COST VOLUME PROFIT, A MANAGERIAL ACCOUNTING TECHNIQUE

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Abstract: This paper aims at highlighting the role of the Cost Volume Profit model in developing and analysing scenarios for the forecast of the impact of managerial decisions on short-term company performance. The research approach is a practical one, with a predominantly constructive nature, of forward looking analysis of the evolution of the result of an economic entity operating in the bakery field. By means of the comparative method applied to a case study, on the example of a company operating in the bakery field, the best scenario being chosen from the perspective of its positive impact on the main primary and synthetic decisional indicators of the Cost Volume Profit model. The limitations of this research are given by the hypotheses of the Cost Volume Profit model as well as by the fact that the case study selected as research model does not allow for a full approach of a business sector.

Key words: cost volume profit model, scenario, decision-making indicators

JEL Classification Codes: M41.

1. INTRODUCTION

In a world of rapid changes in terms of technology, competition, customer preferences, management is challenged to have a strategic thinking in order to find pertinent solutions related to the evolution and the performance of the company.

Under such circumstances, the Cost Volume Profit (CVP) Model is useful for the development of future scenarios meant to reflect the impact of the qualitative change of the value of the input variables on the profitability of the economic entity. The input variables of the aforementioned models are: the volume of the activity (the quantity manufactured and sold), costs (variable and fixed costs), and the product selling price. As a management accounting technique, CVP quantifies the impact of the potential percentage deviations compared to the initial values of a variable on the result of the company where the other variables remain constant.

In practice, the question that arises is: "What happens if all the key variables deviate more or less from the forecast values" (Anastasiei, 2005).

2. RESEARCH OBJECTIVES AND METHODOLOGY

The objectives of the research are the development of scenarios, and their analysis and interpretation by means of indicators specific to the Cost Volume Profit Model. The ultimate goal, namely selecting the best scenario, is achieved by means of the comparative method related to the consistency and plausibility of these future projections.

The research method adopted in the scientific approach of this paper is the scenario method, which has a privileged place among the modern strategic analysis and planning tools. By means of scenarios, managers can make projections of their company's profitability as a response of the

circumstantial changes of the business process related to the three factors: selling price, variable expenses and fixed expenses. (Fătăcean, 2009).

The scenario has an intuitive nature in creating the future intended image as well as in the description of the ways of action needed to achieve the final image starting from a current situation (Postma and Liebl, 2005).

The case study related to the application of scenarios on the example of a company acting in the bakery field will enable us to perform an in-depth and full analysis of the impact of these scenarios on the trend of the key decision-making factors.

An optimal combination of research methods helps us to solve the objectives in terms of theoretical and practical approach. (Chelcea, 2007)

Through this study we adhere to the idea that research in managerial accounting are very useful for practice. (Falconer, 2002)

3. VALENCES AND LIMITATIONS OF THE COST VOLUME PROFIT MODEL AS A DECISION-MAKING TOOL REFLECTED IN THE SPECIALISED LITERATURE

3.1. Cost Volume Profit Model, a consequence of the Direct Costing method

Direct – Costing ca as a method used for the calculation of costs as well as of short-term profit or loss is the theoretical and methodological support of the Cost Volume Profit Model (Firescu, 2006).

The Cost Volume Profit Model is a useful tool in the preparation of simulations, being used commercial forecasting, in finding optimal balance alternatives, for the company performance. The elements of the Direct COSTING methods, also referred at as the variable cost method, emerge for the first time in the specialised literature in 1898 by classifying expenses into fixed and variable by the German economist Schmalenbach. However, both the theoretical and the practical approach of this cost calculation method was made by Jonathan N. Hariss and G. Charter Harrison who applied it independently of each other in the USA in 1934, and in 1935 respectively.

