

Cost Analysis and Reporting the Performances of Companies in the Mining Industry

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Abstract: - The article aims to point out the importance of cost-volume-profit in evaluating and measuring the performance of companies in the mining industry of Romania. Considering the progress of the investigations undertaken in the literature with regard to the implementation of various accounting management methods, the authors of this article demonstrate the usefulness of the cost-volume-profit analysis in monitoring and measuring the performance of companies in the mining industry in Romania and their reporting procedures, and of making clear decisions based on the information provided by it. This paper presents the main tool that was the basis for measuring and reporting performance, namely the cost-volume-profit analysis, as summary document provided by the accounting management. The article ends with the authors' conclusions regarding the advantages and importance of using the cost-volume-profit analysis in the mining industry companies in Romania.

Key-words: Cost-volume-profit analysis, performance, mining industry, indicators, reporting, profit

1. Introduction

In the present context, the management of the companies in the mining industry in Romania is facing problems of internal and external nature. Thus, some of the problems relate to the sales prices which tend to become inflexible, employees are better organized in trade unions or cartels and want higher salaries, while, on the other hand, the State increases taxes, imposing new rules.

Starting from this situation, managers must find a much clearer possibility of controlling costs, in

order to reduce them through more efficient operations and obtain constant benefits. In order to meet these objectives, information on costs must be collected, processed, analyzed and provided to end users-managers, in a very short period of time.

Based on the obtained data statements of cost analysis shall be drawn up, along with comparisons of the planned performances to those achieved through cost control. Managers must have at their disposal all the information necessary for effective decisions concerning the current events and the future implications on the company they are

running. Within the mining industry companies in Romania applying accounting management, there is not yet a set of consolidated official accounting statements showing their internal financial situation. For this reason, the main goal of the article is to show the importance of analyzing the cost-volume-profit analysis in evaluating and measuring the performance of companies in the mining industry by applying the specific principles of the Direct Costing method.

2. Literature review

Cost is the main component in the profit planning activities and the determination of the business plan by helping specialists to understand the relationship between cost, volume and profit and the management to decide on the optimal level of operational activity of the company.

Explanation the relationship between costs, volume and profit has been studied by numerous specialists [8] who showed its usefulness in determining the optimal level and mix of outputs, to be achieved with available resources and proving its efficiency in decision-making in the short term on the outputs of products. Other authors [6] explained the above mentioned relationship as a means to allow the management to decide whether to produce or buy, whether to continue or not the development of a specific product, or whether to enhance the achievement of a certain type of product, by supplementation of new lines of products demanded by the market. The relationship cost-volume-profit has been analyzed under uncertainty conditions [11]. This approach is based on economic models suggested in the case of a decision of a company's optimal outputs under uncertainty conditions, which have been modified using an average standard deviation to provide a cost-volume-utility analysis type, allowing the management to determine the optimal output, considering the desirability of alternate plans, involving changes in both fixed costs and variable costs, the estimated price and its uncertainty, as well as technological changes, causing the economic consequences of fixed costs variations.

Another model of the cost-volume-profit relation [10] takes into account the essential elements of random demands and the level of production for determining the current income and the profits to be made. This model considers the above-mentioned relationship with realism, setting itself free from the basic shortcoming of the traditional model, allowing the management to choose the best products from a range of alternative products and determine the optimum production levels according

to the company's goals and objectives. Cost-benefit analysis [2], [3] is used to make a change or not, and it involves adding the value of benefits in the course of action, lowering the costs. One of the most important indicators used in cost-benefit analysis is the net rate of return [9], determined as the difference between the total amount of benefits and the total costs.

Cost-volume-profit analysis is based on research and analysis of the breakeven point, the relationship between product prices, volume of activity, unit variable cost, total fixed costs, balance mixed production, planning and decision making by the management of the company [1].

Cost-volume-profit analysis is particularly useful in making forecasts and as a tool for managerial control [4]. The method includes a set of techniques for solving problems based on understanding the characteristics of patterns of development costs of a company. This techniques express the relationship between turnover, cost structure and production volume, including results and include the determination of the breakeven point, profit forecasting, providing a general model of economic activity that can be used by managers in optimizing profit in short-term decisions, and the analysis of alternatives in decision making [5].

In order to achieve the objectives set out by the strategy, a performance analysis system is necessary in the decisional subsystem. The building of such a subsystem and the solving of the problems arising from the relationship between the subsystems - identifying components, highlighting the pertinent information enabling an operational and decision-making subsystem to achieve objectives - may be favored by the use of company performance monitoring and reporting.

