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CVP analysis in the conditions of multi-product production as a tool of operational controlling

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Abstract. Current conditions for the successful operation of enterprises are characterized by the globalization of the economic sphere, the accelerated pace of scientific and technical progress, and the strengthening of innovative trends. Therefore, any institution, when building its own strategy, first of all strives to provide conditions for long-term and promising activity, which can be achieved only by creating a strong competitive advantage. In particular, a recognized way to win the competition is cost leadership. Therefore, the search for a rational tool for the organization of the cost management system is currently an urgent issue. In addition, the competitiveness of modern enterprises depends on the model of financial flow management. Advantage and leadership in the market goes to organizations that minimize business risks by calculating losses with constant and variable components. CVP analysis is used to calculate the break-even turnover of each type of product. The purpose of the work was to study the application of CPV analysis to solve the problems of multi-product production and cost accounting in order to increase the efficiency of production activities. The article used the method of economic analysis, calculation of break-even points, comparison, modeling. The features of CVP analysis in the conditions of multi-product production are revealed, and the methods of its implementation are compared. The possibilities of applying the results of the analysis when making management decisions in the operational controlling system are determined. The problem of distribution of total fixed undistributed costs for certain types of products by various methods, as well as determination of the break-even level of production and sale of certain types of products on the basis of weighted average marginal profit, was investigated. The impact on profit of a change in the level of fixed costs and specific variable costs with the help of operating leverage as part of an operational analysis at a manufacturing enterprise was studied

Keywords: CVP analysis, variable costs, fixed costs, marginal profit, break-even point, operational analysis

INTRODUCTION

Modern operating conditions of enterprises are characterized by further globalization of economic activity, high rates of scientific and technical progress, innovative development, and increased aggressiveness of the competitive environment. Therefore, any organization, when building its own strategy, first of all, strives to create conditions for long-term and perspective activity, which is possible only by creating a strong competitive advantage. In particular, cost leadership is a recognized way of winning the competition, and

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in connection with this, the problem of creating an effective cost management system at the enterprise, capable of linking existing management information into a single whole within the framework of a single company, arises. Therefore, the search for a rational mechanism for the organization of the cost management system is currently quite relevant. One of these mechanisms is cost controlling, which is a component of the operational controlling system, the most famous and effective tool of which is CVP analysis.

Features of CVR analysis when used in the controlling system in the process of analysis, planning and control of costs and financial results of the enterprise are revealed in the works of foreign and domestic economists: A. Upchurch [1], S.H. Kim [2], O. Klementyeva, O. Zolotaryova [3], T. Odintsova, O. Nevmerzhitska [4], A. Paskalova [5], O. Tereshchenko [6], A.V. Kuprienko [7], I.V. Baryshevska [8], A.H. Osadcha [9] and others. However, the question of practical application of this toolkit at enterprises that produce many types of products remains understudied.

The purpose of the article is to test and determine the features of the use of CVR analysis in the practical activities of industrial enterprises, in particular in the conditions of multi-product production.

RESULTS

Analysis of the ratio "cost-volume-profit" (Cost-Volume-Profit) is one of the powerful tools in cost management and boils down to establishing the break-even point, i.e. determining the limit from which the company's revenues fully cover its costs. With the help of such an analysis, it is possible to better assess the possibilities of making a profit, and the guarantees of the company's break-even become obvious.

The break-even analysis can be performed mainly in the short term and is based on the following assumptions [2; 6; 10]:

- all costs can be 0divided into fixed and variable;
- there is a certain linear relationship between total costs, the volume of revenue and the volume of production;
- in the planning period, fixed costs do not change significantly along with changes in production volumes;
- variable costs per unit of production are stable, and total variable costs change in direct proportion to the volume of production and sales;
- prices for finished products and for resources forming the cost of production are fixed at a certain level;
- labor productivity and product range are unchanged;
- the level of costs and profit changes only under the influence of changes in the volume of production and sales of products;
- in the planned period, the number of manufactured products coincides with the volume of sold products.

