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**ECONOMIC PARAMETERS AND EFFICIENCY OF AN INVESTMENT MODEL
FOR THE BUILDING OF A VINEYARD
ИКОНОМИЧЕСКИ ПАРАМЕТРИ И ЕФЕКТИВНОСТ НА ИНВЕСТИЦИОНЕН
МОДЕЛ ЗА ИЗГРАЖДАНЕ НА ЛОЗОВО НАСАЖДЕНИЕ**

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E-mail: koprivlenski@au-plovdiv.bg**Abstract**

The study offers economic and technological parameters for the building of a vineyard of 200 dka. They provide maximum manifestation of the capabilities of the technology and are in compliance with the agricultural and biological requirements of the *Cabernet Sauvignon* variety. The project is designed for 25 years and covers the period from the establishment of the plantation till achieving maximum performance (threshold of production). The amount of funds for the creation of the vine plantation is 327,611 BGN; the funds necessary for the holding period to talled 623,375 BGN., (3,117 BGN/dka), and the projected revenue is 2,566,800 BGN; the Net Present Value is positive – 51,120.33 BGN; the Internal Rate of Return is 5.80%; the payback period of the investment is 9 years; the Profitability Index is 1.17; the ratio *revenue – expenses* for the lifetime is 2.7, which shows that the income exceeds the aggregate expenditure. The investment project is economically viable, effective, financially attractive and ensuring a successful business.

Key words: vineyard, investments, Net Present Value, Internal Rate of Return, Profitability Index.

INTRODUCTION

Vine is a traditional specific sector in the agricultural sector in Bulgaria. Its development should be a priority in the strategy of national agriculture. For our country wine production signifies an intensive and structural sector. Availability of good natural and climatic conditions of the potential of local and introduced varieties and distinct wine regions and areas are a real prerequisite for favorable development of the wine industry. In recent years, however, tended to deterioration of wine production in Bulgaria. The total area of vineyards strongly reduced. By 2004, in Bulgaria they are grown 129 580 ha, of them with good efficiency are about 90 000 ha (Table 1). The ratio of newly planted vines uprooted to exceed 1: 8. Uprooted trees are around 7100 ha. Moreover, much of the scrapped vineyards are not past depreciation period. Nationally prematurely liquidated fixed assets of hundreds of millions of BGN. Cervical base is almost eradicated. In 1969. stock nurseries occupied 45000 ha. By 2002, the country are maintained about 54 ha.

Areas planted with vines in farms in 2013 amounted to 58 236 ha, of which 50 192 ha were harvested. Compared with 2012, the area under vines decreased by 7% for over 6 000 ha did not have cared due to various social and economic reasons. Established in 2013, new vineyards with vine varieties amounted to 607,3 ha - about 42%

more than in 2012 and about 2 % of the land holdings are young, aged not fruiting, vineyards. Significantly reduces the amount of unsupported vineyards outside farms - from 14 640 ha in 2012 to 4900 ha in 2013 (about 67% less. As a result of the reduced number of vineyards in both the farm and beyond, in 2013 the total area under vines declined by 18% year on year to 63,136 ha. The largest decline was in the white wine grape varieties - an average of about 27% and there was a reduction of areas in almost all regions except the Southwest. In red wine varieties also saw a reduction in harvested areas, most notably in the North and South regions, respectively 33% and 26%. Unlike wine varieties, with table grape varieties in 2013, an increase of areas under 26% average for the country, mainly due to the perceived growth in the southern regions of the country. Meanwhile, in the North and Northeast regions reported a decrease in the harvested area under table varieties. Leading place in the structure of the vineyards in 2013 continue to hold red wine varieties, with a share of around 59%, followed by areas with white wine varieties - about 36% and dessert - about 6%.

New plantings of vines are created only in the last 10-15 years, thanks to funding provided by the State Fund "Agriculture" and SAPARD pre-accession program of the EU. Their size is still too small, which does not allow even simple reproduction of the areas under vines.

Table 1. Dynamics of the total area of vineyards in Bulgaria for the period 2004 - 2013

Years	Areas under vines, ha	Unsupported vineyards outside farms, ha	Total area under vines, ha
2004	95 551	34 029	129 580
2005	94 724	32 118	126 842
2006	85 320	43 537	128 857
2007	97 387	22 954	120 341
2008	88 570	22 246	110 816
2009	74 018	27 416	101 434
2010	56 968	25 707	82 675
2011	52 567	25 901	78 468
2012	62 701	14 640	77 341
2013	58 236	4 900	63 136

Source: Ministry of Agriculture and Food, "Agrostatistics".