Reporting is a tool commonly used in worldwide companies is considered a tool for monitoring and reporting performance. This management tool expressed in figures, aims only financial indicators is focused on budget control, calculation and analysis of deviations. Through its informational content, this tool provides managers of companies in the extractive mining industry information rich financially. This control tool is post-factual in nature, through it being reported what has been achieved vis-a-vis what was projected through expenses budget at the company level, basically is a correlation between what has been achieved and what was expected from an accounting perspective. Follows the fundamental characteristic of reporting, namely that is based on a management accounting system adapted to the company's structure, so that each responsible person can only view the aspects

for which he is directly responsible. Thus, we can say that reporting is based on three concepts, namely [7]:

- the structure of the economic company, under this concept, experts believe that the economic companies in the mining field should undergo to a process of decentralization in terms of decision making, as one man - director of mining company can not have all the information needed to make optimal decisions;
- Setting targets refers to the fact that reporting is one that measures the extent to which the objectives have been established and made known to the director of mining company in order to fulfill them;
- Controllability, where each responsible person is controlled only in the level of income and expenses incurred/obtained in its area of responsibility.

3. Research methodology

3.1. Data presentation

Our research is focused on the theoretical and practical approach of the implications arising from the cost-volume-profit analysis in evaluating and measuring the performances of companies in the mining industry of Romania. In this respect, the questionnaire was used as a research tool and two major categories of respondents were considered: managers and directors of specialized departments. The sample of the study has been extended to a number of 1421 respondents from seven mining companies of Romania, according to categories. The centralized situation of the questions and the answers given by the two categories under analysis are listed below (table 1).

Table 1. The situation of the respondent categories

Questions	Categories of respondents			
	Directors of specialized departments		Managers of companies	
	Pro	Cons	Pro	Cons
(1) Is the analysis of cost-volume-profit an effective tool for evaluating and measuring the performance of companies in the mining industry?	1101	306	12	2
(2) Is the information provided by the cost-volume-profit analysis relevant for the decision making by the management of the companies in the mining industry?	1189	218	13	1

As one can see, 1101 directors of departments (78.25%) and 12 managers of companies (85.71%) believe that a cost-volume-profit analysis is an effective tool for evaluating and measuring the performance of companies in the mining industry, and 1189 department directors (84.50%) and 13 company managers (92.85%) agree that the information provided by the of cost-volume-profit analysis is relevant for the decision making by the management of the companies in the mining industry.

3.2. Presentation of indicators

In order to obtain optimal results, a company in the mining industry must make the best decisions, which requires the existence of an effective management, both on the company level and on the level of each specialized department. For the realization of this fact, it must be considered that, the fixed costs and the variable costs are in correlation with the permanent volume of extracted coal, with the price per ton of coal paid by the various beneficiaries and with the degree of use of the production capacity for each mining operation. This correlation can be expressed using the following indicators: the break-even point, the coating, the coefficient of dynamic safety and range safety.

The break-even point shows that coal production scale at which total expenditures are equal to the revenues obtained from the sale of coal production at the beneficiary. Thus, the level of unit labor costs and profitability rate size are in close dependency ratio established between coal extraction volume, and total production expenses relating thereto. According to their variation from the production volume, production costs are grouped into fixed costs and variable costs (conventional-constant).

If variable costs are constant in size per ton of coal extracted (their amount increases in direct proportion to the volume of coal extraction), the fixed costs are constant per ton of coal. In this context, the link between the amount of expenditure and the amount of coal to be extracted, so that revenues obtained from the sale of coal production to cover all costs of the extraction of the coal production. Thus, the break-even point called the breakeven threshold, marks the size of production at which the total costs are equal to the revenues from the sale of production, and the result is null. To determine the break-even point for the coal mining companies, the data taken from the accounting management have been subjected to sorting and processing, as follows:

-variable costs have been identified directly and include: direct material costs, direct wages and salaries, other direct expenditures;

-fixed costs have been identified during a first stage on jobs, spending, and were delineated into two categories: fixed costs of production and fixed costs of administration (administrative staff salaries, depreciation, buildings insurance premiums, stationery office, and protocol);

-the delimitation of the indirect costs was performed using the extreme-points procedure (points of maximum and minimum), so splitting them into: fixed costs and variable costs.

The activity becomes profitable after the breakeven point. Up to this level of production, the company registers losses; the break-even point represents the point at which the revenues of the production obtained and sold cover entirely the variable costs incurred in production and the fixed costs of the period, so the company does not get either profit or loss. It shows the point at which any increase in the volume of the production obtained and sold brings profit, while the activity becomes profitable, whereas any decrease in the sales volume of the company brings losses, and its activity becomes inefficient, of course, respecting the correlation between costs, sales prices and production assortment.