CVP analysis is designed to reveal the optimal proportions between costs, sales price, sales volume and, as a result, minimize business risk. To carry out the above analysis, it is necessary to divide all costs of the enterprise into fixed and variable. In practice, this distribution creates many problems, being a rather time-consuming and complicated procedure, since many items of expenses are mixed and contain both constant and variable components.

Based on the analysis of previous studies [3; 9; 10], it can be concluded that in most cases, CVR analysis is carried out in the conditions of single-product production. Indeed, in this case, its analytical significance is great, and the obtained results are more accurate, since the calculation is not affected by such factors as the variety of assortment, the structure of production. And in the case of multi-product production, the analysis is reduced only to the identification of the impact on the overall profit and break-even of production, but at the same time, profit and profitability indicators by types of products are not additionally calculated.

Among Ukrainian scientists, there are many opinions regarding the distribution of fixed costs, with the calculation of break-even turnover, profitability and profitability by type of products. It is believed that the most appropriate basis for the allocation of fixed costs can be sales revenue, marginal profit or volume of production. It follows that, depending on the distribution base, we can calculate several indicators of cost, break-even points, and profit. And this, in principle, contradicts the main purpose of CVP analysis – to determine the volume of products for which the received income will be equal to the incurred costs, and such an indicator should be unambiguous.

So, for example, T. Odintsova and O. Nevmerzhitska, when applying CVP-analysis, propose to distribute fixed costs by types of products in proportion to sales volume [4]. Let's try to calculate such break-even points using the example of the company "Kromberg & Schubert", whose main activity is the production of on-board cable networks, special cables and completing electrical equipment for cars. The enterprise is characterized by a wide range of products. For the calculation, we will use the indicators related to one of the production shops of the enterprise with the corresponding list of the nomenclature. An example of the calculation is given in Table 1.

To calculate fixed costs, they were distributed according to the sales structure for each type of product. The obtained results of break-even points correspond to the main idea – the obtained gross profit covers fixed costs. But it is necessary to pay attention to the fact that one of the key conditions is violated - the unchanged structure of the assortment. The resulting distribution of fixed costs is also questionable. In general, a lot of attention is paid to the issue of distribution of fixed costs in the literature, but there is no universally correct algorithm for all enterprises, since they differ in the specifics of costs.

Table 1. *Calculation of the break-even point based on the division of fixed costs by the structure of product sales*

Indicator\Product type	NCV3 HLS	SLS MG	SLK Sportwagen Hauptleitung	SL Roadster Autarke	Motorrad Haupt-leitung	Motorrad Autarke	Total
Issue volume, units	166,799	Haupt-leitung	22,351	14,201	110,904	112,700	427,793
Production structure, %	39	838	5	3	26	26	100
Selling price, euros	197	0.2	368	107	86	12	
Sales volume, thousands of euros	32,859.4	392	8,225.2	1,519.5	9,537.7	1,352.4	53,822.7
Wage rate, EUR/hour	8.8	328.5	8.8	8.8	8.8	8.8	
Time for the manufacture of the part, min.	305.6	8.8	460	11	129	3	
Labor payment for one part, euros	44.8	442	67.5	1.6	18.9	0.4	
Total salary, thousands of euros	7,476.1	64.8	1,507.9	22.9	2,098.3	49.6	11,209.2
Raw materials and materials for 1 part, euro	120	54.3	235	60	43	9	
Total amount of raw materials, thousands of euros	20,015.9	205	5,252.5	852.1	4,768.9	1,014.3	32,075.4
Variable costs per unit of production, euros	165	171.8	302	62	62	9	
Total variable costs, thousands of euros	27,492.0	269.83	6,760.4	874.9	6,867.2	1,063.9	43,284.6
Marginal profit per unit, euro	32	226.1	66	45	24	3	
Gross profit, thousands of euros	5,367.4	122	1,464.7	644.5	2,670.6	288.5	10,538.1
Fixed costs, thousands of euros				8,607			
Product sales structure, %	61.05	0.61	15.28	2.82	17.72	2.51	100.00
Fixed costs (distribution by sales volume), thousands of euros	5,254.7	52.5	1,315.3	243.0	1,525.2	216.3	8,607.0
Break-even product turnover, units	163,297	430	20,071	5,354	63,340	84,480	336,971
Production structure, %	48	0,1	6	2	19	25	100
Sales volume (breakeven), thousands of euros	32,169.5	168.5	7,386.1	572.8	5,447.2	1,013.7	46,757.9
Total variable costs, thousands of euros	26,914.8	116.0	6,070.8	329.8	3,922.0	797.5	38,150.9
Gross profit, thousands of euros	5,254.7	52.5	1,315.3	243.0	1,525.2	216.3	8,607

