ECONOMIC EFFICIENCY OF INVESTMENT IN PROCESSING OF VEGETABLES

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Abstract
Globally, vegetable is important part of daily nutrition. In Serbia is generally produced by small family farms. Due to relatively short period of appearance as a fresh in local markets, presence of many veggies could be successfully pronged by their processing into the food products at the farm level. Usually individual farm is economically so weak to invest into the specific processing line, but joined in association or cooperative of vegetable producers, it could adequately contribute in generation of value added and additional incomes. The main goal of the paper is to analyze the economic efficiency of investment (in total 88,629.4 EUR) in line for vegetable processing (i.e. production of tomato juice and pickles). Derived results, primarily values for Net present value - NPV (119,868.5 EUR), Internal rate of return - IRR (39.57%) and Dynamic payback period - DPP (2 years and 5,70 months), show that planned investment could be assumed as economically justified, and above all it could represent the sustainable entrepreneurial alternative for any farm involved in sector of vegetable production.

Keywords: *vegetable processing, investment, cooperative, value added, Serbia.*
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Introduction

Among plant species, vegetable represents one of the most valuable crops used in human nutrition (Dhandevi, Jeewon, 2015). It could be consumed as fresh, or processed (dried, pickled, frozen, pasteurized and canned, grinded, etc.), (Breene, 1994). Generally, vegetable is significant natural reservoir of nutrients, as are vitamins, micro and macro minerals, carbohydrates, proteins, fats, etc. (Drozdowska et al., 2020).

Vegetables could be produced in open field or in protected area (greenhouses), (Shi et al., 2009). Production itself could be practiced in few systems of production, such are conventional, organic, integral, et., while achieving the various economic results, and different levels of farm sustainability (Pacini et al., 2003). This is segment of plant production that mainly considers the use of irrigation (Bajracharya, Sharma, 2005). Its production represents one of the most intensive sectors in agriculture production, primarily in sense of used labor (Fathallah, 2010; Reardon et al., 2009). For example, some research shows that in average in structure of overall costs over the 40% belongs to costs of labor (Calvin, Martin, 2010).

Specificity of vegetable production is expressed susceptibility to diseases and pests (Schreinemachers et al., 2016). Besides, vegetable is characterized by high level of perishability, especially in fresh condition (Badea et al., 2022), while it mainly requires shorter distribution channels and careful manipulation (Halder, Pati, 2011). Vegetable is

producing both at small family farms (dominantly) and at large surfaces within the big corporative farms (Mariyono, 2018).
Contrary to large costs, production and later sale of fresh vegetables represents one of the plant production sectors that provides great incomes to farmers. Besides, enlargement of derived incomes could be secured by involvement of value added by investments in vegetable processing (Sethi, Sethi, 2006).
There are globally number of examples that average farmers are individually not so economically strong enough to achieve the decent level of profitability. Joining into the cooperatives they could reach higher level of incomes, by the use of common production facilities, exchange the used technology, equipment and mechanization, joined inputs procurement and products realization (locally or through the export), implementation of certain level of vegetable processing, etc. (Hall, Hall, 1982; Mollers et al., 2018; Bijman, Wijers, 2019; Dong et al., 2019; Tray et al., 2021). Besides, there are certain level of public support turned to establishment and operating of agricultural cooperatives. For example, in Serbia, Ministry of Agriculture, Forestry and Water-management, as well as the Ministry of Rural Welfare have their programs in order to finance the various cooperatives' issues (Krasavac, Petković, 2015; Jeločnik et al., 2017; Nikolić, 2020; Ljubojević, Sekulić, 2021).
Article strives to present the justification mechanism of one investment model directed to vegetable processing, more closely investment in line for tomato juice and pasteurized pickles production that was partly publicly supported. Making the results of analysis visible, could encourage the vegetable producers to invest more in certain lines of vegetables processing, expecting positive impact in value added creation, while boosting overall farm profitability and sustainability.

Methodology

Like in some previous researches, in order to economically asses the investment in one cooperative program of food processing (production of tomato juice and pickles), that was jointly financed by farmers and public resources, methodological framework considers applying the basic static and dynamic indicators for investment evaluation, as are Total Output-Total Input Ratio, Net Profit Margin, Accounting Rate of Return, Simple and Dynamic Payback Period, Net Present Value (NPV) and Internal Rate of Return (IRR), (Subić et al., 2013; Bodiroga et al., 2018; Subić et al., 2020).
Assessment covers cycle of public support to cooperative investments that has been done in 2019. Basic data related to planed investment are obtained through the in-depth interview with the cooperative manager, while research process has also involved consultation with available professional and scientific publications. Securing the further results comparability, they will be expressed in EUR.