The breakeven point can be calculated at the level of the mining operation, the place of expenditure or cost centre-production sector, at the level of product groups and even for each product. On its basis, the concerned structures can determine the influence of changes in costs, variable costs and fixed costs, selling prices and sales volume on profit. The breakeven point can be determined either by arithmetic or by graphic processing, both during the planning stage and during the post calculation stage.

Arithmetically, the breakeven point (Bp) is calculated as the ratio between the total of the fixed costs and gross profit per unit contribution. The result obtained is the amount of production that the mining company must achieve and sell in order for the revenues to cover the costs associated with variable costs and fixed costs, so that the total result should be equal to zero. The model for calculating the breakeven point is as follows:

$$Bp = \frac{\text{Total of fixed costs}}{\text{Gross profit per unit contribution}} \quad (1)$$

Another indicator that can be calculated is the dynamic safety coefficient (DSC), which shows how much the relative sales can decrease (in

percentage) so that the mining company or sector may reach the breakeven point. Any decrease beyond the level of this coefficient leads the mining company in the area of losses, for which all the decisions to reduce the sales limit of the dynamic safety coefficient. The size of the coefficient is calculated using the formula:

$$DSC = \frac{\text{Profit}}{\text{Gross contribution}} \times 100 \quad (2)$$

Another important indicator is the coverage factor (CF), which shows in percentage the extent to which a product can help cover the expenses and obtain profit. It also constitutes a point of orientation in choosing the future mix range. Since coal is the sole product of the mining exploitation, the coverage factor is calculated as follows:

$$CF = \frac{\text{Gross contribution}}{\text{Turnover}} \times 100 \quad (3)$$

The security interval (Si) shows in absolute numbers how much the sales can go down without letting the company get into the losses area and can be determined as follows:

$$Si = \text{Turnover} \times DSC \quad (4)$$

3.3. Data analysis

In September 2014, a mining company extracted and sold 44603 tonnes of hard coal, for an average sales price of 264.10 lei/tonne. The initial centralized situation of the turnover, expenses and result (table 2) is presented below.

Table 2. Initial centralized situation of the turnover, expenses and profit

Explanations	Quantity	Price per unit / Cost per unit	Total (lei)
Turnover	44603	264.1	11779652
Variable production costs	44603	110	4906330
Variable sales costs	44603	108	4817124
Total variable costs	-	-	9723454
Gross contribution	-	-	2056198
Fixed production costs	-	-	320000
Fixed administrative costs	-	-	280000
Fixed sales costs	-	-	150000
Fixed total costs	-	-	750000
Result	-	-	1306198

The calculations provide the following information (table 3) regarding the four indicators:

Table 3. Situation of the indicators in the cost-volume-profit analysis

Indicators	
1. Breakeven point	16268984 tonnes
2. Security coefficient	63.52%
3. Coverage factor	17.45%
4. Security interval	7483013.73 lei

The company aimed to highlight its performances in the following three structures of alternative costs:

1. The variable production costs and the fixed production costs grow by 10%;
2. The variable total costs grow by 10% and the fixed total costs grow by 5%;
3. The physical production volume grows by 10%, the variable total costs grow by 10% and the fixed total costs go down by 20%.

Thus, the following data are obtained:

Table 4. Situation of the result: case 1

Explanations	Quantity	Price per unit/ Cost per unit	Total (lei)
Turnover	44603	264.1	11779652
Variable production costs	44603	121	5396963
Variable sales costs	44603	108	4817124
Total variable costs	-	-	10214087
Gross contribution	-	-	1565565
Fixed production costs	-	-	352000
Fixed administrative costs	-	-	280000
Fixed sales costs	-	-	150000
Fixed total costs	-	-	782000
Result	-	-	783565

Table 5. Situation of the result: case 2

Explanations	Quantity	Price per unit/ Cost per unit	Total (lei)
Turnover	44603	264.1	11779652
Variable production costs	44603	121	5396963
Variable sales costs	44603	118.8	5298836
Total variable costs	-	-	10695799
Gross contribution	-	-	1083853
Fixed production costs	-	-	336000
Fixed administrative costs	-	-	294000
Fixed sales costs	-	-	157500
Fixed total costs	-	-	787500
Result	-	-	296353

Table 6. Situation of the result: case 3

Explanation	Quantity	Price per unit/ Cost per unit	Total (lei)
Turnover	49063	264.1	12957618
Variable production costs	49063	121	5936659
Variable sales costs	49063	129.6	6358604