Source: *built by the authors based on the internal reporting of the company "Kromberg & Schubert Ukraine"*

Foreign scientists [1;2], when using CVP analysis in conditions of multi-product production, avoid the distribution of fixed costs. Thus, the work of A. Upchurch gives an example of determining the break-even point using the weighted average marginal profit [1]. We will perform a similar calculation on the example of the same enterprise (Table 2).

The main feature of this calculation of the break-even point is that it is necessary to adhere to the assumption that the structure of production should remain unchanged. On its basis, the weighted average marginal profit is further calculated, which is still used to calculate the total break-even volume of production. Leaving the structure of production unchanged, the volume of break-even production is calculated for each type of product. Also, the same results can be obtained using the measure of total marginal profit. So, after calculating the ratio between fixed costs and total marginal profit, we get the same total amount of break-even as in the previous calculation.

Compared to the previous method of calculation, the data are more realistic and appropriate for use, because if the existing structure of production is preserved, as a result of the calculation, we get the break-even volume of each type of product, which in the end brings the marginal profit necessary to cover fixed costs.

Table 2. *Calculation of the break-even point based on the calculation of the weighted average marginal profit*

Indicator\Product type	NCV3 HLS	SLS AMG Haupt-leitung	SLK Sport-wagen Haupt-leitung	SL-Roadster Autarke	Motorrad Haupt-leitung	Motorrad Autarke	Total
Fixed costs, euros				8,607,000			
Production structure, %	39.0	0.2	5.2	3.3	25.9	26.3	100.0
Medium weighted	12.55	0.24	3.42	1.51	6.24	0.67	24.63
Marginal profit, euros				349,400			
Break-even point, units	136,233	684	18,255	11,599	90,581	92,048	349,400
Breakeven turnover	26,837.9	268.3	6,717.9	1,241.1	7,789.9	1,104.6	43,959.7
Products, units	22,454.1	184.7	5,521.6	714.6	5,608.8	868.9	35.4
Scope of implementation	4,383.8	83.6	1,196.3	526.5	2,181.1	235.7	8,607.0

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

However, it cannot be said that the results of the calculation of break-even points in the conditions of multi-product production have a high analytical value. For example, if there are products with a loss in the production structure, the decision to increase the price of the product is correct in principle, but when calculating for the enterprise as a whole, this product will not break even until similar calculations are carried out for the enterprise or shop as a whole. Therefore, for a more detailed analysis, it is advisable to calculate additional indicators. So, for example, from the break-even point formula, you can calculate the size of fixed costs for each type of product, from which it follows that fixed costs are equal to the product of the marginal profit per unit of production and the break-even volume (Table 3). On the basis of the obtained data, it is possible to calculate the indicators of total cost and profit for each type of product.

