

Researches Concerning the Optimal Dimensioning of the Investments in a Viticultural Holding

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Abstract. This paper consists in an analysis model of the investments dimension in viticulture in terms of funding by FEADR. The analysis compares investments with a wide spectrum of the economic dimension, starting from 42 EDU (Economic Dimension Units) up to 276 EDU. The results are important for those who take the decision to invest in viticulture.

Keywords: viticulture, marketing, financial indicators, wine grape

INTRODUCTION

In viticulture investments are made for periods up to 40 years. If we correlate the length of time that is influenced by an investment with the value of the investment, we can observe the importance of these decisions. Planning of the investments (allocation of capital) is of fundamental importance for the success or failure of an agricultural holding, since decisions concerning investment budgets are affecting the future of an agricultural holding more than any other decision. A good decision can lead to a significant increase in farm earnings, but a wrong decision could lead to bankruptcy.

Because the results of the decisions taken when planning the investment budgets continues to activate for a certain period of time, flexibility in changing the decision is lost to some extent. Besides, investments being made on long term, they are fundamentally related to the sales estimation on the same period.

The investments influence the situation of an agricultural holding over a period of several years. The normal length of time to amortize an investment in agriculture, after "The catalog concerning the classification and the normal functioning duration of fixed assets" approved by Decision no. 2139 of 30th November 2004, is on average between 8-24 years for investments in agricultural holdings. This period increases investments in processing agricultural products. This implies that the final results of an investment are known after 8-24 years.

There are some factors, whose combination make that decisions on investment budgets probably be the most important decisions that a manager should take.

The evaluation of the investment's requirements in fixed assets should be correlated with cash flow otherwise it may lead to serious consequences, even if the investment itself is good. A very large investment in fixed assets, which were not necessarily required, can lead to lack of liquidity and blocking production.

On the other hand, an insufficient investment could lead to the loss of a market share or loss of competitiveness on the market resulting in the production of lower quality products as compared to the competition or with higher costs as compared to the competition.

Regaining the lost customers usually requires higher selling expenses, price reductions and products' improvements, which are also costly.

The development of a competitive management, in agriculture, as in any branch of the national economy, is only possible by knowing perfectly the evolution of various economic and financial phenomena throughout the biological cycle, their variation next to previsions and in dynamics, and also the correct diagnosis of the period.

MATERIAL AND METHODS

Financial indicators and their scale limit, considered for the analysis are:

1. The investment value(I) = total value of the project excluding VAT.
2. Exploitation incomes (V) = incomes from current activity, respectively the cultivation of grapevines. It was calculated from the physical (quantities of products, production volume) taking into account the prices per unit of measure differentiated for each grape variety.
3. Exploitation expenses (C) = expenses for the current activity.

They are expenses of operating income and are calculated according to the field of activity and specific expenditure.

Net profit: $P_n = R - I$, where:

R = result of the current activity;

I = tax for the operating year;

4. The exploitation result percent (rR) - must be at least 10% of Ve for a profitable investment.

The result from the current activity (R) is calculated: $R = V - C$ – should be positive, and for a viable investment the result percentage from the exploitation must be at least 10% of exploitation incomes for the evaluated years.

The exploitation result percent (rR) is calculated by the formula: $r_R = \frac{R}{V} \times 100$

5. Duration of investment's recovery (Dr) - for a profitable investment should be of maximum 12 years;

Is an indicator which expresses the duration of investment's recovery (in years).

