ОРИГИНАЛНИ НАУЧНИ РАД

Economics of agriculture
UDK: 339.13:631 (498)

METHODS FOR COST EFFICIENCY APPRAISAL IN ROMANIAN FARMS

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Abstract

Production cost and a large spectre of indicators needed for farm decision making process may easily be determined through the use of direct-costing method. This method uses only variable costs for the agricultural product cost calculation, given that the fixed expenses influence directly the gross financial result of the farm. The study was performed based on the data collected in the agricultural year of 2010, from a vegetable farm from the region of South-Muntenia, Romania, having a surface of 15 ha, consecutively cultivating early potato and autumn cabbage. This computation method brings the advantage of emphasizing the most profitable cultivated agricultural products, ensuring a strict control over expenses, by simplified calculation, even though difficulties may appear when separating the variable expenses from the fixed ones. The indicators calculated for the studied farm have shown crop profitability, lack of risks and farm capacity to adapt in due time and with minimum effort to the changes brought about by the conditions generated by the social-economic environment.

Key words: *agricultural product, direct-costing method, production break-even point, financial break-even point, coverage factor, volatility coefficient.*

Introduction

The emergence of a production cost calculation method, meant for the vegetable farms that would ensure rapid cost calculation as well as the determination of a large spectre indicators needed for efficient farm decision making process has lead to the method of the variable costs or the direct-costing method.

Emerged in the USA in 1934 (applied by Jonathan Harris and G. Charter Harrison) and subsequently applied by European countries (England, France, Germany, etc.), the cost determination method is very current, as it allows only the deduction of variable costs (direct or indirect) incurred for vegetable production.

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2. Material and method

The research was performed on a vegetable farm from Romania, Dambovita County, Lunguletu commune, having a surface of 15 ha, consecutively cultivating early potato and autumn cabbage. In order to perform the study, the data collected from the analyzed farm in the agricultural year of 2010 were processed.

The method of the variable costs or the direct-costing method consists of the separation of all costs incurred in the pursuit of attaining production (production costs, distribution costs, etc.) in fixed and variable costs, the fixed costs directly influencing the gross financial result of the farm. As a result, only variable (direct and indirect) costs are applied for this method in calculating the cost per agricultural product unit. In this respect, for the studied farm, we have identified and classified costs based on types of expenses and on each type of agricultural product obtained.

The direct variable costs (related to the production activity) are collected for each type of agricultural product obtained, and the indirect variable costs are deduced. The fixed costs are estimated at the level of each crop and overall production of the farm.

3. Results and discussions

For the crop farm under analysis, we have determined indicators in table no.1, separately for the early potato and autumn cabbage crops and cumulatively per hectare of successive crops.

Through direct-costing method, determination of the production unit cost is performed by relating variable costs (VC) to the agricultural product attained quantity (Q).

$$VC = VC / Q$$

For the early potato crop, the variable cost per unit was of 0.35 lei/kg, and for the autumn cabbage it was of 0.25 lei/kg. Further on, for each agricultural product we have determined its gross contribution to profit or to the margin of variable costs.

The margin of variable costs (MC_{VC}) was determined as the difference between turnover (TO) and the variable costs (VC) incurred for the sold production, also known as the gross margin and it represents the sum of variable costs margins per unit established for the early potato and autumn cabbage multiplied by the afferent production sold.

$$MC_{VC} = TO - VC$$

Table 1. Determination and analysis of the variable cost for a vegetable farm (1 ha)