Table 3. *Calculation of profit by types of products based on the distribution of fixed costs, thousands of euros*

Indicator	NCV3 HLS	SLS AMG Haupt-leitung	SLK Sport-wagen Hauptleitung	SL Roadster Autarke	Motorrad Haupt-leitung	Motorrad Autarke	Total
Fixed costs	4,383.8	83.6	1,196.3	526.4	2,181.2	235.6	8,607.0
Total variable costs	27,492.0	226.1	6,760.4	875.0	6,867.2	1,063.9	43,284.6
Cost of manufactured products,	31,875.8	309.7	7,956.7	1,401.4	9,048.4	1,299.5	51,891.6
Volume of implementation,	32,859.4	328.5	8,225.2	1,519.5	9,537.7	1,352.4	53,822.7
Profit	983.6	18.8	268.5	118.1	489.3	52.8	1,931.1

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

Such a calculation allows you to examine each type of product from the point of view of the costs incurred for its production and the amount of profit it generates. However, it must be remembered that such data are not 100% reliable, because even with such a calculation, the distribution of fixed costs is quite conditional and may not correspond to reality. This is the complexity and peculiarity of using CVP analysis in the conditions of multi-product production. The obtained data can only serve as a guideline for making further management decisions.

Also quite often in the literature there is a division of fixed costs depending on the amount of marginal profit per product group. For comparison, we will perform the necessary calculations (Table 4).

It is worth noting that as a result of this distribution, we get a very close volume of fixed costs, as in the case of calculation using the weighted average marginal profit method. Accordingly, with this method, we will get approximately the same break-even points as in the previous case, because both methods are equivalent given the fact that they involve the use of the same indicators. Therefore, it can be argued that the only adequate method of distribution of fixed costs in conditions of multi-product production is the method of distribution by the volume of marginal profit in any variation. After all, such a distribution allows obtaining the most real and expedient results for making further management decisions related to the management of the cost of production, namely, variable and fixed costs.

Table 4. *Distribution of fixed costs depending on the marginality of products*

Indicators	NCV3 HLS	SLS MG Hauptleitung	SLK Sport-wagen Hauptleitung	SL Roadster Autarke	Motorrad Hauptleit ung	Motorrad Autarke	Total
Volume of issue, pcs	166,799	838	22,351	14,201	110,904	112,700	427,793
Profit per unit, euros	32	122	66	45	25	3	
Marginal profit, thousands of euros	5,261.1	101.9	1,478.2	646.1	2,732.4	285.1	10,504.7
Marginal profit structure, %	50	1	14	6	26	3	100
Fixed costs (distribution by marginal profit), thousands of euros	4,363.3	83.2	1,190.7	523.9	2,171.0	274.8	8,607.0

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

In order to make informed decisions about changes in the volume of production and sales of products, it is also necessary to take into account additional factors affecting the results of operations, such as changes in demand for products, changes in prices for raw materials, and other events that can cause significant deviations from the planned results of operations. One of the ways to take into account the factor of change in demand for products is the calculation of optimistic and pessimistic versions of CVP-analysis, presented in the work of A. Pascalova [5], which is used precisely in the conditions of multi-product production. The calculation methodology consists in the fact that various options for the sale of goods are considered depending on the size of the marginal profit. It is assumed that goods with a lower marginal profit are sold first, depending on demand, or the situation may be the opposite. Taking into account two multipolar options, the company receives a reliable range of development of possible events.

Having estimated values of the marginal profit of each type of product, it is obvious that some goods are more profitable than others, and some bring a minimum profit, which, most likely, with the correct distribution, does not even cover the amount of fixed costs aimed at its production. We rank the analyzed products by the size of the marginal profit (Table 5).

Table 5. *Product profitability ranking*

Indicator\Type of product	Selling price, EUR	Variable costs per unit of production, EUR	Marginal profit per unit, EUR	Rank
SLS AMG Hauptleitung	392	270	122	1
SLK Sportwagen Hauptleitung	368	302	66	2
SL Roadster Autarke	107	61	46	3
NCV3 HLS	197	165	32	4
Motorrad Hauptleitung	86	62	24	-5
Motorrad Autarke	12	9	3	6

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

First, let's use the optimistic scenario of CVP analysis. We assume that in line with the interests of the enterprise, first of all, given the possible demand, products with the highest marginal profit will be sold, or we assume that the market situation is such that the enterprise independently chooses which product to sell first (Table 6).