The logic of the Direct Costing method considers that the products must have a margin that should absorb fixed expenses. (Burland, Simon, 1999). Another characteristic of this method is its manner of approaching future advantages, i.e. fixed expenses are not taken into account in the calculation of the product cost because they are viewed as being generated by time, not by the production or commercial activity. (Albu and Albu, 2003)

The Cost Volume Profit Analysis is a provisional analysis method that allows for determining the conditions required for achieving microeconomic balance (Petrescu, 2008). This facile accounting tool, used in making short-term decisions, is based on the hypothesis that the volume of activity is the main factor that influences cots and incomes. (Deaconu, 2006)

This model useful in making decisions emerged in accounting allowing for the "a-posteriori" as well as "a-priori" analysis of the company performance by finding pertinent solutions related to the level of the break-even point and obtaining profit. (Budugan et al., 2007)

The Cost Volume Profit Model is based on the following calculation formula of the profit or loss:

Turnover (CA)

- (-)Variable expenses (CV)
- = Margin(M)
- (-) Fixed expenses (CF)
- = Result (profit or loss)

3.2 The key indicators of the Cost Volume Profit Model

The optimal scenario is selected depending on the values of the primary and synthetic decision-making indicators underlying the Cost Volume Profit Model.

Table no. 1 shows the primary decision-making indicators related to their calculation formula as well as the interpretation of the value of these indicators.

Ta	Table no. 1 Primary decision-making indicators of CVP							
Primary decision-making indicators	Calculation formula	Explanations and interpretation						
1. The unit cost	$Cu_{i} = \frac{Chvi}{Qi}$	Cu _{i =} the unit cost Chv _i = Total variable expenses of "i" carrier						
		Q _i = the quantity produced and sold in "i" carrier						
2. Individual margin		i = cost carrier m _i =individual margin						
	$m_i = Pv_{i-} C$	Pv _i = unit selling price Cu _i = unit cost.						
	u _i	according to the values of this indicator, it can optimize business structure in favour of the cost carrier with the largest individual margin.						
3. Total margin	$M_i = m_i \times Q_i$	M _i =total margin						
4. Result	$M_i = CA_i - Chv_i$ $R = M_i - CF$	CA _i = turnover of ,i" carrier CF = total fixed costs; a high value of the result is preferred.						

The main synthetic decision-making indicators used in the scenario analysis (Ștefănescu, Țurlea, Tănase, 2012) are:

$\sqrt{\text{The coverage factor}}$

This indicator represents the contribution of each product to the coverage of the fixed expenses and obtaining a profit. It is determined at the individual level of the cost carrier as well as at the overall level of the business. In the scenario analysis, this indicator guides the decision made by the company management towards the products with the highest coverage factor.

$\sqrt{\text{The break-even point}}$

In the specialised papers, this indicator is referred to as "*break-even*" although it does not reflect the profitability, it reflects the balance between sales and related expenses.

The break-even represents the respective volume of activity, the turnover at which the profit is null, more specifically the incomes obtained from the sale of the production fully cover the variable and the fixed expenses. Any increase in the volume of the production sold beyond this point will lead to profit. Horngren defines the break-even point from the perspective of the relationship of the three indicators: cost-volume-profit. The definitions of the break-even point do not have considerable semantic differences, they are rather reformulations of this concept.

Figure no. 1 shows the graphic determination of a break-even point at the intersection between the total expenses and the turnover.

$\sqrt{\text{The safety margin}}$

The safety margin represents the capacity of the company to change its production and to adjust to the market requirements.

$\sqrt{}$ The safety margin rate

This indicator is calculated with the purpose of avoiding the economic operational risk whose highest value is the break-even point. The statistical interpretations of the values of this indicator highlight:

- An unstable situation when SM% (the safety margin rate) is < 10%;
- A stable situation when SM%=10%;
- A comfortable situation when SM%> 20

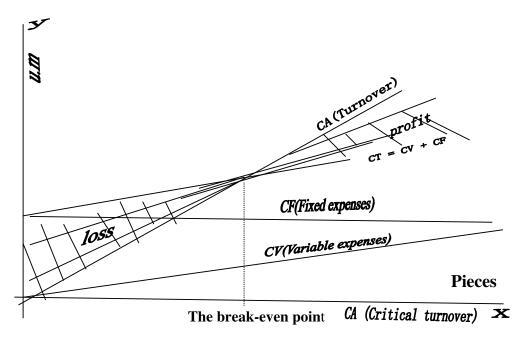


Fig. no. 1 Graphic representation of the break-even point

The table below shows the synthetic decision-making indicators of the Cost Volume Profit Model (CVP) concerning the calculation formula as well as their economic interpretation.