Vines require substantial funds for their creation as a productive asset. The vineyards are run for decades and any error in their design, spatial placement, planting scheme, the choice of varietal composition formations and growing technology, reflects the return on investment throughout the life of the plantation. Those specific conditions in the construction of the vines have an inhibiting effect on the increase in investment activity in the subsector.

There are numerous studies on the investment activity of holdings in various sectors of agriculture in the country. In general, these tests detect several problems that hinder the growth of investment in the sector (including in viticulture), namely: disposable assets and income from operations (Atanassov, 2011); the degree of specialization, size of farms, resource availability, profitability and the availability of financial resources (Kostova, 2013); the scale of investment and the state of investment environment (Chankova, 2006); restrictions apply, faced farmers and the funding received (Bashev Ivanov Radev, Dunga, Atanasova, Slavova Pantaleeva, 2010), which provides additional funds for renovation of machine-tractor fleet, buildings and irrigation systems on farms; minimize market risk by providing a secure market and use of experience in the management of project documentation accompanying the receipt of financial assistance under the various CAP measures. In resolving these problems, harvesters should be supported by banking institutions, by a vote of no confidence in lending to their agricultural activities.

The aim of this study is to analyze and assess the economic suitability of investment business project to build a vineyard of 200 dka, based on economic and technological parameters allowing maximum manifestation of the capabilities of the technology and adapted to the agro-technical and biological requirements the variety "Cabernet Sauvignon".

MATERIALS AND METHODS

The project is designed for construction and operation of 200 dka vineyard of variety "Cabernet Sauvignon" in the village of Bratya Daskalovi, Chirpan. Project covers 25 years and includes the time of the establishment of the plantation to achieve its maximum performance. In developing the project into account some specific features of the vines, both production-technological and organizational economic nature. They have a direct influence on the investment process and its parameters and particularly the assessment of the effectiveness of the project and the choice of investment options and solutions. They can be classified as follows:

a) The existence of periods in the development of plantations, which in economic terms are defined as: a period of fruitless, increasing the yield (production threshold), income equality and loss (profit threshold), maximum performance (limit of production) and reducing income (profit margin).

b) differences in the productivity of the economic life of the plantations, leading to the formation of periods of primary and fastest growing fruiting, full and decreasing fruiting;

c) the length of the investment cycle for the perennials whose statutory term of 3 to 10 years;

d) relatively long useful life (operation) of vineyards, which reaches 30-40 years;

e) the high capital investment process, which almost always requires the involvement of external capital (debt capital).

For the purposes of development, were studied geology, geomorphology and terrain in the village of v. Bratya Daskalovi; highlighted its climatic conditions; A preliminary forecast of phenological vine plantation and characteristics of the soil. It is envisaged that production can be purchased on a contractual basis as follows: 70% of Winery town of Brezovo and 30% of the winery town of Chirpan.



The necessary investment costs of establishing and growing plantation to fruitage and operating costs for its cultivation during the fruiting are divided on elements in the following groups: Material costs; Transportation costs; Expenses for mechanized works; Costs for manual labor and fixed costs. Valuation of costs and finished products is done at prices for the first quarter of 2015. Assessment of the economic suitability of the design and effectiveness of the investment model is carried out by means of a system of indicators as follows: Net present value; The internal rate of return; Term of payback; Index of profit-ability; The ratio of "revenue - expenses".

In the evaluation and analysis of the net present value (Net Present Value - NPV), as criteria for its importance under the following meanings:

- When $NPV > 0$, the project shows good return and should be adopted;
- In $NPV = 0$, this is the level at which the project becomes effective, ie returns on invested capital plus a minimum desired profit. Acceptance of the project is questionable.
- When $NPV < 0$, the project is unacceptable, because it shows low returns.

As a criterion for assessment and analysis of IRR (Internal Rate of Return - IRR) have been adopted following values of the indicator:

If the value of $IRR = 0$, this matter is regarded as the minimum at which the project becomes effective.

If $r > d$ is considered that the investment is more effective than options use the same volume of capital in the bank.

If $r = d$, then the project is the critical level of effectiveness (cost-effectiveness), and as such is also acceptable.

When $r < d$ - the project is ineffective and should be rejected.