Is calculated as follows:

$$Dr = \frac{VI}{\left(\sum_5^1 \text{Updated net influx} + \sum_{12}^6 \text{Updated exploitation influx} \right) / 12}$$

6. Rate of profitability of invested capital (r_{Rc}) - must be at least 5% for the evaluated years;

Is calculated as follows:

$$r_{Rc} = \frac{\text{Exploitation influx}}{VI} \times 100$$

7. Coverage rate in cash flow (RAFN) - must be ≥ 1.2 for the evaluated years;

RAFN = cash flow from exploitation / (interest payments + lease + debt repayment);

8. The debt rate of medium and long term (R_I) - must be maximum of 60% for the evaluated years;

Is calculated as the ratio between total debt on medium and long term and total assets.

$$r_I = \frac{TD_i}{TA_i} \times 100$$

where:

TD_i = total debt on medium and long term in year i ;

TA_i = total assets in year i ;

9. Update (s) rate - is 8%, used to update future cash flows.

where:

r is the update rate equal to 8% (r = refinancing interest rate BCE (4%) + the rate of country risk (4%) rated as average and changes as European monetary market conditions change

10. Net updated value (VAN) - must be positive;

Is calculated as follows:

$$VAN = \sum_{i=1}^5 \frac{FN_i}{(1+r)^i} + \sum_{i=6}^{12} \frac{FN_i \exp l t}{(1+r)^i} - I$$

FN_i = net cash flow in year i ;

$FN_i \exp l t$ = cash flow from exploitation in year i

I = investment value;

11. Cash availability at the end of period - the values are taken from "cash flow" should be positive during the evaluated forecast years.

Mathematical model for these types of investments

These investments can be modeled by Lesourne-Leban functions, with the following assumptions:

- Time horizon is infinite;
- Concerns changes in financial structure (funding may be made in shares, grants or loans);
- Optimal criterion: maximizing the value of the company as the sum of current dividend;
- Take into account the tax policy (tax) of the government.

Model equations:

-balance equation which formalizes funding of capital assets:

$$K(t) = X(t) + Y(t) + Z(t)$$

where:

$X(t)$ - shares value (social capital of the company)

$Y(t)$ - loans (credits)

$K(t)$ - the value of capital assets

$Z(t)$ - the funding value from grants.

-Net profit equation

$$E(t) = \dot{X}(t) + D(t) = (1-f)(R(Q(t)) + aZ(t) - aK(t) - wL(t) - rY(t))$$

where:

$E(t)$ - net profit of the company;

f - the tax rate;

$R(Q(t))$ - company incomes (from sales);

w - salary per employed person;

$L(t)$ - employed staff;

$X(t)$ - Increase share capital;

$D(t)$ - the value of dividends

$aK(t)$ - the value of depreciation

$aZ(t)$ - the movement rate of funds on non-income.

The equation includes the distribution and formation of net profit:

$E(t) = X(t) + D(t)$ (net profit for dividends and / or social capital growth (accumulation)).

The mechanism of net profit's formation is:

$$E(t) = (1 - f) [R(Q(t)) - WL(t) - a(K(t) - Z(t)) - Ry(t)]$$

Model's performance: the company is run by shareholders, the criterion is maximizing dividend flows on infinite horizon.

$$\max_{D, I, L} \int_0^{\infty} e^{-it} D(t) dt$$

RESULTS AND DISCUSSIONS

Using the above indicators we made an analysis for four investments in viticulture. The four investments were called Project 1 (P1), ..., Project 4 (P4). The values that are assigned to these projects are: 500.000 Eurs for P1, 1,500,000 Euros for P2, 2,000,000 Euros for P3 and 3,000,000 Euros for P4.

For each of the four investments a feasibility study has been made, where the values of the indicators proposed for analysis were calculated. Indicators that point out the viability and sustainability of the investment to be promoted were calculated. All forecasts were calculated for a period of 5 years, after finalizing the investment, in constant prices. It was considered that in years 6-12 the cash flow from exploitation are equal to cash flow from exploitation of year 5. Capital costs were considered as being the liquidation's value. Share of the amortization value related to grants was also added to the income. Two inputs were considered: capital and labor.

