Cost - Volume - Profit Analysis – An Instrument of Managerial Control of the Economic Entities in the Extractive Industry

Răscolean Ilie
Rakos Ileana-Sorina
University of Petroşani
ilierascolean@yahoo.com
nihilsinedeo_68@yahoo.com

Abstract

This study intends to demonstrate that the cost-volume-profit analysis is based on the analysis of the balance point, of the relations between the prices of goods, the activity's volume, the unit variable cost, the total fixed costs, the balance of the mixed production, the managerial planning and the decision making is actually a financial model which highlights the changes occurred in the profit size as a consequence of the amendment of the sold volume of good, of the selling price and of the manufacturing costs. The case study was conducted in Mol Romania, an economic entity with integrated activity on oil and natural gas. The CPV relation offers a general model of the economic activity.The study ends up with conclusions in what concerns the advantages offered by the analysis which can be made on the basis of the cost-volume-profit relation and that can be implemented in the decision making process.

Key words: variable costs, fixed costs, cost-volume-profit, economic entity, breakeven level
J.E.L. classification: M21

1. Introduction

Earth's natural resources have been the base of the economic development of the society in the last century. It is extremely difficult to estimate exactly which are the primary resources reserves existing in the world and when exactly they will run short, but the tendency is very clear: we are heading toward a great global energy crisis!!!

In what concerns Romania, all the existing information sources referring to the exhaustible energy resources acknowledge the fact that our country has limited resources of oil and natural gas.

Perhaps the future of the Romanian extractive industry depends in a high degree also on the research sector, but the privatisation of a great number of research-designing institutes activating in the field of the useful mineral resources and the change of the purpose of the land and buildings in question generated today situation that is characterized by the very little influence of present research sector, this facts determining us to consider that the recommencement of it on all the national economy levels is of high importance.

2. Specialized literature

Direct-costing method is a cost calculation method applied by taking into account the advantages and disadvantages offered by its implementation in various fields of activity or branches of the economy of a nation. According to the Romanian researchers Mr. Budugan and Mr. Georgescu (2008, pp.3-8) "the analysis cost-volume-profit is very useful in the prognosis work, being a managerial control instrument that highlights the relations between costs, production amount (volume) and profit".

3. Research methodology

The consultations (talks) with the staff in the accountancy department highlighted the fact that the optimal method of cost calculation in the given market situation is the direct-costing method. This method includes a set of techniques intended for solving certain issues based on understanding the cost evolution model characteristics of an economic entity, therefore we illustrate this analysis (CVP) with a case study on Mol Romania Holding. We will answer to the following questions in this case study: *1.Which is the most simple, viable and efficient method of cost calculation that will help Mol Romania in profit optimization in the actual global market economy conditions? 2. Which are the advantages of the identified method?*

4. Cost-volume-profit analysis - general aspects

Hereunder we succinctly present some aspects related to the Direct-Costing method of costs calculation in what concerns its axiology and index numbers. This method's essence resides in the separation of the manufacturing and distribution expenses related to their character in what concerns the manufacturing and distribution physical amount variation, in variable and fixed costs, while considering for the unit cost of a manufactured article only the variable expenses. Getting to know the breakeven level or the balance point, this helps us to determine the starting point from which an economic entity gains profit and covers its fixed and variable costs.

5. Profit optimization process by using the instruments for evaluation of economic entity's performance

Mol Romania is a company with an integrated activity activating in the field of oil and natural gas industry, focused on the following sectors: Exploration and Production (E&P), Gas and Energy (G&E), Refining and Marketing (R&M). Because the sector R&M has the biggest share in the consolidated incomes of the company, the case study was made in this sector. In the next place we present the global statement of the incomes and expenditures for the three sectors of the Mol Romania Holding (E&P, G&E, R&M) (See Table 1).

Table no.1. Global statement of the incomes and expenditures for the three sectors

Specification	2016	2017 (first 10 months)	Δ%
Sales incomes	24.185,00	21.541,00	-11
Distribution direct expenditures	-646,00	-480,00	-26
Sales cost	-15.485,00	-15.815,00	2
Other exploitation incomes	298,00	316,00	6
Administrative and distribution expenses	-1.284,00	-1.267,00	-1
Operating expenses	-423,00	-156,00	-63
Other operating expenses	-687,00	-801,00	17
Profit before interest and taxes (EBIT)	5.958,00	3.338,00	-44
Net financial outcome	-259,00	-429,00	66
Corporate tax expenses	-875,00	-810,00	-7
Net profit	4.824,00	2.100,00	-56
Minus profit net /(loss) assigned to the private stockholders	3,00	-3,00	-
Net profit assigned to the majority stockholders	4.821,00	2.103,00	-56

Source: Own projection based on the Annual Report of Mol Romania

In order to highlight the profit optimization process in the conditions of the present-day global market, we will bring forward the situation of the two cases which are usually encountered in the current practice of the economic entities that are activating in the oil extractive industry sector (See Table 2).