Table no	2 Synthetic	decision-ma	king indicator	s of CVP
i able no.	2 Symmetric	decision-ina	tking maicator	SOLCYP

Synthetic decision- making indicator	Calculation formula	Explanations and interpretation
1. Coverage factor (F _c)	$F_c = \frac{m_i}{Pv_i} \times 100$ Sau: $F_c = \frac{Mi}{CAi} \times 100$	shows what percentage of sales are needed to cover fixed costs and make a profit; this indicator is actually, margin rate of variable costs according to the values of this indicator, it can
	$F_c = \frac{1}{CAi} \times 100$	optimize business structure in favour of the cost carrier with the largest coverage factor.
2. Break even		Is the volume of activity, respectively turnover, when profit is null;
	$CA_{CR=}$ CF	Represents incomes from the sale of production which covers all variable costs and fixed costs;
	F_c	Any reduction in sales below this point will generate losses
3. Safety margin	MS=CA-CA _{CR} ;	Indicates how sales should fall for the company reach to break even

3.3. Limitations of the Cost Volume Profit Model

The CVP analysis can give errors, given that the parameters in the cost variable are approximations of the reality. In the production practice, there are situations where the variable expenses do not evolve proportionally to the volume of activity, or to the turnover respectively. On the other hand, fixed expenses are not constant in an absolute manner, because they depend on the time horizon to which they are related, and can have, as the case may be, a mandatory or a discretionary nature.

In order to make pertinent decisions by means of the Cost – Volume – Profit model, the following conditions and hypotheses must be observed (Caraiani and Dumitrana, 2005):

- The analysis should not exceed the relevant activity interval;
- The production sold must be equal to the production manufactured, in order to eliminate the impact of the stock variation;
- The prices of the production factors must be constant;
- Costs should allow for their separation into fixed and variable;
- Variable expenses should evolve proportionally to the volume of the production manufactured and sold;
- The production processes should be known and should not undergo changes in the period when the analysis is made.

The CVP Model is used mostly in the budgeting process, and it helps build their predictive dimension. Lately, budgets as managerial instruments used to plan the activity are have been increasingly criticised due to the fact that they do not take into account the increasingly diversified requirements of the company customers.

4. APPLICATION RELATED TO THE SCENARIO IMPACT ON THE KEY INDICATORS OF THE COST VOLUME PROFIT MODEL

In developing the scenarios, we took into account main phases recommended by the specialised literature. (Ionescu, 2013):

- Determining the purpose of the Cost Volume Profit analysis;
- Identifying the key influence factors: price, volume of activity, fixed and variable costs;
- Knowing the basic trends of the influence factors;
- Analyse, interpretation and selection of the optimal scenario.

The scenarios showed below have as starting point the budgets for two of the products manufactured by S.C. Zaris Autocom S.R.L. in the Argeş County: white loaf of bread and cocoa cake.

For efficiency, we have decided to note the white loaf of bread with P_1 , the cocoa cake with P_2 , the scenario with S and the budget with B.

Table no. 1 presents the scenario related to the increase in the selling price of the two products by 15% when the other two factors (costs and production volume) remain unchanged.

Indicators	P_1		P_2		Total	
	В	S_1	В	S ₁	В	S_1
Quantity (pcs)	63.000	63.000	3.000	3.000	66.000	66.000
Selling price (lei/pcs)	0.70	0.80	1	1.15	-	-
Variable unit cost (lei/pcs)	0.40	0.40	1.10	1.10	-	-
Fixed expenses (lei)	-	-	-	-	5.500	5.500
Turnover	44 100	50 400	3000	3450	47 100	53 850

Table no. 3: Scenario 1: Increasing the sealing prices of the two products by 15%