No.	Indicators	Symbol	Unit	Early potato	Autumn cabbage	Crop Total
1.	Total costs	TC	lei	19,999	20,451	40,450
2.	Variable costs	VC	lei	17572	17788	35,360
3.	Fixed costs	FC	lei	2,427	2,663	5,090
4.	Attained Production	Q	kg	50,000	70,000	-
5.	Variable cost per unit	VC_{unit}	lei	0.35	0.25	-
5.	Selling price	SP	lei	1	1	-
7.	Turnover	TO	lei	50,000	70,000	120,000
9.	Variable cost margin	MC_{VC}	lei	32,428	52,212	84,640
10.	Variable costs marginal rate for variable costs	MR_{VC}	%	64.85	74.58	70.53
11.	Variable costs rate	Rcv	%	35.15	25.42	29.47
12.	Production break-even point	q_e	kg	3,733	3,598	-
13.	Financial break-even point	$TO_{critical}$	lei	3,733	3,598	7,331
14.	Coverage factor	CF	%	64.86	74.59	70.53
15.	Safety period	S_{period}	lei	43,065	59,348	102,413
16.	Dynamic safety indicator	$S_{dynamic}$	%	86.13	84.78	85.34
17.	Withdrawal indicator	W	%	4.85	3.80	4.24
18.	Volatility coefficient (operational leverage)	Lo	-	1.16	1.17	1.17

Source: Data processed from the studied farm

We have determined for the studied farm a variable costs margin of 32,428 lei for the early potato crop, which represents 38.31% of the gross margin, and for the autumn cabbage the variable costs margin determined were of 52,212 lei, representing 61.68% of the gross margin. Through the variable costs gross margin rate we have determined what percentage does the gross margin (difference between turnover and variable costs) represents in relation to the attained turnover per crop and overall per farm. Thus, for the early potato crop, the variable costs margin rate shows a value of 64.85%, less than the one determined for the autumn cabbage crop (74.58%), the overall farm level being of 70.53%.

The variable costs rate shows the variable costs status for each crop and respectively for total production within the turnover (total income) obtained from one crop and respectively from the total production. Thus for the early potato crop it was of 35.15%, more than in the case of the autumn cabbage crop for which we have recorded the value of 25.42%. For farm total the variable costs were found in total turnover as for representing 29.47%. Because the gross margin must cover the period costs (fixed costs) that refer to the farm's capacity to produce and sell, we must grant priority to production and sale of some crops and suppress other corps considered unprofitable.

For the studied farm we observe that both crops, through their production capacity and incomes attained over their sale, may cover the period costs, and that their cultivation is convenient to the farmer.

The break-even point expresses the activity volume where the income attained by selling the agricultural products and the afferent total costs are equal, the result being null. This indicator represents the sales level that has the ability to cover total variable costs corresponding to the sales volume and fixed costs corresponding to a specific period. It shows that any additional sales exceeding this level triggers benefits, and the activity becomes profitable.

The break-even point is determined considering the following elements:

- total agricultural surface existing in the farm, without making new investments by increasing the surface in the reference period;
- existence of stable prices for production factors during the analyzed period;
- prices of the products sold are constant, so they do not depend on the volume of sales;
- there are no problems concerning the cash flow (discrepancy between incurring the costs and their payment or between attaining income and collecting it);
- eliminating variations on the volume of stocks (the production achieved is considered as for being sold).

For the early potato crop, the break-even point is reached when the turnover is equal to total costs (lei 19,999), and for the autumn cabbage the break-even point is reached at lei 20,451.

The procedures for determining the break-even point are: mathematical and graphical. The mathematical procedure implies determining a critical point in physical units (q_e) and in monetary units that is a critical turnover ($TO_{critical}$). So, the production break-even point equals the ratio between total fixed costs and variable cost unit margin. By multiplying the ratio of the production break-even point by the selling price (SP) we obtain the financial break-even point ($TO_{critical}$). Therefore, the financial break-even point is the ratio between the total fixed costs and the variable costs marginal rate. For the early potato crop, the production break-even point is 3,733 kg, and the critical turnover is recorded when the value of lei 3,733 is reached. For the autumn cabbage crop, the production break-even point is of 3,598 kg, the critical turnover is recorded when the value of lei 3,598 is reached. Per farm total, the critical turnover is recorded when the amount of lei 7,331 is reached.

