Economic efficiency in protected vegetable cultivation

Necula, Diana Maria

Research Institute for Agricultural Economics and Rural Development

20 November 2014

THE ECONOMIC EFFICIENCY FOR THE VEGETABLE CULTURE IN PROTECTED AREA

Necula Diana Maria[1]

Abstract *In this study, it is considered setting up a vegetable farm in protected areas and the economic efficiency of the proposed vegetable crops . The investment itself involves setting up a vegetable farm in protected areas, whose capacity will be of 1,000 square meters. The proposed vegetable varieties for cultivation are: tomatoes, cucumbers and spinach . The solarium will consist of two modules with metal structure covered with plastic wrap in dual inflatable fitted with drip irrigation and fertigation. For water supply is provided drilled and purchase of equipment needed in the production flow: tiller, drill, plug, etc. In the analysis performed we estimated two hypothetical situations: where basic investment expenditures (106,578 lei) are covered by the loan to the bank and the situation in which the investment is financed 40% by way of grant and 60% loan form the bank. . Are calculated for each of these two cases the basic investment expenses, receipts and payments for a period of 5 years at the date of investment*.

Keywords: *Vegetable farm, investment, payments and receipts.*

INTRODUCTION

The vegetables are part of the daily food ration of man, either fresh or processed, which has a significant economic importance, both for the consumer and producer of vegetables.

The statistics show that the main vegetables produced in Romania, in order of weight are, potatoes, followed by cabbage, tomatoes, sugar beet, melons, onions, cucumbers and peppers.

Although Romania has favorable conditions for the cultivation of vegetables, horticultural system degradation led to the Romanian market entry of imported vegetables: tomatoes, peppers, cucumbers, peas, potatoes, onions, etc. The vegetables import is done for reasons of demand substitution, not to make something that does not grow in our country .

The amount of vegetables consumed is influenced by several trends that currently occurs on Romanian market.

First, there is a tendency for consumers to switch to local products, especially when it comes to seasonal products. Romanian taste and quality are recognized and appreciated by consumers preferring them at the expense of another origin.

Secondly, a tendency to move towards a healthier diet that includes a higher intake of vegetables and fruits. In Romania, the annual consumption of fruits and vegetables is about 120 kg / capita, and the EU average, is between 180-200 kg/capita.

MATERIAL AND METHOD

This study was gone through two hypothetical situations: where the costs for the basic investment loan is covered by the bank and the situation in which the investment is funded through grants and bank loan.

As a method of analysis it was used the normative and constructive method which consists of a comparative analysis of two hypothetical situations proposed.

RESULTS AND DISCUSSION

1. Project Description

The solarium is designed specifically for both the climate in Romania coverage recommended height (trough height: 2.30 m Ridge height: 4.00 m), ventilation and resistance to the strong winds 110 km / h and deep snow (50kg / m vertical load).

[1] Researcher Diana Maria Necula, ICEADR, necula.diana @ iceadr.ro

The solarium coverage is made with plastic, inflatable double system with long-term use. Isolation front end is made of double-layer inflatable foil.

To access the greenhouse is mounted a metal sliding door with the opening of two pieces of 3.3 m covered with poly carbonate (lexan) of 6 mm and the rail is secured in concrete, with a height of 2.25 m. The side ventilation is achieved through openings wound manually operated.

For power supply KIT is proposed installation of a PV power 840W to ensure consisting of polycrystalline 280W solar panels, size: 1956 * 992 * 50mm.

For water supply we proposed the establishment of a deep drilled 30 m to ensure crop irrigation for water needed. It is provided with a manhole and will use PVC tube with a diameter of 125mm.

The irrigation system and drip fertigation, comprising:

- Main water supply pipeline,
- 10 drip hose lines (tube) diameter 16 mm solar module, the droppers are placed at 30 cm distance / rate of 2.0 l / h / dropper.
- Pump Dispensers (type DOSATRON) mounted on backbone connected to the source of water and fertilizer tank.

The fertirrigation drip system is the most effective solution for irrigation of vegetables in greenhouses and in the field. The drip irrigation has a plurality of advantages listed below, leads finally to obtain a production increase of up to one hundred percent and increase product quality.