From the data presented in Table 6, we can see that under an optimistic scenario, the company will exceed the break-even point by selling only 5 types of products. The proceeds from sales will cover all variable and fixed manufacturing costs. The break-even point under such conditions will be equal (Table 7):

$$BP1=42\,932\,574+9\,537\,744\cdot \cdot(1\,027\,978/2\,670\,568)=46\,603\,923\ (euro). \quad (1)$$

So, based on the volume of sales of 46,603.9 thousand euros and on the condition that the goods with a larger volume of marginal profit will be sold first, the company will reach the break-even point. At the same time, the volume of the first four products according to the level of marginality remains unchanged, and the Motorrad Hauptleitung product needs to be sold only in the amount of 3,671.3 thousand euros, compared to the input data in the amount of 9,537.7 thousand euros.

Table 6. *Optimistic version of CVP analysis*

Indicator\Type of product	Sales volume, euro	Sales volume by cumulative sum, euro	Variable costs, euro	Marginal profit, euro	Marginal profit coefficient	Profit (loss) by cumulative sum, euro (=8607000)
SLS AMG Hauptleitung	328,496	328,496	226,115	102,381	31%	-8,504,619
SLK Sportwagen Hauptleitung	8,225,168	8,553,664	6,760,432	1,464,736	18%	-7,039,883
SL Roadster Autarke	1,519,507	10,073,171	874,971	644,536	42%	-6,395,347
NCV3 HLS	32,859,403	42,932,574	27,492,034	5,367,369	16%	-1,027,978
Motorrad Hauptleitung	9,537,744	52,470,318	6,867,176	2,670,568	28%	1,642,591
Motorrad Autarke	1,352,400	53,822,718	1,063,888	288,512	21%	1,931,103
Total	53,822,718		43,284,615	10,538,103	20%	

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

Table 7. *Break-even point according to the optimistic version of the CVP analysis*

Indicators	Break-even point, euro		SLS AMG Hauptleitung	SLK Sportwagen Hauptleitung	SL Roadster Autarke	NCV3 HLS	Motorrad Hauptleitung
Sales volume, euros	46,603,923		328,496	8,225,168	1,519,507	32,859,403	3,671,349
Volume of realization, pcs.	246,879	*or*	838	22,351	14,201	166,799	42,690
Variable costs, euros	37,996,923		226,115	6,760,432	874,971	27,492,034	2,643,371
Marginal profit, euros	8,607,000		102,381	1,464,736	644,536	5,367,369	1,027,978

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

There is also a possible variant of the development of events, in which the company will primarily be able to sell goods with the smallest marginal profit per unit. Such a development can be called pessimistic. Let's calculate the break-even point under such conditions (Table 8).

Under the pessimistic version of the CVP-analysis under the given conditions, the company breaks even with the sale of only four types of products, which is one position less than under the conditions of the optimistic version. Let's calculate the break-even point:

Table 8. *Pessimistic version of the CVP analysis*

Indicator\Type of product	Sales volume, euros	Sales volume by cumulative total, euros	Variable costs, euros	Marginal profit, euros	Marginal profit coefficient	Profit (loss) by cumulative total, euros (8607000)
Motorrad Autarke	1,352,400	1,352,400	1,063,888	288,512	21%	-8,318,488
Motorrad Hauptleitung	9,537,744	10,890,144	6,867,176	2,670,568	29%	-5,647,920
NCV3 HLS	32,859,403	43,749,547	27,492,034	5,367,369	16%	-280,550
SL Roadster Autarke	1,519,507	45,269,054	874,971	644,536	43%	363,986
SLK Sportwagen Hauptleitung	8,225,168	53,494,222	6,760,432	1,464,736	18%	1,828,721
SLS AMG Hauptleitung	328,496	53,822,718	226,115	102,381	31%	1,931,103
Total	53,822,718		43,284,615	10,538,103	20%	

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

$$BP2=43\,749\,547+1\,519\,507\cdot(280\,550/644\,536)=44\,410\,950\ (euro). \quad (2)$$

Table 9. *Break-even point according to the pessimistic version of the CVP analysis, euros*