The coverage factor (*CF*) is the indicator expressing how much of the turnover is needed to cover all costs and start obtaining profit, and it is determined as ratio between the variable costs margin per crop and crop turnover, and gross margin and total turnover. The higher this indicator is, the greater the profit is, and the farm will focus its production and supply strategy on those products bearing the highest coverage factor value. Therefore, for the analyzed farm, the coverage factor for the early potato crop is 64.84%, less than the coverage factor for the autumn cabbage crop, which raises to

74.59%, meaning that between the two crops, the cabbage crop has a higher profitability potential. For the farm, the coverage factor raised to 70.53 % of the turnover.

This indicator may be considered an indicator for profitability potential, aiming at focusing decisions towards optimizing the production and supply structure.

The safety interval indicates how much the sales could go down so that the farm would reach its break-even point. This represents the limit that the farm may reach without recoding any losses. The safety interval for the early potato crop is of lei 43,065, which means, hypothetically speaking, if the sales would decrease to this value, the break-even point would be reached and the company wouldn't record losses for the crop. For the autumn cabbage crop, the safety interval is of lei 59,348. Calculated for the farm, the safety interval is of lei 102,413, in which case the farm does not record losses, the income equals the costs, and the economic result is zero.

The dynamic safety indicator represents the indicator through which we establish the percentage that we may decrease the turnover with so that the farm reaches its break-even point. Therefore, for the early potato crop, the safety interval is of 86.13%, showing that the turnover has to go down to this percentage in order to reach the break-even point for this crop. For the autumn cabbage crop, this safety interval is of 84.78 %, showing that this crop is more profitable, and for the overall farm this indicator is of 85.34%.

The withdrawal indicator represents the percentage of the turnover which is used to cover fixed costs. If it is as little as possible, then the farm may easily reach the break-even point. As the calculations performed show, we observe that the farm records a withdrawal indicator of 4.85% for the early potato crop, and for the autumn cabbage crop 3.80%, meaning that for the latter crop the farm may easily reach the break-even point. For the overall analyzed farm the withdrawal indicator is of 4.24%.

The volatility coefficient or the operational leverage emphasizes the influence that the current status compared to the break-even point has on the economic result. It shows economic risk dependence to the turnover: the farthest the turnover is from the break-even point, less risky is the farm's activity.

For a better emphasis of the volatility coefficient dependence on the break-even point, we take into consideration the calculation relations between the turnover and the economic result, which is in turn determined by the additional turnover after reaching the break-even point.

The volatility coefficient represents the indicator by which the economic risk of the analyzed farm may be assessed, that is its incapacity to adapt in due time and with minimum effort to the changes brought about by the conditions generated by the social-economic environment. This risk is proportional to the level of fixed costs and to the how close is the turnover compared to the break-even point.

The volatility coefficient for the analyzed farm exceeds the value of 1, and therefore the turnover is situated far from the break-even point, so the farm's activity is less risky.

4. Conclusions

As any method of calculation and cost analysis, the direct-costing method has both *advantages* and *disadvantages*.

The advantages of the method:
- because it takes into consideration only variable costs, the costs calculation for agricultural products cultivated is very simplified;
- it helps spotting the most profitable crops cultivated (having the highest margins);
- it ensures a rigorous cost control;
- it analyses performances according to the deduced/agricultural product margin.

The disadvantages of the method:
- it separates variable costs from fixed costs, fact that brings about some difficulties (related to the production capacity that engages fixed costs and the use of production capacity that engages variable costs);
- the stocks are assessed only to the level of variable costs, influencing the exploitation result level (it comes against the requirements of financial accountancy which mentions that the stock assessment is performed for the total cost).

The indicators calculated for the studied farm have shown crop profitability, lack of risks and farm capacity to adapt in due time and with minimum effort to the changes brought about by the conditions generated by the social-economic environment.

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