Results with Discussion

Starting some decade ago, national team for Serbian village revival, and later national Ministry for rural welfare was introduced the program of financial support for technological advancement, and economic strengthening of newly established and already existed cooperatives. Primary intention of such a measure was revival of rural communities, as well as promotion of cooperatives and entrepreneurial ideas, while boosting the competitiveness of actors active in national agriculture (Subić, Jeločnik, 2021). Currently, mentioned ministry grants the entrepreneurial initiatives in line to improve cooperatives' activities and overall image from original fund worth of over the 4 million EUR, with initial support of up to about 127,5 thousand EUR per one old cooperative, or up to about 63,5 thousand EUR per one

newly established cooperative. Granting has competing character and considers the best ranked previously submitted entrepreneurial ideas of different cooperatives (KTV, 2022).
Agricultural cooperative is located in village Skobalj at the territory of Smederevo city. It involves several vegetable producers, oriented to conventional production of commonly used vegetables organized in open field and greenhouses. Cooperative sells all produced vegetables as a fresh at local market. In order to technologically and economically improve its business, cooperative apply to public grant with its business idea. Idea considers enlargement of currently used surfaces under the tomatoes and gherkins, and their production in ecologically acceptable way, both in open field and protected area, by the use of modern agro-technics and equipment. Besides, in order to improve products realization one part of investment will be redirected into the processing line for producing the tomato juice and pickles. So, business idea involves next elements:
1) Tomato will be produced in open field at 3 ha and in greenhouses at 3,6 ha. Its planned to sell the 30% of the total tomato yield derived from the open field as a fresh, while the rest will be processed. In same time, whole I class yield (75%) gained in greenhouse will be sold as a fresh at local market, while the second class will be processed and later sold as the tomato juice packed in 1 l glass bottles.
2) Gherkins production will cover the same area as the tomato. There is a plan to process overall yield of gherkins and sell them as a pasteurized pickle packed in a glass jar at local market.
3) It's expected that will be achieved the utilization coefficient in tomato processing of 60%, or cooperative will ensure overall production of almost 356 thousand liters of tomato juice. For vegetable processing will be procured the line for tomato juice production (equipment for squeezing and grinding the tomatoes, as well as line for later pasteurization and packaging of derived juice). For gherkins processing, it will be acquired just calibrator, as for later pasteurization and packaging will be used the same line as for tomatoes. The economic reason in planed investment is that locally exists adequate demand for all derived processed products.
In next table (Table 1.) is given the structure and overall value of planed investment in production enlargement and implementation of vegetables processing. Specifically, business idea involves investment in facilities (establishing the greenhouses) and equipment (purchasing the calibrator for gherkins, line for vegetables washing, working table with weighing scale and welding machine, two-chamber pasteurizer, vertical machine for tomatoes pureeing, duplicator, inspection conveyor, veggie cutting machine, pouring machine, and tunnel for packaging with thermo-foil). Equipment has share of over the 60% of overall investment. By the agroeconomic practice, permanent working capital (PWC) takes 10% of the value of required fixed assets.
Related to source of financing (Table 2.), the most of fixed assets (slightly over 71%) will be financed by public grant, while the rest will be covered with own financial assets of cooperative (participation of cooperants).

Table 1. Overall investment in cooperative's business idea (in EUR)

No.	Element	Overall investment	Share in overall investment (in %)
I	**Fixed assets**	**80,550**	**90.91**
1	Facilities	26,343	29.73
2	Equipment	54,207	61.18
II	**PWC**	**8,055**	**9.09**

Total	**88,605**	**100.00**

Source: IAE, 2019.

Table 2. Sources of financing (in EUR)

No.	Element	Overall investment	Share in overall investment (in %)
I	**Own sources**	**25,094**	**28.32**
1.	Fixed assets	17,039	19.23
2.	PWC	8,055	9.09
II	**External sources**	**63,511**	**71.68**
1.	Fixed assets	63,511	71.68
Total (I+II)		**88,605**	**100.00**

Source: IAE, 2019.