The index of profitability (Profitability Index PI) is established on the basis of the analyzed value of the net cash inflows for the entire economic life

of the project or as an average rate of return. The project is effective if $PI > 1$. In other words the sum of the discounted cash flows should be greater than the size of the investment.

The ratio of "revenue - cost" (Benefit / Cost Ratio - BCR) provides information about the movement of the overall efficiency in planning periods, net of discounting. If the ratio $BCR < 1$, this is proof of the financial unattractiveness of the project, and vice versa, any deviation of the ratio above one indicates a financial attractiveness of the project.

RESULTS AND DISCUSSION

The results of preliminary geological and geomorphological studies, phenological forecast and soil and climate conditions give reason to conclude that in the area of Bratya Daskalovi there are favorable conditions for the construction of vines.

3.1. Investment costs

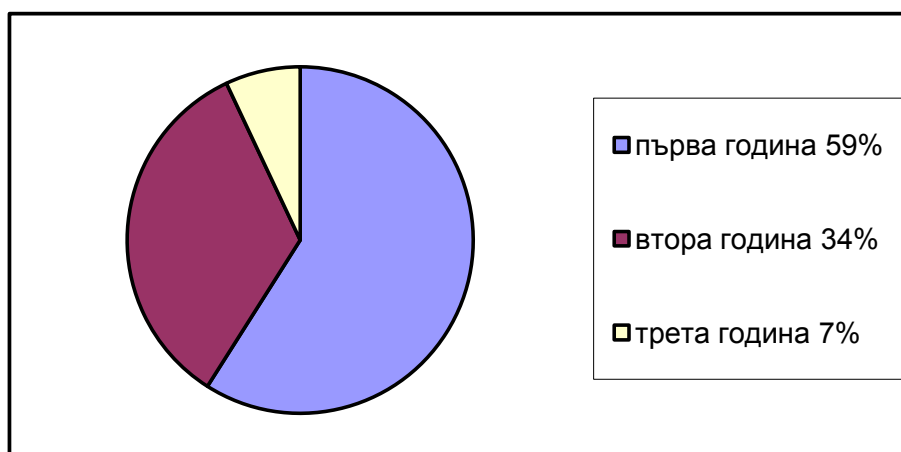
Necessary investment costs of establishing and growing plantation to fruitage are detailed in the calculated part of the project - Table 2. The construction period of the vine plantation include the first three years of its life cycle and the years of growing up he took fruiting. The main activities in this stage are preparing the area for planting rooted vines and build a truss. The necessary financial resources to create 200 dka in the vineyard. Bratya Daskalovi amounted to 327 611 BGN or 1638,05 BGN / dka. Those investment costs are within the average for Chirpan area. The latter are in the range of 1500 to 2500 BGN/ dka. Investment costs of the construction of the vine plantation account and in the fourth and fifth years - this is the period of cultivation before fruitage. The total amount of these costs for the fourth year is 26582 BGN, and in the fifth year – 28057 BGN.

Figure 1 shows the structure of the total capital investment in years. Spending are highest in the first year, decreased in the second and especially in the third year.

Table 2. Investment costs of establishing 200 dka vineyard in BGN

Types of costs	First year (BGN)	Second year (BGN)	Third year (BGN)	Total for three years – (BGN)
Material costs	163 233	93 619	5407	262 259
Transport	157	359	49	564
Mechanized works	19 475	8611	9872	37 959
Handwork	4037	3956	5603	13 596
Fixed costs	7099	3690	2444	13 233
Total costs	194 001	110 235	23 375	327 611
Average cost of 1 dka	970	551,15	116,88	1638,05

Source: own calculations.



Source: own figure.

Fig. 1. Structure of total expenditure over the establishment period of the plantation

Material costs in the first year include the necessary funds for the purchase of 55 556 number-rooted vines, designed to create 200 dka vineyard at 3.00 m spacing and in rows - 1.20 m. In the bill of material costs are the materials for marking vineyard purchase of phosphorus and potassium fertilizers to perform stocking fertilization and plant protection. Estimates of required quantities and funds for preparations were performed in an example of their application. Highest share of total expenditure for the purchase of materials is rooted vines, which represents 74% of the total. The transport is done by hired vehicles at the prices in force in the country in the first quarter of 2015. Stocking fertilization is done three times. Fertilizers mixed with the soil by double disking. Planting of vines is done with drills. During the vegetation soil is kept free from weeds with a fourfold culturing. Necessary equipment for mechanized works are hired at the prices in force in the area.