Variable expenses	25.200	25.200	3300	3300	28.500	28.500
Unitary margin	0.30	0.40	-0,10	0.05	0.28	0.38
Total margin	18.900	25.200	-300	150	18.600	25.350
Result (profit / loss)	-	-	-	-	13.100	19.850
Coverage factor	42,86	50%	-10%	4,35	39,49	47,08
Critical turnover	-	-	-	-	13.928	11.682
Safety margin	-	-	-	-	33172	42.168
Safety margin rate	-	-	-	-	70.43	78,30

The application of the scenario providing the increase in the selling price by 15 % leads to an increase in the turnover for the white loaf bread by 6300 lei and of the coca cake by 450 lei. At the level of the entire business, the turnover gowns by 14%, which is a growth rate lower than that of the increase in the selling price. The increase in the selling price of the cocoa cake has a favourable impact on the unitary gross margin, which from an initial negative value, becomes a positive value of 0.05 lei. At the level of the entire business, the total margin grows by 36% compared to its budgeted level as a result of the increase in the selling price of the two products.

The result shows a spectacular increase by 6750 lei, i.e. 51% compared to the initial version.

The break-even point expressed through the critical turnover is diminished by 2246 lei, which means a reduction of the economic operational risk by approximately 16%.

Also, the increase in the safety margin and the safety margin rate are strong arguments related to the positive impact of scenario no. 1 on the financial performance of the entity.

Given the aforementioned aspects, we can undoubtedly conclude that scenario no. 1 concerning the increase in the selling price of the two products should be adopted.

Table no. 4 Scenario 2: Increasing the quantity manufactured and sold for both products (by 10%)

(by 10 %)							
Indicators		P_1		P_2		Total	
	В	S_2	В	S_2	В	S_2	
Quantity (pcs)	63.000	69.300	3000	3300	66000	72600	
Selling price (lei/pcs)	0.70	0,70	1	1	-	-	
Variable unit cost (lei/pcs)	0.40	0,40	1,10	1,10	-	-	
Fixed expenses (lei)	-	-	-	-	5500	5500	
Turnover	44.100	48.510	3000	3300	47.100	51.810	
Variable expenses	25.200	27720	3300	3630	28.500	31.350	
Unitary margin	0.30	0,30	-0,10	-0,10	0,28	0,28	
Total gross margin	18.900	20.790	-300	-330	18.600	20.460	
Result (profit / loss)	-	-	-	-	13.100	14.960	
Coverage factor (%)	42,86	42,86	-10	-10	39,49	39,49	
Critical turnover	-	-	-	-	13.928	13.928	
Safety margin	-	-	-	-	33.172	37.882	
Safety margin rate (%)	-	-	-	-	70,42	73,12	

From the table above we can conclude that the impact of scenario 2 on the financial performance of the company chosen for this study is unfavourable, due to the following reasons:

 $[\]sqrt{}$ The negative unitary margin of the cocoa cake remains unchanged and has a negative impact on the result of P_2 ;

 $[\]sqrt{}$ The coverage factor and the break-even point expressed in terms of value as critical turnover remain unchanged;

 $\sqrt{}$ The increase in the total business turnover by 10% is offset by the increase by the same percentage of the variable expenditures.

Table no. 5 Scenario 3: reducing the unit cost of the two products by 5%

Indicators	Pı		P ₂		Total	
	В	S_3	В	S_3	В	S_3
Quantity (pcs)	63.000	63.000	3000	3000	66.000	66.000
Selling price (lei/piece)	0.70	0,70	1	1	-	-
Variable unit cost (lei/piece)	0.40	0,38	1,10	1,05	-	-
Fixed expenses (lei)	-	-	-	-	5500	5500
Turnover	44.100	44.100	3000	3000	47.100	47.100
Variable expenses	25.200	23.940	3300	3150	28.500	27.090
Unitary gross margin	0.30	0,32	-0,10	-0,05	0,28	0,30
Total gross margin	18.900	20.160	-300	-150	18.600	20.010
Result (profit/loss)	-	-	-	-	13.100	14.510
Coverage factor (%)	42,86	45,71	-10	-5	39.49	42,48
Critical turnover	-	-	-	-	13.928	12.947
Safety margin	-	-	-	-	33.172	34.153
Safety margin rate (%)	-	-	-	-	70,42	72,51