Utilization of investment (purchased equipment and established production facilities) will derive certain incomes for the cooperative. Although the parts of investment could be used in longer period (some elements over the 10 years), in order to simplify analysis, in line to value of expected investment analysis indicators, and financial and production practice, all analytical observations will be done for the five years period. So, in next table is presented the structure of formed incomes during the investment exploitation (Table 3).

Besides, further simplification of investment analysis is assured by the assumption that produced volumes of agri-food products, their prices and production costs are fixed over the observed period. Specifically, almost 90% of incomes will be generated from the processed food products.

In the Table 4. are presented all costs that follow the production and further processing of tomatoes and gherkins. Overall material costs for 36% overhangs the sum of immaterial costs. Within the sum of material costs dominate the direct material (primarily raw material for processing, seedlings, agro-chemicals, etc.) with around 79%. On the other side, within the sum of immaterial costs dominate the group of other immaterial costs (primarily costs linked to temporary labor engagement with over 65%, costs of maintaining the fixed assets, costs of processing, reservations, etc.).

Table 4. Total costs (in EUR)

No.	Element	Year				
		I	II	III	IV	V
I	**Material costs**	**343,253**	**343,253**	**343,253**	**343,253**	**343,253**
1.	Direct material	271,375	271,375	271,375	271,375	271,375
2.	Energy	24,830	24,830	24,830	24,830	24,830
3.	Other material costs	47,048	47,048	47,048	47,048	47,048
II	**Immaterial costs**	**251,441**	**251,441**	**251,441**	**251,441**	**251,441**
1.	Depreciation	8,055	8,055	8,055	8,055	8,055
2.	Labor	66,214	66,214	66,214	66,214	66,214
3.	Interest (credit)	0	0	0	0	0
4.	Other immaterial costs	177,172	177,172	177,172	177,172	177,172
Total (I+II)		**594,694**	**594,694**	**594,694**	**594,694**	**594,694**

Source: IAE, 2019.

Table 3. Forming of incomes (in EUR)

No	Incomes - Products	Years														
		I			II			III			IV			V		
		Price (per kg)	Quantity (in kg)	Value (in EUR)	Price (per kg)	Quantity (in kg)	Value (in EUR)	Price (per kg)	Quantity (in kg)	Value (in EUR)	Price (per kg)	Quantity (in kg)	Value (in EUR)	Price (per kg)	Quantity (in kg)	Value (in EUR)
0	**1**	**3**	**4**	**5=3x4**	**6**	**7**	**8=6x7**	**9**	**10**	**11=9x10**	**12**	**13**	**14=12x13**	**15**	**16**	**17=15x16**
1.	Sales incomes			625,406			625,406			625,406			625,406			625,406
1.1.	Tomatoes: Fresh	0.21	297,600	63,158	0.21	297,600	63,158	0.21	297,600	63,158	0.21	297,600	63,158	0.21	297,600	63,158
1.2.	Tomatoes: Juice in bottle	0.07	355,680	256,645	0.07	355,680	256,645	0.07	355,680	256,645	0.07	355,680	256,645	0.07	355,680	256,645
1.3.	Gherkins: Pickles in jar	0.51	600,000	305,603	0.51	600,000	305,603	0.51	600,000	305,603	0.51	600,000	305,603	0.51	600,000	305,603
Total				**625,406**			**625,406**			**625,406**			**625,406**			**625,406**

Source: IAE, 2019.

Table 6. Economic flow (in EUR)

No.	Element	Zero moment	Year				
			1	2	3	4	5
I	**Total receipts**	**0**	**625,406**	**625,406**	**625,406**	**625,406**	**673,736**
1.	Total income	0	625,406	625,406	625,406	625,406	625,406
2.	Salvage value	0	0	0	0	0	48,330
	2.1. Fixed assets	0					40,275
	2.2. PWC	0					8,055
II	**Total expenditures**	**88,605**	**589,710**	**589,710**	**589,710**	**589,710**	**589,710**
3.	Investment value	88,605					
	3.1. Fixed assets	80,550					
	3.2. PWC	8,055					
4.	Costs without depreciation and interest	0	586,639	586,639	586,639	586,639	586,639
5.	Income tax	0	3,071	3,071	3,071	3,071	3,071
III	**Net cash flow**	**-88,605**	**35,696**	**35,696**	**35,696**	**35,696**	**84,026**

Source: IAE, 2019.