The workers are recruited payment is consistent with the type of work carried out at the cost of hired labor in the area. Reflected in the cost of manual labor per diem payment is gross and includes the necessary deductions.

The additional costs in the first year are as follows: insurance - 2% of the direct costs of production, management - 2% of PCD, unforeseen - 0.5% of PCD. The other costs such as: Research, design and supervision, Security and annuities in price 1dka.

The bilding truss is connected to the purchase of the corresponding quantities concrete poles and galvanized wire. Those materials represent 76% of total material costs in the second year. The purchase of 2778 pcs. vines needed to

replace the fallen. That number represents 5% of the total number of vines in the first year. In the bill of material costs in the second year included more material tie the vines to the support structure, the purchase of manure, ammonium nitrate and pesticides. In the third year, provides for a yield of grapes in 220 kg/dka, to form a certain income. In the third year a significant share of the necessary funds for material costs spent on purchase of plant protection products. Their total value is 91% of all costs for materials.

3.2. Size of the operating costs

Operating expenses the maintenance costs of the vine plantation and its cultivation during vegetatsiyata. Summary information about them in years and types of costs is presented in Table 3.

3.3. Planned revenue

The size of the resulting products and revenues from vineyards depend on the biological potential of this vine variety of physiological condition, climate and production conditions, on the one hand and the market prices of the finished products on the other. As a measure of productivity used the category yield grapes in kg/dka. During operation of a vineyard yield is amended in a particular way. Increased sharply in the period from the third to the fifth year, supports a maximum of about '15 and decreases relatively smoothly in the remaining period. The estimated yield curve for the years of growing future vineyard is shown in Figure 2. The size of the resulting production per year is a function of the area of the plantation and the size of the average yield.

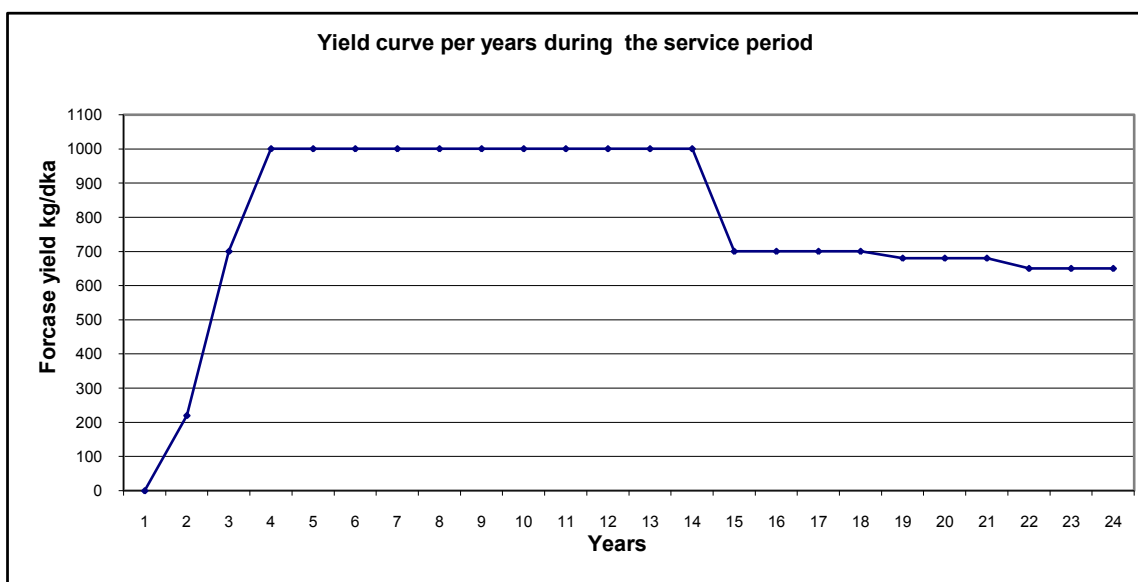
Total production over the lifetime of the vine plantation amounted to 4278 tons. And the value of the planned revenues amounted to 2.5668 million BGN.



Table 3. Operating expenses (BGN) for growing 200 dka fruit-bearing vineyard

Types of costs	6-15 year (BGN)	16-19 year (BGN)	20-22 year (BGN)	23-25 year (BGN)	Total (BGN)
Material cost	98271	40789	30534	20497	190091
Transport	1717	661	486	472	3336
Mechan. costs + Depreciations	119100	49527	37145	38502	244274
Handwork	45569	17922	13300	13080	89871
Fixed costs	20606	8324	6238	5997	41165
Total costs:	285263	117223	87703	78548	568737
Costs for 1 dka:	1426.32	586.12	438.52	392.74	2843.69

Source: own calculations.