Total variable costs	-	-	12295263
Gross contribution	-	-	662355
Fixed production costs	-	-	256000
Fixed administrative costs	-	-	224000
Fixed sales costs	-	-	120000
Fixed total costs	-	-	600000
Result	-	-	62355

3.4. Data interpretation

According to Table 3, the mining company should extract and sell during the respective period 16268.984 tonnes to fully meet its expenses and revenues, so that the profit may be zero. Any production increase over the optimum will lead to a supplementary profit over the one programmed according to the budget but also to the creation of certain problems regarding the assurance of the sales for this production, and similarly any diminution of the production under the optimal quantity will lead to the diminution of the profit, and so to the non-accomplishment of the provisions from the budget regarding the programmed profit, and of the contractual obligations in point of sales, with all the consequences deriving from it.

According to the dynamic security coefficient, the coal sales to the beneficiary need to grow by 63.52% in order not to get into the losses area. Using this calculation, one can find the real contributive margins (CB), which can lead to the making of adequate decisions by the leadership of the mining company. The security interval is situated at 7483013.73 lei, corresponding to the percentage obtained for the security coefficient. According to the data, the coverage factor is 17.45%, which means that this percentage covers the expenses and brings profit to the company.

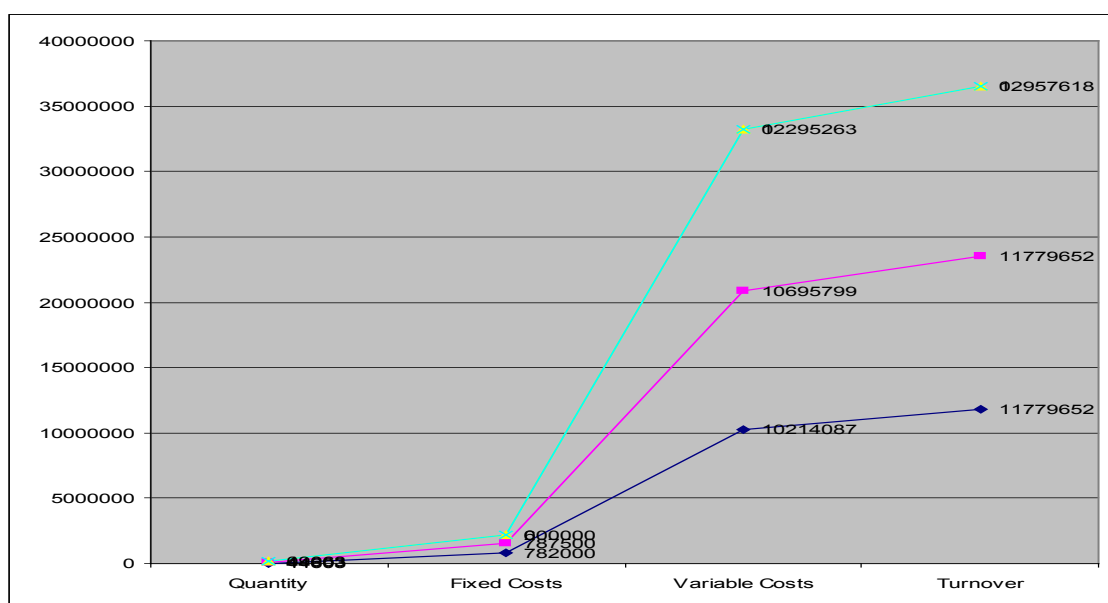
According to Table 4, one can observe, in the case of the growth of the variable production costs and of the fixed production costs by 10%, a decrease of the result, compared to the initial situation, to 783565 lei.

According to Table 5, one can notice, in the case of the increase of the total variable costs by 10% and of the total fixed costs by 5%, a decrease, compared to the initial situation, to 296353 lei.

According to Table 6, one can notice, in the case of the increase of the physical volume of the production by 10%, of the total variable costs by 10% and of the decrease of the total fixed costs by 20%, a much more clear decrease of the result, to 62355 lei.

Graphically, the situation of the quantities, total costs and results appears as follows (Graph 1):

Graph 1. Situation of the quantities, costs and results for the three situations



5. Conclusions

The cost-volume-profit analysis has been used to find the most profitable combination for the variable costs, fixed costs, sales price and sales volume. Profits can sometimes be improved through the reduction of the contribution margins if the fixed costs can be reduced by a larger sum (case 3). Just like any other analysis method, the cost-volume-profit analysis relies on sure presuppositions that may limit the applicability of the results when it comes to managerial decision making. These limitations are triggered by the presuppositions made by the specialist in the analysis of the costs. In other words, the specialist should provide to the manager sure data that can be correctly interpreted by the manager in his decision making.

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