

FACTOR ANALYSIS OF FIRM-LEVEL PROFIT

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Abstract : *The purpose of this article is to carry out factor analysis of profit at the firm level, in particular by following the main indicators that act directly on it, namely: factor analysis of gross profit for the year, factor analysis of operating profit and factor analysis of profit related to turnover. The company's profit reflects the company's efficiency, liquidity and solvency. Profit acts as an indicator, responding to any changes in the external environment and within the company, so it is important to be able to analyse this indicator, correctly assessing the degree of impact of all criteria. Given the main objective of an economic entity's activity, namely to make a profit, which is the reason for the establishment of an entity, the value of profit is of great importance for any entity, regardless of its activity, we conducted a case study related to profit in an economic entity.*

Key words: *factorial analysis, gross result, exploitation result, profit, turnover.*

J.E.L. Classification: *M41.*

1. Introduction

„In the contemporary economic theory there is a division of opinions regarding the definition of profit, which represents: the advantage obtained in monetary form from an action, operation or economic activity.

Economic agents must have information on the size and profitability of the business, information captured by the two key indicators: the profit mass and rate” (Iosif, 2000, p.338).

2. Profit analysis. Theoretical aspects

“The profit margin is the absolute amount obtained as the difference between revenue and costs or, at product level, the difference between the selling price and the cost. This indicator thus represents the positive financial result that expresses the efficiency of the productive activity of an economic entity.

The profit rate is the percentile ratio of profit and turnover (cost or capital) depending on the basis of comparison we choose. A final or residual element of the difference between total income and costs; implicit remuneration of production factors.

The condition for earning a maximum profit is that the marginal yield of each factor equals its price. In addition, the sufficient profit maximization condition is that, at optimal, the marginal yields of the factors are decreasing.

A general, systemic diagnosis of the entity's profitability situation requires an analysis based on the following system of indicators: the net profit of the entity's total economic and financial activity; the gross profit of the entity's total economic and financial activity; the gross profit on the three types of activities; gross profit on organizational structures (by profit centers); gross profit on various products.

Based on this system of indicators, the areas of activity, the organizational structures and the products where there was an unfavorable profit dynamics can be identified or, although favorable, still do not meet the level of competitiveness demanded by the internal and external market in terms of profitability in that branch” (Iosif, 2000, p.338).

Profit analysis also needs to be made on the basis of endogenous and exogenous factors acting on the entity level. Taking into account the variety of forms under which the entity profit is presented, its factorial analysis can be broadened considering the following output categories: the gross result of the exercise; the result of exploitation; the result of turnover.

3. Factorial analysis of the gross result of the financial period

The gross result of the financial year (Rb) is determined as the difference between total revenue and total expenditure thus:

$$\overline{prb} = \frac{\sum y_i \times prb_i}{100}$$

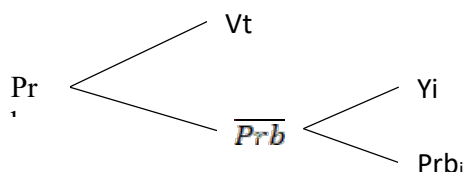
where:

\overline{prb} - represents the gross average result (profit) per 1 leu of total income;

y_i - total revenue structure by activity category;

prb_i - the gross profit per 1 leu income per category of activity.

The system of factors is acting on gross profit, so it is presented:



Measurement of factor influence is achieved using the chain substitution method.