Table no. 2. Initial Report of the Mol Romania Holding in R&M sector from Romania

- Thousand lei -

No crt.	Explanations	Gasoline	Diesel oil	Kerosene	Black oil	Total
1.	Sales volume (qv) thousand tons	838	2.085	245	71	3.239
2.	Unit price (p) thousand lei/ton	3	3	3	1	12
3.	Turnover (CA) thousand lei	3.114.008	7.260.603	823.350	115.128	11.313.090
4.	Fixed expenses (Cf) mii lei	1.665.247	3.882.353	440.258	61.560	6.049.420
5.	Variable expenses (Cv) thousand lei	1.463.707	3.412.483	386.974	54.110	5.317.276
6.	Unit variable expenses (v) thousand lei/ton	1	1	1	0,762	5
7.	Critical volume (qcritic) thousand tons	845	2.103	247	71	3.267
8.	Critical CA thousand lei	3.142.211	7.325.195	830.675	116.152	11.414.235
9.	Safety margin (Ms) thousand tons	-7	-18	-2	- 0,632	-28
10.	Safety margin (Ms) thousand lei	-28.203	-64.592	-7.324	- 1.024	-101.144
11.	Safety range (Is) %	-0,001	-0,001	-0,001	-0,001	- 0,004
12.	Efficiency gain (Se) %	-0,001	-0,001	-0,001	-0,001	- 0,004
13.	Profit /loss thousand lei	-14.946	-34.233	-3.882	-542	-53.605

Source: Own projection based on the Annual Report of Mol Romania

The two cases are as follows:

1. The variable manufacturing costs grow by 10% and the fixed manufacturing costs raise by 5%.
2. The goods sale prices grow by 10%, the total fixed costs raise by 10%, the manufacturing variable costs decrease by 5%, and also the volume of goods decrease by 10%.

Starting from the initial situation, the changes requested by the above mentioned cases were determined as follows:

Case 1. The variable manufacturing costs grow by 10% and the fixed manufacturing costs raise by 5%. (See Table 3).

Table no. 3. The situation of the incomes, costs and the outcome generated by Case 1

No crt.	Explanations	Gasoline	Diesel oil	Kerosene	Black oil	Total
1	Sales volume (qv) thousand tons	838	2.085	245	71	3.239
2	Unit price (p) thousand lei/ton	3	3	3	1	12
3	Turnover (CA) thousand lei	3.114.008	7.260.603	823.350	115.128	11.313.090
4	Fixed expenses (Cf) mii lei	1.748.509	4.076.471	462.271	64.638	6.351.891
5	Variable expenses (Cv) thousand lei	1.610.078	3.753.732	425.672	59.521	5.849.003
6	Unit variable expenses (v) thousand lei/ton	1	1	1	0,838	6
7	Critical volume (qcritic) thousand tons	974	2.423	284	82	3.765
8	Critical CA thousand lei	3.620.430	8.439.899	957.082	133.827	13.151.240
9	Safety margin (Ms) thousand tons	-136	-338	-39	-11	-526
10	Safety margin (Ms) thousand lei	-506.422	-1.179.295	-133.731	-18.699	-1.838.150
11	Safety range (Is) %	- 0,014	- 0,014	- 0,014	- 0,014	- 0,014
12	Efficiency gain (Se) %	- 0,016	- 0,016	- 0,016	- 0,016	- 0,014
13	Profit /loss thousand lei	-244.580	-569.599	-64.592	-9.031	-887.804

Source: Own projection based on the Annual Report

Case 2. The goods sale prices grow by 10%, the total fixed costs raise by 10%, the manufacturing variable costs decrease by 5%, and also the volume of goods decrease by 10%. (See Table 4).