Source: own graph.

Fig. 2. Yield curve per years during the service period

The price of wine grapes in recent years showed a strong variation - from 0.50 to 1.50 BGN for one kilogram of grapes. New vines to create slow and difficult, and the existing not kept according to the requirements of the technology, which is expected to in the next 5 to 10 years, demand for wine grapes to exceed supply. Taking into account these conditions, the calculation of operating income of this project, we opted for a relatively low average price of wine grapes from 0,60 BGN / kg. The Excellent technological qualities of the grapes produced from Cabernet Sauvignon and its use for the production of high quality and suitable for aging red wines, give reason to expect realization of sales and higher than that price.

3.4. Feasibility study of the investment project

Construction of cash flows in this study requires detailed calculation of all income and expenses. Generally net cash flow (NCF) is defined as the difference between the two time series of revenues and expenses. Cash flow, however, can not be used directly for the needs of the financial analysis of the business project, as it is not taken into account the so-called. time value of money. Therefore, for purposes of analyzing the economic suitability of the project is implemented mechanism for transforming the future values (revenues, expenses, capital) at present, t.e.- discounting. In summary, the discounted cash flows are presented in Table 4.

Table 4. Cash flow and investment appraisal for creating and growing a vineyard area of 200 da

Years	Revenue BGN	Production costs, BGN	Gross profit, BGN	Depreciatin. BGN	Profit after depreciat. BGN	Interest costs BGN	Profit before tax BGN	Taxes BGN	Profit after tax BGN	Cash flow BGN	Discount rate	Discount cash flow BGN
1	0	194001	-194001	0	-194001	7105	-201106	0	-201106	-201106	0.943	-189723
2	0	110235	-110235	0	-110235	11511	-121746	0	-121746	-121746	0.890	-108353
3	30000	23375	6625	288	6337	12685	-6348	1884	-8233	-6060	0.840	-5088
4	102000	26582	75418	14244	61174	13696	47478	21032	26446	61722	0.792	48889
5	120000	28057	91943	14244	77699	14792	62908	26795	36113	77151	0.747	57652
6	120000	28057	91943	14244	77699	15014	61785	26795	34991	76029	0.705	53598
7	120000	28057	91943	14244	77699	17036	60663	26795	33868	74907	0.665	49817
8	120000	28057	91943	14244	77699	18159	59541	26795	32746	73785	0.627	46293
9	120000	28057	91943	14244	77699	19281	58418	26795	31624	72662	0.592	43009
10	120000	28057	91943	14244	77699	20403	57296	26795	30501	71540	0.558	39948
11	120000	28996	91004	14244	76760	21556	55204	26453	28752	69448	0.527	36584
12	120000	28996	91004	14244	76760	22716	54044	26453	27592	68288	0.497	33937
13	120000	28996	91004	14244	76760	23876	52885	26453	26432	67129	0.469	31472
14	120000	28996	91004	14244	76760	25035	51725	26453	25272	65969	0.442	29178
15	120000	28996	91004	14244	76760	26195	50565	26453	24112	64809	0.417	27042
16	114000	29306	84694	14244	70450	27347	43103	24240	18864	57347	0.394	22575
17	114000	29306	84694	14244	70450	28519	41931	24240	17691	56175	0.371	20861
18	114000	29306	84694	14244	70450	29691	40749	24240	16519	55003	0.350	19270
19	114000	29306	84694	14244	70450	30864	39587	24240	15347	53831	0.331	17792
20	111600	29234	82366	14244	68122	32028	36094	23426	12668	50338	0.312	15696
21	111600	29234	82366	14244	68122	33197	34924	23426	11499	49168	0.294	14463
22	111600	29234	82366	14244	68122	34367	33755	23426	10329	47999	0.278	13320
23	108000	26182	81818	14244	67574	35457	32117	23277	8839	46361	0.262	12137
24	108000	26182	81818	14244	67574	36504	31069	23277	7792	45313	0.247	11191
25	108000	26182	81818	14244	67574	37552	30022	23277	6745	44266	0.233	10314
Общо:	2566800	950986	1615814	313655	1302159	595486	706673	553016	153657	1020328	-	351875

Investment 327610.88
Discount rate for investment 0.918
Updated investment 300754.55
Discounted cash flow 351875
Net present value (NPV) 51120.33
Profitability index 1.17
Internal rate of returned 5.80%
Payback period of investment 9 години



The rate of return is accepted for 6%. The depreciation amounts to 313 665 BGN was obtained after adding the total repair of the retaining structure. Liquidation value was accepted for 0.00 BGN annual depreciation amount is calculated using the straightline method.