The adoption of scenario no. 3 leads to the following positive aspects:

- $\sqrt{\text{variable expenses are reduced;}}$
- $\sqrt{}$ the economic operational risk decreases by approximately 9%;

On the other hand, this scenario generates a number of changes with a negative impact on the company performance:

- $\sqrt{}$ the unit margin of product P_2 maintains its negative value with an unfavourable impact in this product;
- $\sqrt{}$ the coverage factor at the total business level grows at a rate of approximately 8%, lower than the unit cost reduction percentage;
- $\sqrt{}$ the safety margin and the safety margin rate grow by only approximately 3% compared to the unit cost reduction percentage for the two products.

In our opinion, based on the aforementioned reasons, the adoption of scenario no. 3 has a negative impact on the financial performance of the company.

Table no. 6 Scenario 4: Reducing fixed expenses (by 500 lei)

Indicators	P_1		P_2		Total	
	В	S_4	В	S_4	В	S ₄
Quantity (pcs)	63.000	63.000	3000	3300	66000	66000
Selling price (lei/piece)	0.70	0,70	1	1	-	-
Variable unit cost (lei/piece)	0.40	0,40	1,10	1,10	-	-
Fixed expenses (lei)	-	-	-	-	5500	5000
Turnover	44.100	44.100	3000	3000	47.100	47.100
Variable expenses	25.200	25.200	3300	3300	28.500	28.500
Unitary gross margin	0.30	0,30	-0,10	-0,10	0,28	0,28
Total gross margin	18.900	18.900	-300	-300	18.600	18.600
Result (profit/loss)	-	-	-	-	13.100	13.600
Coverage factor (%)	42,86	42,85	-10	-10	39,49	39,49

Critical turnover	-	-	-	-	13.928	12.661
Safety margin	-	-	-	-	33.172	34439
Safety margin rate (%)	-	-	-	-	70,42	73,12

The changes generated by the aforementioned scenario, in relation to the reduction of the fixed expenses by 500 lei, can be summarized as follows:

- $\sqrt{}$ at the overall business level, the turnover, the variable expenses, the unitary margin and the total margin related to the two products remain unchanged;
- $\sqrt{}$ the critical turnover decreases by 1267 lei, which means a reduction of the economic operational risk by approximately 9%;
- $\sqrt{}$ the safety margin rate grows by only approximately 3.8% compared to the decrease of the fixed expenses by 9%;

Considering that the negative margin of product P₂ remains constant, having the same negative impact on the result, the adoption of this scenario remains questionable.

Margin on variable costs is a good criterion for analysing product profitability. (Bouquin, 2004)

Indicators	P_1		P_2		Total	
	В	S_5	В	S_5	В	S_5
Quantity (pcs)	63.000	69.300	3000	3300	66000	72600
Selling price (lei/piece)	0.70	0,80	1	1,15	-	-
Variable unit cost (lei/piece)	0.40	0,38	1,10	1,05	-	-
Fixed expenses (lei)	-	-	-	-	5500	5000
Turnover	44.100	55.440	3000	3795	47.100	59235
Variable expenses	25.200	26334	3300	3465	28.500	29799
Unitary gross margin	0.30	0,42	-0,10	0,10	0,28	0,48
Total gross margin	18.900	29.106	-300	330	18.600	29436
Result (profit/loss)	-	-	-	-	13.100	24.436
Coverage factor (%)	42,86	52,50	-10	8,69	39,49	49,69
Critical turnover	-	-	-	-	19.777	12.121
Safety margin	-	-	-	-	27.323	47.114
Safety margin rate (%)	_	_	_	_	58.01	79,54

Table no. 7 Scenario 5: The cumulation of all the scenarios presented above

The positive impact of this scenario on the financial performance of the company is confirmed by the following arguments:

- $\sqrt{}$ the total turnover grows at a rate of 25.7 %, clearly higher than the growth rate of the variable expenses by only 4.5%:
- $\sqrt{}$ the unitary gross margin of product P_2 exceeds its negative value from the budgeted period, reaching the value of 0.10 lei;
 - $\sqrt{}$ the total margin grows by 58% compared to the initial version;
- $\sqrt{}$ the result grows dramatically by 86.5% compared to the budgeted period at the overall company business level;
- $\sqrt{}$ the coverage factor at the overall business level grows by 26 %, which means that fixed expenses are covered and a higher profit is certainly obtained;
 - $\sqrt{}$ the economic operational risk expressed through the critical turnover decreases by 61%;
 - $\sqrt{}$ the safety margin and the safety margin rate grow by 72%, and by 37% respectively.