Indicator	Break-even point, euro		Motorrad Autarke	Motorrad Hauptleitung	NCV3 HLS	SL Roadster Autarke
Scope of implementation	44,410,950		1,352,400	9,537,744	32,859,403	661,403
Volume of realization, pcs.	396,584	*or*	112,700	110,904	166,799	6,181
Variable costs	35,803,950		1,063,888	6,867 176	27,492,034	380,853
Marginal profit	8,607,000		288,512	2,670,568	5,367,369	280,550

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

So, according to the pessimistic forecast, the break-even point is even smaller by 2,193.0 thousand euros than according to the optimistic one. At the same time, the number of types of products is also smaller. In the pessimistic scenario, it is enough for the company to sell only 3 types of products in full and SL Roadster Autorke products in the amount of 661,403 euros. This result is caused by the fact that the products with the highest marginal profit in the total, taking into account the number of units sold, are many times smaller than the total amount of marginal profit of products with a smaller amount of profit per unit. So, for example, such a product type as NCV3 HLS received a unit profitability rank of 4 out of 6, but at the same time, the volume of the total marginal profit for this group of products is more than 50% of the total marginal profit for the shop. Therefore, for practical use it is more appropriate to use the averaged methods of CVP analysis presented above.

Conducting a CVP analysis is not limited to the calculation of the break-even point. Its continuation is an operational analysis, in the process of which the change in profit is considered as a function of the following factors: variable and fixed costs, the price of products (works, services), the volume and range of products sold. The main goal of such an analysis in modern conditions is to find answers to the question: what will happen to financial results if the specified factors are changed. O. Klementieva and O. Zolotaryov [3] paid a lot of attention to this issue in their research. Based on the obtained break-even point with the help of operational analysis, we will try to determine the margin of financial strength and operating leverage for the enterprise under study (Table 10).

Table 10. *Operational analysis in enterprise profitability management*

Indicator	Base value	Change in sales volume (-10%)	Change in fixed costs (+10%)	Change in variable costs (+10%)
1. Sales volume, euros	53,822,718	48,440,446	53,822,718	53,822,718
2. Total wages, euros	11,209,228	10,088,306	11,209,228	12,330,151
3. Total cost of raw materials, euros	32,075,387	28,867,848	32,075,387	35,282,926
4. Total variable costs, euros	43,284,615	38,956,154	43,284,615	47,613,077
5. Marginal profit, euros (p. 1-4)	10,538,103	9,484,292	10,538,103	6,209,641
6. Fixed costs, euros	8,607,000	8,607,000	9,467,700	8,607,000
7. Break-even point, euro (p. 6/5*1)	43,959,729	43,959,729	48,355,702	74,602,079
8. Stock of financial strength, euros (p. 1-7)	9,862,989	4,480,717	5,467,016	
9. Margin of financial strength, % (p. 8/1)	18	9	10	
10. Profit, euros (p. 5-6)	1,931,103	877,292	1,070,403	-2,397,359
11. Profitability ratio, % (p. 10/1)	3.59	1.81	1.99	-4.45
12. Operating lever (p. 5/10)	5.46	10.81	9.84	

Source: *built on the basis of the authors' own calculations based on the data in Table 1*

The indicator of the reserve of financial strength reflects the size of a possible decrease in the volume of product sales, which will not lead to a loss. So, under basic conditions, the company can allow a decrease in sales volume by 18%, or by 9,863.0 thousand euros. In this case, it will be in the break-even zone.

To model changes in economic indicators, the enterprise needs to use the indicator of operating leverage,

applying various scenarios of the development of events. The action of the mechanism of operating leverage is based on the fact that the presence of any amount of constant types of them in the composition of operating costs leads to the fact that when the volume of sales of products changes, the amount of profit always changes at an even higher rate. The higher the specific weight of fixed costs in the total amount of costs of the enterprise, the greater the amount of profit changes relative to the rate of change in the volume of sales.