The results of our study show that the realization of the investment business project to build a vineyard is a perspective view of:

1. The soil and climatic conditions in the village of v. Bratya Daskalovi are very favorable for the cultivation of vineyards.

2. The net present value (NPV) is positive 51120.33 BGN, ie investment is effective. This gives grounds for project establishment and cultivation of 200 dka of vineyard, variety “Cabernet Sauvignon” in the village of Bratya Daskalovi to adopt for implementation.

3. The internal rate of return at which the difference between the investment cost and updated net cash income acquires a value of 0 is 5.8%.

4. Benefit / Cost Ratio - BCR for the lifetime is 2.7, which shows that income exceeds the aggregate expenditure. The latter gives rise to expected performance of the investment funds for the establishment and cultivation of the vine plantation.

5. The period of payback is shown in Figure 3. The balance of revenue and expenditure occurs in the ninth year of the total operating period. The payback period is favorable given that the plantation enters the stage of full fruitfulness of the fifth year

of the total operating period, and the period of establishment of the plantation lasts three years. The actual time period for which revenues are aligned with the cost of four (4) years. After a period of 16 years are characterized by a gradual increase in the ratio of “revenue - expenses”.

CONCLUSIONS

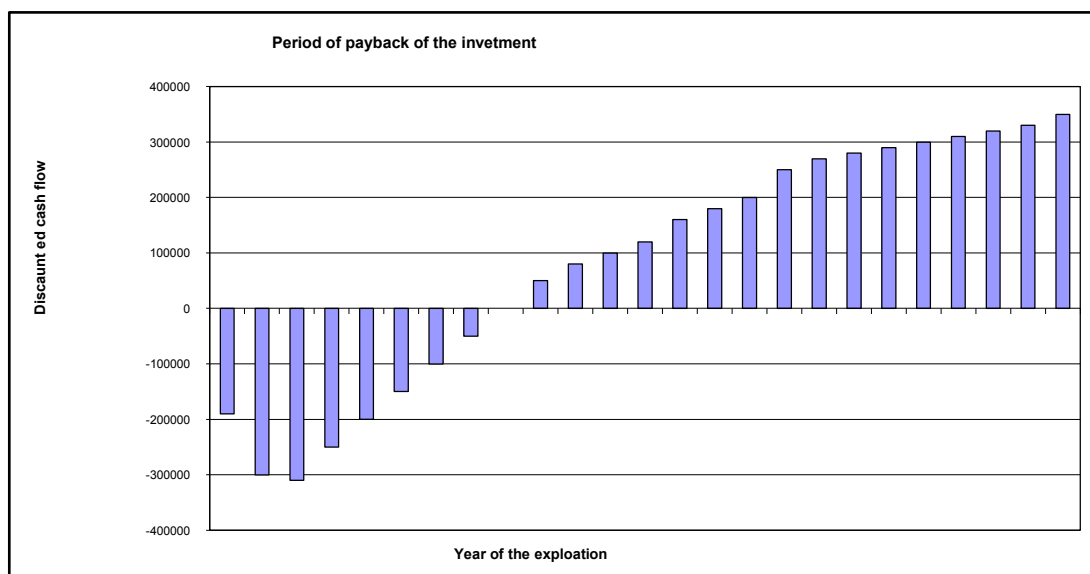
For the period up to 2020 a significant role in the development of small and middle viticulture, will play “Program for rural development.” Given this, we believe that investment in further development of modern viticulture country still need to focus on solving the following major tasks:

1. Quick adjustment of the production structure in the viticulture to the requirements of the international market (clear market orientation of the sector);

2. Expansion of areas occupied with quality, high-yielding red and white cultivars suitable for efficient industrial cultivation and production of environmentally friendly, high-quality wines with outstanding individuality, authenticity and proven origin;

3. Improve industrial technologies for grape production on the basis of maximum mechanization of processes in the vineyards;

4. Overcoming seasonality, expanding the range and parallel increase in production of table grape varieties, introducing a greater variety of seedless varieties and expanding the production of juices and other products.



Source: own figure.

Fig. 3. The period of payback of the investments

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