Table no.4. The situation of the incomes, costs and the outcome generated by Case 2

No crt.	Explanations	Gasoline	Diesel oil	Kerosene	Black oil	Total
1	Sales volume (qv) thousand tons	754	1.876	220	63	2.915
2	Unit price (p) thousand lei/ton	4	3	3	1	13
3	Turnover (CA) thousand lei	3.082.867	7.187.997	815.117	113.976	11.199.959
4	Fixed expenses (Cf) mii lei	1.831.772	4.270.589	484.283	67.716	6.654.362
5	Variable expenses (Cv) thousand lei	1.390.522	3.241.859	367.626	51.404	5.051.412
6	Unit variable expenses (v) thousand lei/ton	1	1	1	0,804	6
7	Critical volume (qcritic) thousand tons	816	2.030	238	69	3.154
8	Critical CA thousand lei	3.336.854	7.778.994	882.136	123.347	12.121.332
9	Safety margin (Ms) thousand tons	-62	-154	-18	-5	-239
10	Safety margin (Ms) thousand lei	-253.986	-590.996	-67.018	-9.371	-921.373
11	Safety range (Is) %	-0,008	-0,008	-0,008	-0,008	-0,008
12	Efficiency gain (Se) %	-0,008	-0,008	-0,008	-0,008	-0,008
13	Profit /loss thousand lei	-139.426	-324.451	-36.792	-5.144	-505.814

Source: Own projection based on the Annual Report

Observations based on the presented and analysed cases

In order to highlight the evolution of prices, costs and production physical volume based on the four studied cases we present below the evolution of incomes, costs and outcome for each of the analysed cases (See tables 5, 6,7 and 8).

Table no.5. The evolution of the incomes, costs and outcome based on the test of the four cases for gasoline *- Thousand lei -*

No crt.	Explanations	Case 1	Case 2
		Gasoline	Gasoline
1	Turnover (CA)	3.114.008	3.082.867
2	Fixed expenses (Cf)	1.748.509	1.831.772
3	Variable expenses (Cv)	1.390.522	1.390.522
4	Critical CA	3.620.430	3.336.854
5	Profit /loss	-244.580	-139.426

Source: Own projection based on the Annual Report

Table 6. The evolution of the incomes, costs and outcome based on the test of the four cases for Diesel oil
- Thousand lei -

No crt.	Explanations	Case 1	Case 2
		Diesel oil	Diesel oil
1	Turnover (CA)	7.260	7.187
2	Fixed expenses (Cf)	4.076	4.270
3	Variable expenses (Cv)	3.241	3.241
4	Critical CA	8.439	7.778
5	Profit /loss	-569	-324

Source: Own projection based on the Annual Report

Table 7. The evolution of the incomes, costs and outcome based on the test of the four cases for kerosene
- Thousand lei -

No crt.	Explanations	Case 1	Case 2
		Kerosene	Kerosene
1	Turnover (CA)	823.350.920	815.117.411
2	Fixed expenses (Cf)	462.271.000	484.283.905
3	Variable expenses (Cv)	367.626.185	367.626.185
4	Critical CA	957.082.814	882.136.274
5	Profit /loss	-64.592.505	-36.792.679

Source: Own projection based on the Annual Report

Table no.8. The evolution of the incomes, costs and outcome based on the test of the four cases for black oil
- Thousand lei -

No crt.	Explanations	Case 1	Case 2
		Black oil	Black oil
1	Turnover (CA)	115.128.062	113.976.781
2	Fixed expenses (Cf)	64.638.737	67.716.772
3	Variable expenses (Cv)	51.404.680	51.404.680
4	Critical CA	133.827.613	123.347.938
5	Profit /loss	-9.031.883	-5.144.670

Source: Own projection based on the Annual Report

We can observe a significant growth of the outcome in Case 3 when we study the centralised situation of the four products (See Table 9).

Table no.9. Centralised situation of the case studies 1-2 for the R&M sector

No crt.	Explanations	Initial data	Case 1	Case 2
1	Sales volume (qv) thousand tons	3.239	3.239	2.915
2	Unit price (p) thousand lei/ton	12	12	13
3	Turnover (CA) thousand lei	11.313.090	11.313.090	11.199.959
4	Fixed expenses (Cf) mii lei	6.049.420	6.351.891	6.654.362
5	Variable expenses (Cv) thousand lei	5.317.276	5.849.003	5.051.412
6	Unit variable expenses (v) thousand lei/ton	5	6	6
7	Critical volume (qcritic) thousand tons	3.267	3.765	3.154
8	Critical CA thousand lei	11.414.235	13.151.240	12.121.332
9	Safety margin (Ms) thousand tons	-28	-526	-239
10	Safety margin (Ms) thousand lei	-101.144	-1.838.150	-921.373
11	Safety range (Is) %	-0,001	-0,014	-0,008
12	Efficiency gain (Se) %	-0,001	-0,016	-0,008
13	Profit /loss thousand lei	-53.605.710	-887.804.354	-505.814.818

Source: Own projection based on the Annual Report

Because it is considered to be an ideal case of profit optimization, we used it in the calculation of the specific indicators of the Direct-Costing method and we prepared the scoreboard based on the given data. We can draw the following general observations based on the presented and analysed above case studies (case 1 to 2): The manufacturing variable costs grow by 10% and the manufacturing fixed costs grow by 5%.