3.1. Factorial analysis of the exploitation result

The result of the (Re) exploitation is circumscribed on the level of the entity's core activity and characterizes in absolute terms the profitability of the exploitation cycle. It is determined that the difference between operating income (Ve) and related expenses (Ce) as follows:

$$Re = Ve - Ce$$

The factorial analysis of the result of the exploitation may be performed on the basis of the following models:

$$a) Ve \left(1 - \frac{Ce}{Ve}\right) = Ve \times \overline{pre}$$

where:

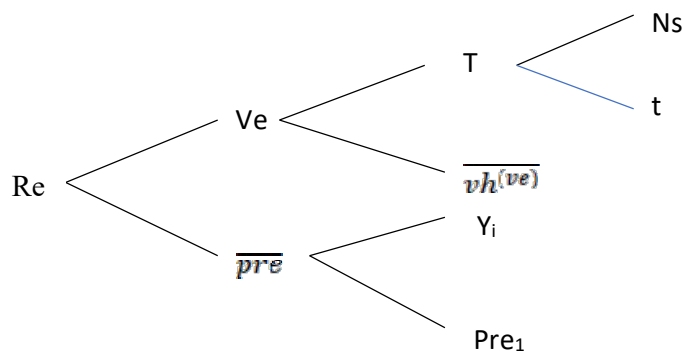
$$\overline{prb} = \frac{\sum y_i \times prb_i}{100},$$

$$pre_i = 1 - \frac{Ce_i}{Ve_i}$$

$$b) Re = \overline{Ns} \times \frac{\overline{Mf}}{\overline{Ns}} \times \frac{\overline{Mf}}{\overline{Mf}} \times \frac{Qe}{\overline{Mf}} \times \frac{Ve}{Qe} \times \frac{Re}{Ve}$$

$$c) Re = Ae \times \frac{Ve}{Ae} \times \frac{Re}{Ve}$$

The system of factors is presented for the “x” analysis model:



This model of analysis, although generally valid for all entities, is recommended to be used predominantly by those entities that do not have an important technical and material basis.

The methodology of factorial analysis and quantification of factors influences, respectively:

$$\Delta Re = Re_1 - Re_0$$

in which, due to:

a) the influence of the change in operating income:

$$\Delta Ve = (Ve_1 - Ve_0) \times pre$$

- the influence of the change in the total working time fund

$$\Delta T = (T_1 - T_0) \times \overline{wh} \times \overline{pre_0}$$

- the influence of the change in the average number of employees

$$\Delta \overline{Ns} = (\overline{Ns}_1 - \overline{Ns}_0) \times \overline{t_0} \times \overline{wh_0} \times \overline{pre_0}$$

- the influence of the change in the average number of employees

$$\Delta \overline{t} = \overline{Ns}_1 \times (\overline{t}_1 - \overline{t}_0) \times \overline{wh_0} \times \overline{pre_0}$$

- the influence of average hourly productivity

$$\Delta \overline{wh(ve)} = \overline{T}_1 \times (\overline{wh}_1 - \overline{wh}_0) \times \overline{pre_0}$$

b) the influence of the change of the average profit to 1leu operating income:

$$\Delta \overline{pre} = Ve_1 (\overline{pre}_1 - \overline{pre}_0)$$

- the influence of the structure of operating revenues on types of activities:

$$\Delta y_i = Ve_1 \times (\overline{pre}_1 - \overline{pre}_0); \quad \Delta \overline{pre} = \frac{\sum y_{i1} \times \overline{pre}_{i0}}{100}$$

- i profit influence per 1 leu operating income per types of activities:

$$\Delta \overline{pre}_0 = Ve_1 (\overline{pre}_1 - \overline{pre}_0)$$

An example of factorial analysis and the quantification of factors influences according to the "a" model and appropriate to the economic results of the economic entity analysed are presented in the following table:

