COST – BENEFIT ANALYSIS, THE QUALITATIVE METHOD OF EVALUATING THE PERFORMANCE AND RISKS OF THE COMPANY

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The concept of risk has no meaning only when present and future attempts to estimate the return rate fluctuations in developing forecasts.

To estimate the risk of operating and financial risk, business practice using a tool of analysis known as the threshold of profitability (in French: Analyse coût – volume - profit, and in English: Breakeven Point Analysis), a method of analysis to estimate establish the conditions needed for the microeconomic balance, with or without profits (breakeven point). It's a graphical representation of the elements that make the benefit through their difference and it's applied to a homogeneous production or product distribution after expenses, from the assumption constants costs and turnover.

Threshold of profitability is the volume of activity that balances revenue expenditure, the result is zero, called the breakeven point. From this point the company, having covered all fixed and variable costs, has the benefits.

***Key words**: risk, threshold of profitability, breakeven point, benefit.*

Financial analysis is concerned both with profitability as a whole, through the study of the performance of exploitation, recorded in the income statement, and with the impact of the financing resources used compared with the means.

The profitability of exploitation, together with the exploitation risk, determines the level of the other profitability types and associated risks: financial risk, total risk, and bankruptcy risk.

The notion of risk is only significant when future is presented and when attempts are made to estimate the fluctuations of the profitability rate when making predictions.

In order to estimate exploitation and financial risk, business practice uses an analysis instrument known as *the break-even point* or the *cost–volume–profit analysis*. This tool is used to study the relationship between the sales figure, which reflects the level of the company's activity, the variable costs, the fixed costs, and the result of the company's activity. The technique of this analysis consists in determining the break-even point, which reflects the minimum activity level that a company must reach in order not to function at a loss.

MATERIAL AND METHOD

Specialized literature recommends, for calculating the break-even point (the point when the sales figure is equal to the total costs corresponding to a certain volume of company activity) the algebraic and the graphic method [1].

According to the *algebraic method*, in order to determine the break-even point, we should start from the fact that the sales figure corresponding to the value of a certain production volume should allow the company to cover all the expenses implied by obtaining and capitalizing on production and gaining a profit. This leads us to the conclusion that the size of the profit depends of the volume of the sold products and their price, and the latter depends on the cost structure and on the factors on the market.

According to the *graphic method*, the elements necessary to determine the break-even point are presented in a system of coordinated axes, where the abscissa records the production volume, and the ordinate, the total costs and the sales figure, taking into account the linear or non-linear variability of the variable costs and the production volume.

Starting from these considerations, this article aims at presenting the theoretical and practical aspects in determining the break-even point using the two mentioned methods.

RESULTS AND DISCUSSIONS

Reaching a balance in the conditions of a homogenous production or per product, after the distribution of expenses and starting from the hypothesis of the linearity of costs and sales figure, presupposes the following equation [3]:

$B = CA - C_T = q \cdot p - (Cf + q \cdot v) = q(p - v) - Cf,$

This can be reduced to the equation:

$B + Cf = Mcv,$

Where:

B = benefit;

q = physical sales volume;

p = sales price;

v = variable expenses per product unit;

p – v = mcv = unitary margin of variable costs;

q (p – v) = Mcv = total margin of variable costs;

Cf = Fixed costs.

The break-even point is the *volume* of activity (physical sales volume or critical volume) where the incomes (sales figure) *balance* the expenses, the result being equal to zero (B = 0). Starting from this point, the fixed and variable expenses of the company are covered, and the company starts to gain profits.

The diagram of the break-even point if the sales figure and variable costs are linear is used to the following purposes [5]:

1) Establishing the necessary conditions for *recovering* the expenses from incomes without any profit, at the break-even point (B = 0), when from the equation:

$q_{critical}\ (p - v) = Cf$, there results the following critical values:

a) Critical sales volume: $q_{critical} = \frac{Cf}{p-v} = \frac{Cf}{mcv}$ (physical units);

b) Critical sales figure: $CA_{critical} = q_{critical} \times p = \frac{Cf}{1-v/p}$ (monetary units).