Each investment includes the setting up a vineyard, its maintenance in the first three years and necessary equipment to exploit the plantation. Need for technical materials facilities were considered to meet the requirements of mechanization of all the works at the farm. The workers are qualified and permanently used, floaters being employed only accidentally. We didn't take into account the value of the land, considering that it is in the property of the exploitation. The values taken into account are without VAT. Investments are made with cofounding by grants from the European Fund for Agriculture and Rural Development program. This cofounding is 50% of the investment but not more than 1,000,000 Euros regardless of how big the investment is.

Table 1

Culture structure and percent on the area

Culture structure	Project 1 (500000 Euro)	Project 2 (1500000 Euro)	Project 3 (2000000 Euro)	Project 4 (3000000 Euro)	Yields kg/ha	Estimated price lei/kg
Merlot	33.33	38.89	38.10	34.81	12,000	1.80
Cabernet Sauvignon	33.33	36.11	31.43	34.81	11,000	1.80
Feteasca neagra	10.42	6.94	9.52	9.49	12,000	1.80
Chardonnay	10.42	6.94	5.71	6.33	9,500	1.80
Sauvignon blanc	4.17	2.78	5.71	5.70	11,000	1.70
Feteasca regala	8.33	8.33	9.52	8.86	16,000	1.40
TOTAL	100.00	100.00	100.00	100.00		
Total surface(ha)	24	72	105	158		

In the analysis we took into consideration that the investments are made in the wine-growing region of Banat, in this case the wine grape varieties structure is specific to this

region. Because of marketing considerations the red varieties percent is 75% -80%, and white varieties have a percent of 20% -25% of the culture.

The proposed varieties for planting are: Merlot, Cabernet Sauvignon, Feteasca neagra, Chardonnay, Sauvignon blanc and Feteasca Regala. The structure of the varieties can be modified and these changes don't have significant influence over the indicators. Yields per hectare are presented in Table T1 and are provided for the years when grapevine is yielding. There are also presented the yields per hectare and estimated selling prices. Costs for the first three years are included in the project. The exchange rate used in calculations is 4.347 Lei / Euro.

Project P1 has an investment value of 500.000 Euro, respectively 2,173,500 lei. Out of this amount 298,800 Euro (59.76%) are expenses with the set up of the plantation on an area of 24 ha (24 ha x 12.450Euro/ha) and 201,200 Euro (40.24%) are expenses with the purchase of necessary equipments for the exploitation of 24 ha and for the maintenance during the first three years. Analyzing the indicators it is observed that the exploitation result rate (rRe) is the lowest (37.13%), duration of investment's recovery (Dr) exceeds the scale established for 12 years. Net updated value (VAN) is negative, indicating that at the end of the investment life period the value of capital is lower than the investment.

Table 2

Economic indicators for investments in viticulture

Indicators		Project 1 (P1)	Project 2 (P2)	Project 3 (P3)	Project 4 (P4)
Investment value (EURO)		500.000	1.500.000	2.000.000	3.000.000
Investment value (LEI)	VI	2.173.500	6.520.500	8.694.000	13.041.000
Exploitation incomes	Ve	567.998	1.714.551	2.473.148	3.583.774
Exploitation expenses	Ce	357.114	893.451	1.347.113	2.087.389
Net profit /year	Pn	177.143	689.724	945.869	1.256.963
The exploitation result percent	rRe	37,13%	47,89%	45,53%	41,75%
Duration of investment's recovery (years)	Dr	14,408	11,813	11,655	11,930
Rate of profitability of invested capital	rRc	11,07%	13,50%	13,68%	13,37%
The debt rate of medium and long term	rl	36,44%	18,66%	28,17%	29,13%
Update rate	i	8%	8%	8%	8%
Update net value	VAN	-363.203	103.298	257.770	76.495
Cash availability after 5 years		1.656.458	5.725.322	7.964.408	7.218.943
Surface (ha)		24	72	105	158
Net profit / ha		7.380,96	9.579,50	9.008,28	7.955,46

P2 project has an investment value of 1,500,000 Euro, respectively 6,520,500 lei.