Table 1. Example of factor analysis

NO.	INDICATORS	SYMBOL	EXPECTED	ACHIEVED
1	Revenues from exploitation	Ve	22.540	29.120
2	Expenditure from exploitation	Che	20.286	26.499,2
3	Average number of employees (pers.)	\overline{Ns}	350	400
4	Exploitation result (1-2)	Re	2.254	2.620,8
5	Total labour time fund (hours)	T	644.000	728.000
6	Average time per employee (hours)	\bar{t}	1.840	1.820
7	Hourly average productiveness calculated based on the exploitation revenues	$\overline{wh^{(ve)}}$	35	40
8	Average profit for 1 leu exploitation revenues (lei)	\overline{pre}	0,10	0,09
9	Average profit recalculated for 1 leu exploitation revenues (lei)	$r_{\overline{pre}}$	-	0.085
10	Annual average value of fixed means, of which: - directly productive fixed means	\overline{Mf} $\overline{Mf^i}$	3.850 2.464	4.600 2.990
11	Output of the financial year	Qe	21.467	28.549
12	Degree of technical endowment of labour (million lei/employee)	$\frac{\overline{Mf}}{\overline{Ns}}$	11	11,5
13	Weight of directly productive fixed means (%)	$\frac{\overline{Mf^i}}{\overline{Mf}}$	64	65
14	Output of the financial year for 1 leu directly productive fixed means (lei)	$\frac{Qe}{\overline{Mf^i}}$	8,7122	9,5482
15	Degree of valorisation of the financial year output (lei)	$\frac{Ve}{Qe}$	1,05	1,02

Source: drawn up by the author

The calculations result in the following results: $\Delta Re = Re_1 - Re_0 = + 366,8$ mil. lei, of which, due to:

a) the influence of the change in operating income:

$$\Delta Ve = (Ve_1 - Ve_0) \times pre = +658 \text{ mil. lei}$$

- the influence of the change in the total working time fund:

$$\Delta T = (T_1 - T_0) \times wh \times \overline{pre} = +294 \text{ mil. lei}$$

- the influence of the change in the average number of employees:

$$\Delta \overline{Ns} = (\overline{Ns}_1 - \overline{Ns}_0) \times \bar{t}_0 \times \overline{wh}_0 \times \overline{pre}_0 = +322 \text{ mil. lei}$$

- the influence of changing average time on an employee:

$$\Delta \bar{t} - \overline{Ns}_1 \times (\bar{t}_1 - \bar{t}_0) \times \overline{wh}_0 \times \overline{pre}_0 = -28 \text{ mil. lei}$$

- influence of average hourly productivity

$$\Delta \overline{wh^{(ve)}} = \bar{T}_1 \times (\overline{wh}_1 - \overline{wh}_0) \times \overline{pre}_0 = +364 \text{ mil. lei}$$

b) influence of the change of the average profit to 1leu operating income:

$$\Delta \overline{pre} = Ve_1 \times (\overline{pre}_1 - \overline{pre}_0) = -291,2 \text{ mil. lei}$$

- the influence of the structure of operating revenues on types of activities:

$$\Delta y_i = Ve_1 \times (pre_1 - pre_0) = -436,8 \text{ mil. lei}$$

- profit influence on 1 leu operating income per types of activities:
 $\Delta pre_0 - Ve_1 \times (\overline{pre}_1 - \overline{pre}_0) - +145,6 \text{ mil. lei}$

There is an exceedance of the expected exploitation result of 366.8 million lei, or 16.27%, due exclusively to the increase in operating income. This situation is favourable because the overrun is found in gross profit, net profit and net profit of the economic entity.

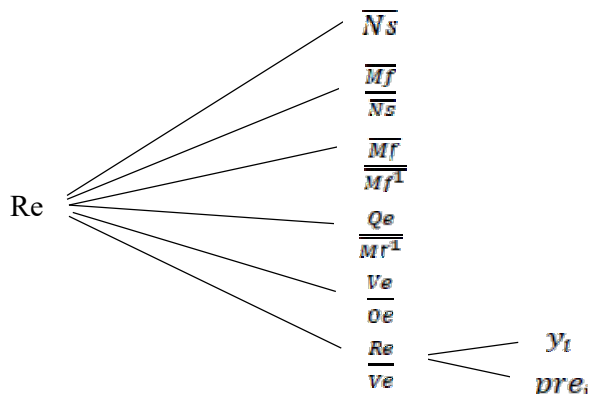
Analysing the influences of the factors that generated the change in the exploitation result, we find the following:

- the increase in operating income and operating result was determined in proportion of 44.7% by the extensive use of the labour force and the 55.3% difference was due to the intensive side, respectively the increase in the average hourly productivity. The increase in the average hourly productivity led to the increase of operating revenues by RON 3,640 million lei and the operating result by 364 million lei;
- as a result of the full use of working time, the operating result increased by 294 million lei. This situation was caused by the increase of the number of employees with 50 employees, while the average time per employee was not achieved by 20 hours / employee, which resulted in a reduction of the operating result by 28 million lei;
- as a result of the full use of labour time, the operating result increased by 294 million lei. This situation was caused by the increase of the number of employees by 50 employees, while the average time per employee was not reached by 20 hours / employee, which resulted in a reduction of the operating result by 28 million lei.