2) Determining the *safety margin* (Ms), which would allow performing an activity in safe conditions, in two variants:

a) $Ms = q_v - q_{critical}$ (physical units);

b) $Ms = CA - CA_{critical}$ (monetary units).

3) Determining the *safety interval* (Is) provided by sales, in two variants:

a) $Is = \frac{q_v - q_{critical}}{q_{critical}} \times 100$ (%);

b) $Is = \frac{CA - CA_{critical}}{CA_{critical}} \times 100$ (%)

4) Calculating the profitability index that measures the safety margin in percentage from the sales figure or the *increase in efficiency* (Se), in two variants:

a) $Se = \frac{q_v - q_{critical}}{q_v} \times 100$ (%);

b) $Se = \frac{CA - CA_{critical}}{CA} \times 100$ (%).

In order to avoid the maximum exploitation risk at the break-even point, the necessary safety margin is considered at 10 - 20% above the critical sales figure [3].

The analysis of the break-even point in the basic commercial activity based on the break-even point diagram presents specific factors to this activity, starting from the way in which profit is computed:

$$B = CA - Chcirc = \frac{R \cdot \overline{A}}{100} - \left(Cf + \frac{R \cdot \overline{N_v}}{100} \right), \text{ where:}$$

CA = sales figure;

Chcirc = floating expenses;

R = goods roll-over;

$\bar{A}$ = medium commercial addition;

Cf = fixed expenses;

$\overline{N_v}$ = Medium level of variable floating expenses.

At the break-even point (B = 0), covering the floating expenses fro the sales figure presupposes the equation $CA = Chcirc$, corresponding to the break-even point, which leads to the following balance equation:

$$R_{critical}\left(\frac{\bar{A}-\bar{N}v}{100}\right)=Cf$$

From this equation, there result the critical values specific to the basic commercial activity, the sales ($R_{critical}$) and the sales figure ($CA_{critical}$):

a) $R_{critical}=\frac{Cf}{\bar{A}-\bar{N}v}\times 100$ (monetary units);

b) $Ca_{critical}=R_{critical}\times \bar{A}=\frac{Cf}{1-\bar{N}v/\bar{A}}$ (monetary units).

The values computed in this manner must be taken into account in the current and provisional management of the company, since they allow estimates concerning profit increases in various variants of commercial additions in relation with the medium relative level of the floating expenses.

The analysis of the break-even point in the case of a single-product company can be achieved based on the data in the table below *(table 1)*:

Table 1

The break-even point of product A

No.	Indicators	Fiscal year		Deviations	Indices
		Previous	Current	(± Δ)	(%)
1.	Sales volume (q_v) - tons	22,100	26,000	3,900	117.65
2.	Unit price (p) - lei/t	30	25	-5	83.33
3.	Sales figure (CA) – lei	663,000	650,000	-13,000	98.04
4.	Fixed expenses (Cf) - lei	90,000	90,000	0	100
5.	Variable expenses (Cv) - lei	18	18	0	100
6.	Unitary variable expenses (v) - lei/t	397,800	468,000	70,200	117.65
7.	Critical volume (q_{critic}) – tons	7,500	12,857	5,357	171.43
8.	CA critical – lei	225,000	321,425	96,425	142.86
9.	Safety margin (Ms) – tons	14,600	13,143	-1,457	90.02
10.	Safety margin (Ms) – lei	438,000	328,575	-109,425	75.02
11.	Safety interval (Is) - %	194.67	102.22	-92.45	52.51
12.	Efficiency increase (Se) - %	66.06	50.55	-15.51	76.52

Interpretation:

For the current period, the company must obtain a minimum of 7,500 tons of product A in order to reach the break-even point, and respectively to be able to cover its total costs without obtaining any profit. The production corresponding to the break-even point increases from one period to another, which means an unfavorable situation for the company.

For the analyzed period, the profit obtained decreases because the sales figure is lower and total variable costs increase. In numeric expression, the company should obtain a sales figure of 225,000 lei and respectively 321,425 lei in order to reach the break-even point.

The recorded safety margin (14,600 tons or 438,000 lei, respectively 13,143 tons or 328,575 lei) allows the company to perform its activity in safe conditions, with a safety interval provided by the sales of 194.67% and respectively 102.22%.