Advantages of irrigation and drip irrigation are:

- Allows accurate dosing of water required different types of crops, eliminating losses;
- Allows management of fertilizers and various treatments during irrigation;
- Maintain soil structure and texture so that the root system of plants can grow much better than other methods of irrigation;
- The drip irrigation does not cool the soil which eliminates the stress of the plant that would have had if other than drip irrigated;
- Collapse possibility of developing wet weeds because the only active area of plant roots in culture, resulting in the elimination of weed control treatments;
- Collapse can spread throughout the crop diseases and pests;
- Low energy consumption and water;
- Dry areas between the rows of plants allow easy access within specific cultures so that work can be made easier and faster .;
- Manpower necessary for the operation of drip irrigation system is much lower compared to other forms of irrigation, which means more time for other activities and reduce costs;
- Drip fertigation installation does not require skilled labor exploitation;
- As an accumulation of some of the benefits listed above, drip fertigation system can provide increased productivity by up to 100%;

It will acquire the technological equipment necessary: tiller, plow, rotary, etc.

The motorrized hoe is a machine of simple construction, low power motor performs:

- Preparing the soil (with drills) for sowing and planting;
- Maintenance of cultures (with hoeing and rarity);

Specifications:

- Engine capacity: 7 hp / 5.14KW (power calculated at 3600 revolutions/min.)
- Adjustable Working width: 800-1400mm;
- Units: Rare adjustable weeding, metal wheels, plug plowing, rubber wheels, milling, digging, couple.

2. Estimate of expenditure

Expenses necessary to achieve the objective are divided in:

- **Costs for utilities necessary** lens contains water supply costs and electricity supply.
- **Expenses for design and technical assistance** include expenses for field studies, design, technical support, etc.

- **Expenses for investment,** costs include construction and installation, assembly machines, tools and equipment necessary for conducting agricultural activity.
- In Chapter other expenses enter the site organization costs and fees expenses.

Table 1. The expenditure shown in the general budget to achieve the objective by category of expenditure

Crt.	Categories of expenditure	Lei	%
1	Costs for utilities necessary objective	24767	16.6
2	Expenses for design and technical assistance	10347	6.9
3	Expenses for the basic investment	106.578	71.4
4	Other expenses	7524	5.1
Total Investment		149.217	100

3. Annual costs for agricultural activity

- *Annual costs for raw materials* **- include** the amount for the purchase of raw materials and materials in agricultural activity in the solar vegetable cultivation: planting, disinfectants, support material, fertilizers, pest treatment, packaging, fuel, etc.

Table no. 2 The annual costs for raw materials

Raw materials	**UM**	**Consumption unit**	**Annual Consumption**	**Unit Price (VAT included)**	**Total annual payments**
				LEI / UM	LEI / UM
Spinach seed	kg	2g / sqm	February	23.34	46
Tomato Seedling	pc	2.5 plants / m	1250	One	1250
Cucumber Seedling	pc	2.2plante / sqm	1100	One	1100
Fertilizers, pest treatment	l	aprox.2 l solution / 500 sq m	10	30	300
Disinfectants ground	l	70 l / 1000 sq.m.	70	13.5	945
Twine support	kg	1kg equivalent to 1600ml	5	15	75
Black film mulching	kg	approx. 35 kg (equivalent to 2400 mL)	70	12	840
Wire support	kg	10 lines / 50 m / row about 2 Kg	4	Three	12
Packing	pc	capacity 10 kg / pc	400	1.5	600
Fuel consumption	l	about 1.8L / h	16	6.3	101
Total expenditure on raw materials					5269

- *Personnel expenses in the amount of* **17.100 lei / year** is the monthly salary costs including social security contributions.

Labor necessary agricultural activities will be provided by a single employee and family members.

- *Payments for agricultural activity,* worth 4350 lei / year represents insurance spending, distributes and administrative expenses.

Table 3. Other payments to agricultural activity

Specification	**Total disbursements annual LEI**
Expenditure insurance	1,350
Distributes expenses	1,200
Administrative expenses	1,800
Total other payments	**4350**

In Chapter other payments - Values of local taxes on land and construction costs estimated at 5.5% tax contributions to CASS and 31.3% for CAS, pay VAT tax rate is 24%, net income tax (16%).

Table no. 4 Other pay the local taxes

Specification	Total annual disbursements LEI
Local taxes	969
Expenditure tax contributions due	4531
VAT	2,490
Income tax net	2180
Total other payments	**10170**

4. Production-capacity estimate.

To estimate production capacity of varieties of vegetables grown in solar resulting in:

- Crops spinach, on 1000 sqm productivity average of 2 kg / sqm / month resulting annual production of 2,000 kg.

- To crop cucumbers on 500 sqm average productivity per month for 5 kg / m² and a sampling period of 4 months, resulting annual production of 10000 kg.

- The tomato crop on an area of 500 square meters, the average productivity per month 3 kg / m² and a sampling period of 4 months, follows an annual production of 6,000 kg.

The culture of spinach in the solar system is in successive cultures, in this case before the basic culture (tomatoes, cucumbers, etc.).