After presenting the all elements involved in income or costs side of investment utilization, there could be presented the profit and loss statement (Table 5.). As was previously explained, caused by fixed aspect of assumed annual incomes and costs, value of gained net income within the observed period has also fixed character. So, the use of investment will derive the positive net income for the cooperative in each year (in accordance to accounting practice, applied income tax is 10%).

Table 5. Profit and loss statement (in EUR)

No.	Element	Years				
		I	II	III	IV	V
I	**Total incomes**	**625,406**	**625,406**	**625,406**	**625,406**	**625,406**
1.	Sales incomes	625,406	625,406	625,406	625,406	625,406
2.	Subsidies	0	0	0	0	0
3.	Other incomes	0	0	0	0	0
II	**Total expenditures**	**594,694**	**594,694**	**594,694**	**594,694**	**594,694**
1.	Operational costs	594,694	594,694	594,694	594,694	594,694
1.1.	Material costs	**343,253**	**343,253**	**343,253**	**343,253**	**343,253**
1.2.	Immaterial costs (without depreciation and interest)	243,386	243,386	243,386	243,386	243,386
1.3.	Depreciation	8,055	8,055	8,055	8,055	8,055
2.	Interest	0	0	0	0	0
III	**Gross income (I-II)**	**30,712**	**30,712**	**30,712**	**30,712**	**30,712**
IV	**Gross income tax**	3,071	3,071	3,071	3,071	3,071
V	**Net income (III-IV)**	**27,641**	**27,641**	**27,641**	**27,641**	**27,641**

Source: IAE, 2019.

Entering the core of investment analysis requires forming of economic flow (Table 6.). As it could be seen the economic flow that derives from investment use is positive in each observed year.
Now there are all elements necessary for the static and dynamic assessment of investment. All indicators are visible in next table (Table 7.), so according to their values business idea seems to be economically justified.

Table 7. Indicators of investment assessment

Element	
Indicators of static assessment	
Total Output-Total Input Ratio	1.05
Net Profit Margin	4.42%
Accounting Rate of Return	31.20%
Simple payback period	2 years and 3.43 months
Indicators of dynamic assessment	
Net Present Value	119,836 (EUR)
Internal Rate of Return	39.57%
Dynamic payback period	2 years and 5.70 months
Break-even point	82.05%

Source: IAE, 2019.

Value of the Total Output – Total Input ratio, i.e. Economic-efficiency coefficient is higher than 1, expressing that total incomes exceed overall expenditures. So, investment idea is economical, or cost effective.
Net Profit Margin is higher than 4% (current interest rate at national market). In line to that investment idea could be considered accumulative, as its exploiting will bring to covering of all expenses derived from funding sources, as well as it will generate certain level of earnings for the cooperative.

In same time, Accounting Rate of Return is also much higher than 4% (assumed price of capital), while investment idea shows very good level of profitability. It could be expected that invested financial assets will be returned to cooperative (according to Simple Payback Period) in relatively short period, 2 years and 3.43 months.
Involving the aspect of dynamics in analysis, in assumed economic lifespan of analyzed investment (5 years), it will enable the cooperative to increase the expected profit (Net Present Value), recalculated to the zero (initial) moment of investment exploitation (n = 0), up to 119,836 EUR.
Besides, the expected value for the Internal Rate of Return is also much above the observed discount rate (4%), giving the clear legitimacy to cooperative's decision to enter the proposed investment idea. Value of Dynamic Payback Period is also favorable for investment, as it counts to 2 years and 5.70 months.
Within the entire observed period (5 years) project profitability will be secured if production volume in each year does not fall below 82.05% (or allowed decline in production volume is maximally 17.95%). In same time, in assumed production and market circumstances, sales incomes in each year have to be above 513,129 EUR.

Conclusions

Farmers could, specifically small farms, could significantly improve their incomes and profitability through the joined activities (as cooperative members) and involving the processing of produced agricultural products (reaching the value added). Several years ago, there are available certain public programs in Serbia that mainly offer incentives for cooperative promotion, improvement of cooperative's technological and managing basis, as for strengthening of economic position and competitiveness of existing cooperatives.
Proposed business idea of establishment the vegetable processing at cooperative level (production of tomato juice and pasteurized pickles), sounds economically justified (according to the values of static and dynamic indicators linked to investment analysis), both for specific cooperative and public financier. Its realization will surely affect the boosting of farms, i.e. cooperative business performances, while it could potentially benefit the local rural community through the additional employment of rural population, increase in paid sum of local taxes, better image of community, etc.

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