, this part of analysis represents important segment of evaluation of production and processing at the cooperative level, by which is emphasizing the important role of economic efficiency of investments for sustainable development of agricultural farms organized in the form of a legal entity (Subić, 2010).

Static assessment of investments' economic efficiency is based on simple static methods which imply calculation by taking into account only the parameters from one, or average year from the legal entity's business period. This way of assessment of investments effects does not consider overall period of investing and later exploitation of investment object, but only one time section (Subić, 1999). In this case, the calculation does not adequately take the time within the analysis and evaluation of business activities, i.e. it does not cover the entire period of business operation and exploitation of business objects. In this way there comes to simplification of assessment of the economic effects of business activities, in order to provide simpler calculation of certain methods, but on other hand there come to losing the possibility to consider the effects during the entire period of investing and exploitation of the investment object. As a large number of static methods are proposed in foreign and domestic theory and practice, the special accent will be done to calculations that have an adequate theoretical background and practical verification (Subić et al., 2007).

Due to the imperfection of static methods, there were come to development of dynamic methods for assessment of investments' economic effectiveness, while they have started to rapidly use in economic practice. Currently, these are the methods that are used the most in the process of assessment the economic efficiency of business activities, while the use of static methods is significantly reduced and mainly used as complementary methods to dynamic methods (Subić, 2010). Methodologically, dynamic methods do not include average (annual) expenditures, but all cash expenditures done for the purchase and use of the business object, as well as all cash receipts derived from entire period of business activities based on the use of business object (investment), i.e. they consider assessment of economic efficiency of investment derived from the comparison of invested sum with the calculated sum of net annual

incomes gained in the individual years of investment exploitation. These methods are more complex, since their application is based on a complex interest account, i.e. on the application of financial mathematics (Subić, 2010; Jeločnik, Subić, 2020).

In assessment of the business effects, the lack of ability to forecast certain events in upcoming period (sum of incomes and expenses, exact period of investment usage, etc.) has the important impact on the economic justification of business and reduces the real opportunities in making of adequate decisions. Therefore, when making decision, the manager is facing composite and complex issues that enact uncertainty, or he is facing so complex mission to eliminate or leastwise to decrease the risk of a possible weak decision. Evaluation of the business effects in conditions of risk and uncertainty can be made by various methods and techniques (Subić, 2010).

For the purposes of assessing the economic effects of production and processing on the farm, we believe that in presented case it is sufficient to consider only the profitability threshold.

Results with Discussion

By purchase of modern greenhouses (eight) with accompanying equipment, as well as lines for processing tomatoes and cucumbers (gherkins), there will be opened the possibility to achieve a higher selling price, both fresh products (tomatoes) and processed products (grinded tomatoes packed in bottles and pasteurized gherkins packed in jars). In particular, the farm is expecting next benefits (IAE, 2020):

- Expected selling price of the fresh tomatoes is 25 RSD/kg, while the expected price of bottled grinded tomatoes is 85 RSD/l;
- Expected selling price of pasteurized gherkins in a jar is 60 RSD/kg.

After sale of obtained products (fresh and processed) it can be achieved the average annual incomes in the sum of 73,672,800 RSD. On the other hand, expected average annual profit (net profit) of the cooperative generated through the realization of the proposed business idea is 3,256,058 RSD.

Among the other expected effects of the project realisation the next could be underlined (Table 2.):

- Net present value of investment project: 16,861,455.21 РСД;
- Internal rate of return: 46,05%, while the assumed weighted price of capital is 4,58%;
- Dynamic payback period of investment: 2 years and 5.70 months.

Within the all years of project life cycle (Table 2.) there is:

- The production volume does not fall under the 80,07%;
- Its allowed the fall in production volume for 19,93%.

Table 2. Economic effects of production and processing of vegetables

No.	Description	
1.	**Investment project**	
1.1.	Title of the project	Economic effects of vegetable production and processing on the agricultural holding
1.2.	Investor	Aleksandar Ilić
1.3.	Location	Skobalj
2.	**Estimated value of investment (in RSD)**	
2.1.	Total investment	10,437,675.60
2.2.	Investment in fixed assets	9,488,796.00
2.3.	Investment in permanent working capital	948,879,60
3.	**Source of financing**	
3.1.	Total source of financing	10,437,675.60
3.2.	Internal financial resources	2,956,077.60
3.3.	External financial resources	7,481,598.00
4.	**Object of investment project**	
4.1.	Purpose of investing	Investment in fixed assets and permanent working capital
4.2.	Start of investing	During the 2019
4.3.	End of investing	During the 2020
4.4.	Economic life of the investment project	5 years
4.5.	Sales market	National
5.	**Expected effects of the investment project**	
5.1.	Static assessment of the investment project	
5.1.1.	Economical-efficiency coefficient	1.06 > 1
5.1.2.	Net profit margin ratio	5.11 > 4.58
5.1.3.	Accounting rate of return	36.60
5.1.4.	Simple payback period	2 years and 3.43 months
5.2.	Dynamic assessment of the investment project	
5.2.1.	Net present value	16,861,455.21
5.2.2.	Internal rate of return	46.05
5.2.3.	Dynamic payback period	2 years and 5.70 months
5.3.	Break-even point	80.07%
5.4.	Totally engaged labour - permanent staff	5
5.5.	Totally engaged labour - seasonal staff	10

Source: IAE, 2020.

Conclusion

Achieving the secure and permanent realization of veggies in the local market requires to provide both the wide assortment of products, as well as implementation of processing and selling of processed products. Along to mentioned, general conclusion could be directed to the fact that results of the research are in line with the following priority areas of strategic changes within the field of national agriculture and rural development:

- Income stabilisation of the farmers;
- Advancement of system for the knowledge transfer and development of the human potentials;
- Technological development and modernisation of agricultural production and processing;
- Protection and advancement of environment and preservation of natural resources;
- Improvement of quality and food products safety.

On the other hand, the application of research within the field of interest joining into the cooperative points to the following conclusions:

- Improving the competitiveness of co-operators, through the processing and other forms of added value gaining to the agricultural products;
- Improving the profitability of co-operators, what is of particular importance given that a large part of co-operators live and work on small farms;
- Improving the associations activities in the field of processing of agricultural products on the co-operators' farms.

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