The percentage controlled growth (a certain percent) of the manufacturing variable costs and of the fixed costs determines the following: the growth of balance point; the decrease of the coverage factor; the decrease of the dynamic safety coefficient; the decrease of the profit.

The rise of the selling prices of the goods by 10%, the growth of the total fixed costs by 10%, the decrease of the manufacturing variable costs by 5% and the decrease of the goods volume by 10% take place.

The rise of the selling prices of the goods, the growth of the total fixed costs, the decrease of the variable costs and the decrease of the goods volume generates the following: the growth of balance point; the decrease of the coverage factor; the decrease of the safety coefficient and of the safety range; the decrease of the profit.

6. Conclusions

By using the cost-volume-profit method we consider that this can be a performance managerial system for the economic entities in this field of activity. After the issuing of the Accountancy Law no 82/1991, the management accounting remained in a "shadowed place" (Dumitru & Calu, 2008), because managers and accountants had considered that its implementation is not mandatory, this being the reason that neither the specialized literature had given too much significance to this aspect. In an uncertain and highly competitive environment, the economic entities stay competitive only if they have an adequate management of the managers' knowledge meant to plan, analyse and control the internal activities and processes, in order to issue short, medium and/or long term strategies and to manage the sources in a highly efficient manner, being able to eliminate those activities which do not add value to the company.

Using an integrated cost management system managers have the possibility to integrate the cost calculation and analysis in the strategic activity of the economic entity, in order to create a sustainable competitive advantage, contributing this way not only to the decision making in what concerns the goods portfolio, but also to a set of micro-decisions that lead progressively to the change of the economic entity's position, meant to make the entity competitive on an international and national level.

7. References

- Briciu S., Căpuşneanu S., Rof L.M., Topor D., (2010) *Accountancy and management control*, Editura Aeternitas, Alba Iulia, p.335;
- Budugan D., Georgescu I. (2008), *Use of the cost-volume-profit analysis to estimate earnings,* Analele Ştiinţifice ale Universităţii "Alexandru Ioan Cuza" din Iaşi - Ştiinţe Economice, vol. 55, pp.3-8;
- Burja V., Todea, T., Burja, C., (2003*), Financial analysis and evaluation of the company,* Editura Risoprint, Cluj-Napoca, p.7;
- Călin O., Man M., Nedelcu M.V., (2008), *Management accountancy,* Editura Didactică şi Pedagogică, Bucureşti, p.31; p.87; p.98; pp.109-112; p.115;
- Căpuşneanu S., (2008), "*Elemente de management al costurilor",* Editura Economică, Bucureşti, p.180; p.186; pp.198-202;
- Dumitru C.D., Ioanăş C., (2005), *Management accountancy and performance evaluation,* Editura Universitară, Bucureşti, p.349;
- Horngren C.T., Datar S.M., Foster G., (2006), *Cost accountancy, a managerial approach,*Editura ARC, Ediţia a XI-a; P.168; p.201
- Man M., (2008), *Rationing of the managerial accountancy*, Editura Arves, Craiova, pp.21-29; pp. 29-35; p.32; p.39; p.67; p.76;
- Man M. (2007), *Management accountancy and cost calculation,* Ed. Scrisul Românesc, Craiova, p.15; pp.45-48;
- Man Mariana, Rakos Ileana-Sorina, Cost-Based Budgeting - A Relevant Instrument for the Improvement of Mining Companies' Performances Proceedings of The 25th IBIMA Conference; 7-8, May 2015, Amsterdam, Netherlands, pp.2444 – 2458; ISBN: 978-0-9860419-4-5;
- Niculescu, M, Vasile N. (2011), *Epistemology. Interdisciplinary perspective,* Editura Bibliotheca, Târgovişte, p.59; pp.61-62; p71; p.108;
- Răscolean I., Dura, C., Isac, C.(2008), *The Grounds of the Decision of Financing a Company*, Annals of the University of Petroşani, vol VIII, part II, Universitas Publishing House, Petroşani, pp. 135-147;
- Tabără N., (2004), *Accountancy and management control. Studies and researches,* Editura Tipo Moldova, Iaşi, p.31;
- Tabără N., Briciu S., ş.a., (2012, *Facts and perspectives in accountancy and management control,* m Editura Tipo Moldova, Iaşi, P. 12; p.50;
- Tabără N., (2004), *Accountancy and management control. Studies and researches*, Editura Tipo Moldova, Iaşi, 2004, p.71.