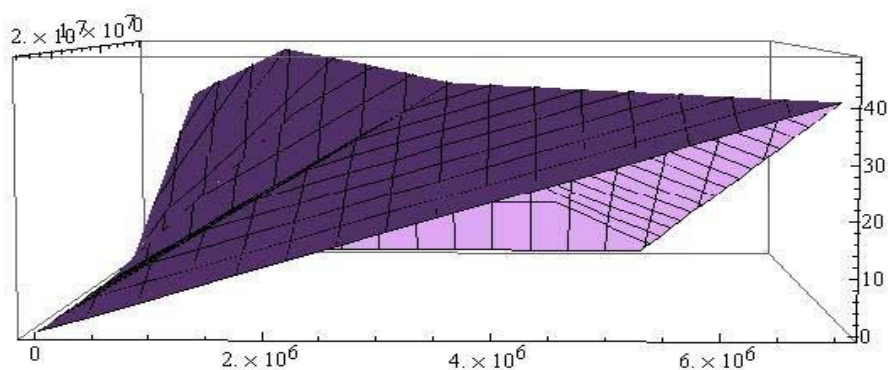
Out of this amount 896,400 Euro (59.76%) are projected expenses with the set up of the plantation on an area of 72 ha, and 603,600 Euro (40.24%) are expenses with the purchase of equipment and with the maintenance of the plantation in the first three years.

Even if the percentage of investment that is allocated to plantation set up is lower (59.76%) compared to P2 (65.36%) or P3 (65.57%) the outcome of the operation (rRe) is the highest (47.89%). Duration of recovery of investment (Dr) is below the scale of 12 years and comparable to P2 and P3. Debt rate on medium and long term is the lowest (18.66%). Cash available after 5 years shows that it is approaching the investment, provided that no dividends are taken. All these observations show that when the optimal criterion is to maximize company value as the sum of current dividends, the investment value is about the P2 project.

P3 project has a value of investment of 2,000,000 Euro, respectively 6,520,500 lei. Out of this amount 1,307,250 Euro (65.36%) are projected expenditure for the plantation set up on an area of 105 ha, and 692,750 Euro (34.63%) are expenses for purchasing equipment and maintenance of plantation in the first three years. Indicators of this project shows that this investment is less effective than the P2, although the percentage of investment in culture is greater than P2, and the ratio between the number of hectares and the investment is higher. Differences are not significant.

P4 project has a value of investment of 3,000,000 Euro, respectively 6,520,500 lei. Out of this amount 1,967,100 Euro (65.57%) are projected expenditure for the plantation set up on an area of 158 ha and 1,032,900 Euro (34.43%) are expenses for purchasing equipment and maintenance of plantation in the first three years. At this investment the cofounding rate decreases from 50% to other investments by only 33%. Worthiness of indicators falls in relation to P2 and P3.

Graphic representation of profit/ha for the four projects is:



CONCLUSIONS

From the economic indicators and the graph it is observed that the most profitable investments from an economic point of view are those between the interval 1.500.000 Euro-2.000.000 Euro, closer to the value of 1.500.000 Euro.

According to this interval Exploitation result rate decreases (from 47,89% at an investment of 1.500.000 Euro to 41.75% at an investment of 3.000.000 Euro), Rate of profitability of invested capital is decreasing (from 13,68% at an investment of 2.000.000 Euro to 13.37% at an investment of 3.000.000 Euro), and Duration of investment's recovery, expressed in years increases (from 11,655 years at an investment of 2.000.000 Euro to 11.93 years at an investment of 3.000.000 Euro).

In the future viticulture will remain a profitable sector, with a profitability of over 15%, and a safe commodity market due to Romanian wines' quality, so these investments are attractive.

From the analysis of the economic indicators it results that profit per invested money unit varies depending on the investment value.

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