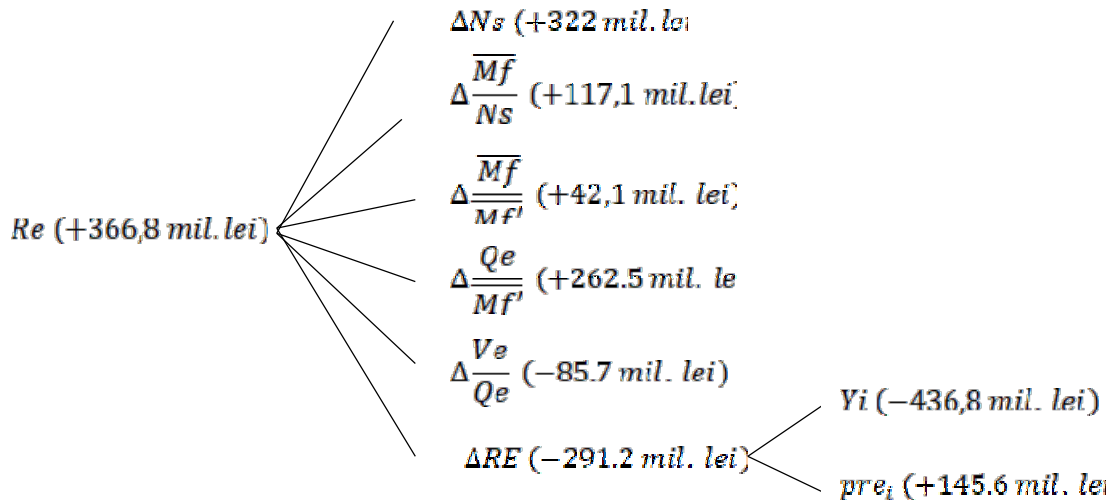
By enhancing the average profit analysis for 1 leu exploitation income through indirect factors, the following results:

- the modification of the exploitation income structure took place in favour of the types of activities, which provided a profit of 1 leu less operating income than the average programmed at the level of the entity, which generated the decrease of the operating result by 436.8 million lei;
- the profit per 1 leu of exploitation income per type of activity influenced the result of exploitation in the sense of increasing it by 145.6 million lei, which shows that the types of activities that have a decisive share in the incomes from exploitation, which have registered a positive evolution ($Ive_i > Ice_i$). This situation is mainly determined by the production sold and, at its level, the reduction of unit costs and the increase in average unit sales prices.

According to the model "b" analysis, the system of factors is:



This model of analysis is recommended to be used by manufacturing entities that have an important technical and material basis. To measure the influences of the factors on the phenomenon used, the chain substitution method (the variant produced by factors).

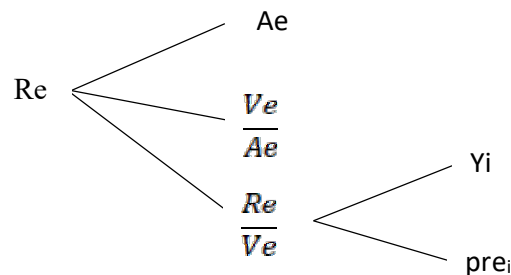


Analysing the influence of the factors, the following are found:

- the increase in the number of staff by 50 has the effect of increasing the exploitation result by 322 million lei. This influence is judged to be justified by the increase in the volume of activity in the conditions of increasing labour productivity;
- the increase of the labour endowment by 0.5 million lei/ person led - in the given conditions - to the increase of the exploitation profit by 117.1 million lei;
- the increase of the direct productive fixed assets by 1% compared to the planned level is reflected in the increase of the exploitation result by 42.1 million lei; million lei, so $iQ_e > iMf$. This situation can be determined by increasing the use of production capacity, improving product quality, etc.;
- the value of the output of the exercise was reduced by 0.01 lei, leading to a decrease in the operating result by 291.2 million lei.