Indicators Budgete Scenario 1 Scenario 2 Scenario Scenario 4 Scenario 3 5 47.100 59.235 Turnover 47.100 53.850 51.810 47.100 27.090 28.500 28.500 29799 Variable expenses 26.700 31.350 Total gross margin 20.400 25.330 20.460 20.010 18.600 29.436 Result (profit/loss) 14.900 19.850 14.960 11.510 13.600 24.436 42,48 39,49 Coverage factor 43,31 47,07 34,49 49,69 Critical turnover 32.200 11.682 13.928 12.947 12.661 12121 Safety margin 14.900 42.168 37.882 34.153 34.439 47114 Safety margin rate 78,30 72,51 73,12 79,59 31,63 73,12

Table no. 8 Scenario no. 6: - Comparative analysis of the five scenarios

By means of the comparative method related to the values obtained for the five scenarios, we will develop a matrix with the purpose of assessing the importance of each scenario in terms of impact on each indicator pertaining to the Cost Volume Profit Model. Basically, we can identify the importance of each scenario in the matrix below at the intersection between the values of the indicators and the respective scenario. In other words, we will score the importance of each scenario with I, II, III, IV, V. V, depending on their place in relation to the favourable impact on the indicators of the model used at the overall company business level.

Table no. 9 Matrix of the positions of the scenarios depending on their impact on the indicators of the CVP model

Indicators	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Turnover	II	III	IV	IV	I
Total gross margin	II	III	IV	V	I
Result (profit/loss)	II	III	V	IV	I
Coverage factor	II	V	III	IV	I
Critical turnover	II	V	IV	III	I
Safety margin	II	III	V	IV	I
Safety margin rate	II	III	IV	III	I

We can easily notice that Scenario 5 has the most favourable impact on the positive trend of the key indicators of the model used: turnover, total margin, result, coverage factor, breakeven point expressed through the critical turnover, safety margin and safety margin rate.

At first glance, scenario 5 would be the obvious choice of the management, but we should analyse whether this scenario that comprises four changes of the variables Cost Volume Profit are within the circumstantial restrictions of the market and the operational ones of the company selected for the research.

Thus, from the research found in the specialised literature we know that in the bakery sector, the increase in the selling price of the products can be made in the 10%-20% range depending on the advertising policy applied by the company. On the other hand, the reduction of the variable unit cost can be made down to at most 15% by promoting a policy of supplying from new suppliers in the market that have god prices without jeopardising the quality. (Ştefănescu, Turlea, Tănase, 2012)

The discretionary advertising fixed costs, the professional training, etc. can be decreased during short periods of time, without unfavourable consequences on the long-term objectives; these are the relative or controllable fixed expenses.

5. CONCLUSIONS AND LIMITATIONS OF THE STUDY

By means of the scenario method applied to the example of the Zaris company in the Argeş County, we were able to determine the impact of the changes of the variables Cost Volume Profit on the trend of the main decision-making factors compared to the budgeted variation of these indicators. The four scenarios related to the increase in the selling price by 15% la for both products, the increase by 10% of the volume of activity, the decrease of the variable unit cost by 5%, the decrease of the fixed costs by 500 lei that we developed and analysed, according to the hypotheses and requirements of the Cost Volume Profit model, as well as the market and operational constraints pertaining to the bakery sector.

Scenario no. 5 represents the future choice of the company management justified by means of the comparative method related to the positive impact on the key indicators of the Cost Volume model, with a net better impact compared to the four aforementioned scenarios.

As a valid research method, a future approach of the scenarios will be applied to a representative sample of companies operating in the bakery sector.

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