The quantity and value forecast revenues from agriculture, is as follows (table 5):

Table no. 5 Income annual physical and value crops of tomatoes, cucumbers and spinach.

Nr. Crt.	Category	Price / Unit	Physical Sales	Sales value
		lei / kg	KG	LEI
1	Tomatoes	Three	6000	18000
2	Cucumbers	2.5	10000	25000
3	Spinach	4.5	2000	9000
Total sales			18000	52000

In this study we analyzed two situations:

A. The situation where the costs for the basic investment (106,578 lei) are covered by credit from the bank (hypothetical situation no. 1).

In this hypothetical situation (No.1) was considered necessary investment bank loan for the amount of 106,578 lei worth base representing a rate of 71.4% and own contribution in the amount of 69,358 lei.

The following table presents rates, interest and fees associated with the loan contracted for 6 years with an annual interest rate of 8%, the first year of grace, year of the project, starting pay rates since February (the first year of forecast).

Table 6 panel of bank loan repayment (hypothetical situation No.1)

Specification	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Rate	0	21316	21316	21316	21316	21316
Interest and commissions	7816	7745	6039	4.334	2,629	924
Total Payments	7816	29060	27355	25.650	23945	22239

Table No. 7 Estimate the hypothetical situation no. One

Nr. No.	Category	UM	TOTAL YEAR 1
1	Own contribution	LEI	69358
2	Other income (interest, etc.)	LEI	27289
3	Loans contracted	LEI	106.578
Total receipts		**LEI**	**203.225**
4	Payments for debt repayment:	LEI	**7817**
5	- Loans taken from banks and interest	LEI	7817
6	Payments related to the project	**LEI**	**149.217**
TOTAL PAYMENTS		LEI	**157.034**
AVAILABLE CASH AT END OF PERIOD		LEI	**46191**

Table. 8 contains estimates of revenue and payments for a period of 5 years after the investment.

Includes revenues from agriculture, estimated at the same level throughout the period, payments to settle the debt (bank loan), taxes on agricultural activity, which consists of payments for raw materials and other payments to agricultural activity (staff costs and administrative payments, distribution, etc.).

In the part of other expenses payments are included VAT, taxes and fees.

Table 8 Estimate of receipts and payments over a period of 5 years from the investment

Nr. Crt.	Category	UM	Year 1	AN 2	YEAR 3	YEAR 4	AN 5
Proceeds from agriculture		LEI	**52,000**	**52,000**	**52,000**	**52,000**	**52,000**
Payments for debt repayment:		LEI	**29060**	**27355**	**25.650**	**23945**	**22239**
Payments for farming:		LEI	**26719**	**26719**	**26719**	**26719**	**26719**
One	- Payments for raw materials	LEI	5.269	5.269	5.269	5.269	5269
February	- Other payments	LEI	21450	21450	21450	21450	21,450
Other payments		LEI	10170	10170	10170	10170	10170
TOTAL PAYMENTS		LEI	**65949**	**64244**	**62539**	**60834**	**59128**
SURPLUS / DEFICIT		LEI	**-13,949**	**-12,244**	**-10,539**	**-8834**	**-7128**
CASH AVAILABLE FROM THE PREVIOUS PERIOD		LEI	**46191**	**32242**	**19997**	**9458**	**623**
AVAILABLE CASH AT END OF PERIOD		LEI	**32242**	**19997**	**9458**	**623**	**-6505**

By estimating receipts and payments table. for a period of 5 years from the time of investment demonstrates that the investment available cash in the first year of implementation is 46,191 lei in the first year of forecast earnings from agriculture are worth 52,000 lei and total payments worth of 65,949 lei, resulting in available cash at the end of the first year of 32,242 lei. In the coming years the forecast available cash at the end is becoming smaller, with proceeds from agricultural activity cannot cover, thus Year 5 tested negative.

B. The situation in which the investment is financed 40% through grants and 60% bank loan (hypothetical situation No.2)

Table No. 9 The project

Financial Plan	Value eligible	Value ineligible	Total
Public aid grant	46446		46446
Private co-financing, of which:	69669	33102	102,771
- Self-financing		33102	33102
- Loans	69669		69669
TOTAL PROJECT	116,115	33102	149,217

As shown in the data table 9, where no.2 hypothetical situation, public aid for 46446 lei, representing a 40%, the loans from contracted bank of 69669 lei, representing a 60% of the eligible project .

Self-financing of 33102 lei, are not for eligible project expenses (VAT, etc.).