The effect of operating leverage can be observed when the basic conditions change. In our example, indicators were listed when changing such components as the volume of sales, the volume of variable and fixed costs. As you can see, the most critical for the enterprise is the increase in variable costs - under such conditions, the enterprise receives a loss, and the break-even point increases almost twice compared to the basic conditions. This indicates the expediency of managing variable costs to a greater extent than fixed costs, because with a 10% increase in fixed costs, according to our calculations, the company usually loses part of the profit, but this is the most acceptable option of all those mentioned. When the sales volume decreases by 10%, the company suffers a loss of profit due to the fact that the volume of marginal profit has decreased compared to fixed costs – the operating leverage under such conditions doubles. With the help of operational analysis, it is also possible to monitor the combinations of variable and fixed costs, sales price and volume of products sold that are adequate for the enterprise. After all, in some cases it is better to reduce the price of the product to increase sales volumes, and in others to increase individual items of fixed costs, which will ensure high demand [3].

Once again, we have a situation where the operational analysis involves the calculation of indicators based on the total volume of sales, disregarding the conditions of multi-product production, and in particular, it does not take into account the existing structure of production and sales. This fact also makes the results of the analysis conditional, very generalized, so they can only serve as a guide for making further management decisions.

CONCLUSIONS

The practical application of CVP analysis is related to solving a number of operational controlling tasks, namely: operating profit management, demand forecasting, assessment of break-even guarantees. The most important applied value of building a CVP-analysis model is related to the possibility of quantitative assessment of purposeful management of the ratio of fixed and variable costs in order to increase the efficiency of production activities under various trends of the product market situation and stages of the life cycle of the enterprise.

The complexity and peculiarity of the application of CVP analysis in the conditions of multi-product production is that its results are only indicative for making management decisions. The problem lies in the distribution of fixed costs by types of products, which in most cases is quite conditional and may not correspond to reality. However, the implementation of detailed accounting and detailed analysis at the enterprise will ultimately allow to separate all fixed and variable costs, which will increase the level of reliability of the results obtained. At the same time, the practical application of CVP analysis is limited, given the unreality of meeting all its inherent conditions.

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CVP-аналіз в умовах багатопродуктового виробництва як інструмент операційного контролінгу

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Анотація. Актуальні умови успішної діяльності підприємств характеризуються глобалізацією господарської сфери, прискореними темпами науково-технічного прогресу, посиленням інноваційних тенденцій. Тому будь-яка установа при побудові власної стратегії, насамперед прагне до надання умов для тривалої і перспективної діяльності, що можливо досягти лише за рахунок створення сильної конкурентної переваги. Зокрема, визнаним способом перемоги в конкурентній боротьбі є лідерство за витратами. Тому в даний час актуальним питанням є пошук раціонального інструменту організації системи управління витратами. Крім того, конкурентоздатність сучасних підприємств залежить від моделі керування фінансовими потоками. Перевага і лідерство на ринку переходить до організацій, які розрахунком втрат із постійними та змінними складовими мінімізують підприємницькі ризики. Для розрахунку беззбиткового обороту кожного виду продукції використовують CVP-аналіз. Метою роботи було дослідження застосування CPV-аналізу для рішення задач багатопродуктового виробництва і обліку витрат з метою підвищення ефективності виробничої діяльності. У статті було використано метод економічного аналізу, розрахунку точок беззбитковості, порівняння, моделювання. Розкрито особливості CVP-аналізу в умовах багатопродуктового виробництва, проведено порівняння методик його здійснення. Визначено можливості застосування результатів аналізу при прийнятті управлінських рішень в системі операційного контролінгу. Досліджено проблематику розподілу загальних постійних нерозподілених витрат на окремі види продукції різними методами, а також визначення беззбиткового рівня виробництва і реалізації окремих видів продукції на основі середньозваженого маржинального прибутку. Досліджено вплив на прибуток зміни рівня постійних витрат та питомих змінних витрат за допомогою операційного важелю в рамках операційного аналізу на виробничому підприємстві

Ключові слова: CVP-аналіз, змінні витрати, постійні витрати, маржинальний прибуток, точка беззбитковості, операційний аналіз