The increase in efficiency indicates that the sales figure that the company aims to achieve using its production capacity can decrease for market-related reasons by at most 66.06% and respectively 50.55% without the company to record losses or to go below the break-even point.

In what concerns the *graphic method* for determining the break-even point, the hypothesis of the linear or non-linear variation of variable costs and production volume is taken into account *(fig. 1)*.

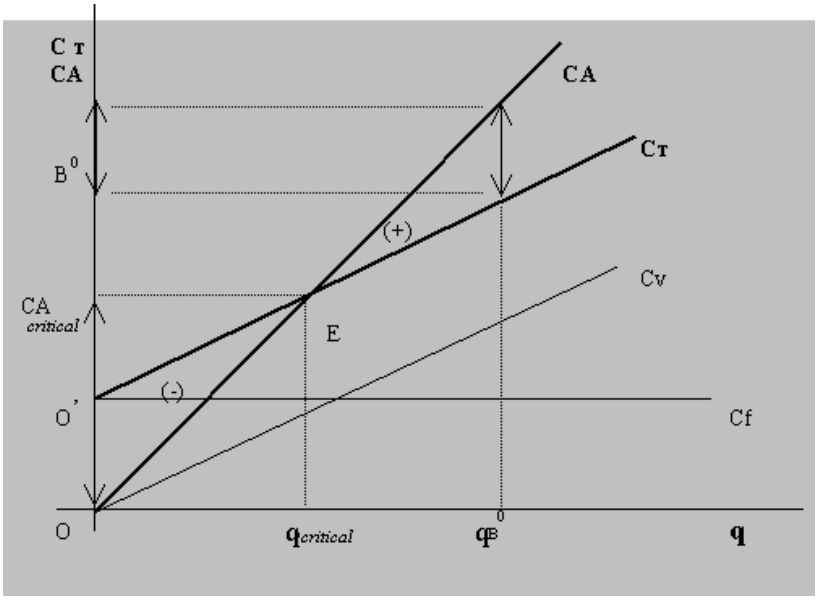

Figure 1 **The linear model of analysis of the break-even point**

The graphic shows that break-even point E delimits two areas [2]:

a) The *losses* area, where the expenses are higher than the sales figure (O'E > OE) as a result of a sales volume lower than the critical volume ($q_v < q_{critical}$);

b) The *benefits* area, where the sales figure is higher than the expenses (ECA > ECT) because of a sales volume higher than the critical volume ($q_v > q_{critical}$).

In spite of all the advantages of the method on which the cost-volume-profit analysis is based in establishing the microeconomic balance according to the break-even point, this method also has some *limitations* that should be taken into consideration for several reasons, such as [4]:

- The analysis presupposes either an unlimited *demand* at a fixed price, where a demand-price elasticity is recorded, which tends towards the infinite, or a *perfect* competition market that justifies the *linearity* of the sales figure, depending on the sales volume as the only variable that the producer can influence in the conditions of an equilibrium price on the market that does not depend on the

former. The linear variable costs correspond to the specific situation that characterizes *constant* factorial returns, which are usually variable;

- In the conditions of an imperfect competition market and of variable factorial returns, the sales figure and the expenses are not linear;
- The method cannot be applied by extension at the level of a non-homogenous production, but requires a homogenous production or an individualization at the product level;
- The time span is on the short term, when no structural production changes occur.

CONCLUSIONS

With all the above limitations, the break-even point analysis must be used in company management because it provides useful information in the following directions:

- It indicates the minimum activity level for the company to obtain profits;
- It supports decision-making when selecting an investment for a new product, for expansion or for modernization;
- It allows anticipating profits in various work hypotheses, taking into account fixed and variable costs, as well as various price variants;
- It indicates to what extent a loss in profits is caused by a reduction in sales, or by an increase of the fixed or variable costs, thus explaining the differences between previsions and achievements;
- Based on the economic and financial lever coefficient, it allows estimating the degree of the economic and financial risk of the activity;
- It helps estimating the conditions for maximizing profits in relation to the competition market.

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