Table no. 10 Pictures of bank loan repayment (hypothetical situation No.2)

Payments to pay bank debt	Year 1 Implementation	Forecast Year 1	Year 2 of the weather	3 year forecast	Year 4 forecast	5 year forecast
Rate	0	13934	13934	13934	13934	13934
Interest and commissions	5109	5063	3948	2,833	1,719	604
Total Payments	5109	18996	17882	16767	15652	14538

Table No.10 stands out rates and interest on those six years, the first year of implementation and 5 year forecast period that covers the loan in the amount of 69669 lei with an annual interest rate of 8% and the year of grace implementation project.

Table. 11 Estimate the hypothetical situation No. 2

13	Own contribution	LEI	33102
15	Other income (interest, etc.)	LEI	27289
17	Loans contracted	LEI	69669
18	Grant EAFRD	LEI	46446
Total receipts		**LEI**	**176.506**
19	Payments for debt repayment:	LEI	**5109**
20	- Loans taken from banks and interest (and interest rates	LEI	5109
31	Payments related to the project EAFRD:	**LEI**	**144.107**
32	-achiziţii tangible fixed assets, including VAT	LEI	7741
33	-achiziţii intangible fixed assets, including VAT	LEI	11655
34	-increasing investment being	LEI	124.712
TOTAL PAYMENTS		LEI	**149.217**
SURPLUS / DEFICIT		LEI	**27289**
AVAILABLE CASH AT END OF PERIOD		LEI	**27289**

In the hypothetical situation No.2 revenues is the sum of own contribution, grant loans and aid plus other income, and if the sum of payments for the payment of debt payments and payments linked to the proposed investment, resulting in late implementing a cash available of 27289 lei.

Table 12 The estimate of receipts and payments over a period of 5 years from the investment

Nr. Crt.	Category	UM	Year 1	AN 2	YEAR 3	YEAR 4	AN 5
Proceeds from farming.		LEI	**52,000**	**52,000**	**52,000**	**52,000**	**52,000**
Payments for debt repayment:		LEI	**18996**	**17882**	**16767**	**15652**	**14538**
Payments for farming:		LEI	**26719**	**26719**	**26719**	**26719**	**26719**
One	- Payments for raw materials	LEI	5269	5269	5269	5269	5269
February	- Salaries and expenses for carrying agricultural	LEI	21,450	21,450	21,450	21,450	21,450
Three	Taxes	LEI	10170	10170	10170	10170	10170
TOTAL PAYMENTS		LEI	**55886**	**54771**	**53657**	**52542**	**51427**
SURPLUS / DEFICIT		LEI	**3886**	**2771**	**1657**	**-542**	**573**
CASH AVAILABLE FROM THE PREVIOUS PERIOD		LEI	**27289**	**23403**	**20632**	**18975**	**18433**
AVAILABLE CASH AT END OF PERIOD		LEI	**23403**	**20632**	**18975**	**18433**	**19006**

The data presented in Table 12 is distinguished receipts and payments for the 5-year forecast after the issuing of investment, resulting in:

- In the first year receipts are 52,000 lei and 55,888 lei payments, resulting in a deficit of -3886 lei, using the available cash at the end foregoing a cash available at the end of the first year of 23,403 lei.
- In the coming years using the available cash payments cover the previous period of agricultural activity and contrast the payments for loans, as in the past year to have a surplus of 573 lei and available cash at the end of 19006 lei.

CONCLUSIONS

The first hypothetical situation analysis that is very difficult to sustain a bank loan only from the proceeds of agricultural activity carried out in a vegetable farms, it will risk that after the first years not to have cash to cover expenses necessary for agricultural activity and cover the loan. In this case, the own contribution should be much higher.

In the second hypothetical situation analyzed demonstrates that public support is very important. Together with revenues from agricultural activity available cash farmer provides necessary expenses for carrying out agricultural activities on the farm and cover payments for debt repayment.

Of the two hypothetical situations arise that implementation of the project by attracting grants resulting in a shorter recovery time than in the case of the first case in which the investment project was made entirely from own sources.

Through the investment and application of new technologies that will ensure the deployment of technological process for growing vegetables under optimum conditions will get increased production yields, high value-added products with higher quality and will meet the most important growth lens- income.

REFERENCES

1. Adrian Turek Rahoveanu, (2008), Analysis chain fruits and vegetables sector in Romania, Bucharest, Romania, University Charter.
2. ***http://www.proiectetip.iceadr.ro/home/proiecte-tip-legume-spatii-protejate
3. ***http://www.gazetadeagricultura.info/plante/legume/14461-model-de-proiect-pentru-2-hectare-de-legume-in-camp.html
4. ***http://irigatii-profesionale.ro/content/4-fertirigarea