The interpretation of the action of indirect factors acting through the average profit to 1 leu in operating income is done in the same way as for model 1.

According to the "c" analysis model, the factor system is the following:



The value of operating assets reflects the value of non-current assets and of assets related to the operating cycle. The size of operating assets determines the amount of output of the exercise, operating income and operating profit.

The V_e / A_e indicator represents the average operating income per 1 leu of exploitation assets and reflects the efficiency of the exploitation assets. The increase in the

value of this indicator can be achieved by accelerating the rotation speed of circulating exploitation assets, improving the quality of products, etc.

3.2. Factorial analysis of the profit afferent to the turnover

In the case of production entities, for the factorial analysis of turnover profit, the following models are recommended:

$$a) P = \sum qvp - \sum qvc$$

$$b) P = \sum qvp \left(1 - \frac{\sum qvc}{\sum qvp} \right) = CA \times pr$$

$$c) P = T \times \frac{\overline{Mf}}{T} \times \frac{CA}{Mf} \times \frac{Pr}{CA}$$

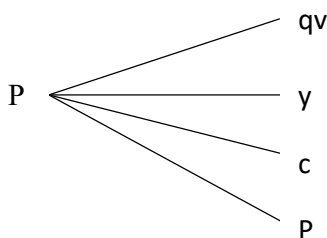
The analysis of turnover profit is made using the data in the table below:

Table no. 2. Analysis of turnover profit

NO.	INDICATORS	SYMBOL	EXPECTED	ACHIEVED
1	Revenues from exploitation	$\sum qvp$	20.000	21.000
2	Expenditure from exploitation	$\sum qvc$	18.000	19.135
3	Average number of employees (pers.)	$\sum qv_1 \cdot P_0$	-	21.740
4	Exploitation result (1-2)	$\sum qv_1 \cdot c_0$	-	19.457,5
5	Total labour time fund (hours)	Pr	2.000	2.365
6	Average time per employee (hours)	\overline{pr}	0,10	0,11

Source: drawn up by the author

According to the model "a" analysis, the system of factors that act on profit is the most important:



where:

- qv - is the physical volume of the sold product;
- y - the structure of production sold on products;
- c - full unit costs;
- p - average unit sales prices, VAT excluded.

The factorial analysis of the profit afferent to turnover supposes:

$$\Delta P = P_1 - P_0 = 2365 - 2000 = +365 \text{ mil. lei}$$

of which, due to:

1. the influence of the change in the physical volume of the sold production:

$$\Delta qv = P_0 I_{qv} - P_0 = 2000 \times 108,7\% - 2000 = (+174)$$

$$I_{qv} = \frac{\sum qv_1 \times p_0}{\sum qv_0 \times p_0} \times 100 = \frac{21740}{20000} \times 100 = 108,7$$

2. the influence of the change in the structure of production sold on products:

$$\Delta y = \left(\sum qv_1p_0 - \sum qv_1c_0 \right) - P_0I_{qv} = (2174, -19457,5) - 2000 \times 108,7\% \\ = 108,5 \text{ mil. lei}$$

3. the influence of unitary cost:

$$\Delta c = \left(\sum qv_1p_1 - \sum qv_1c_1 \right) - \left(\sum qv_1p_0 - \sum qv_1c_0 \right) = - \left(\sum qv_1c_1 - \sum qv_1c_0 \right) \\ = +322,5 \text{ mil. lei}$$

4. the influence of the change in average unit sales prices, VAT excluded

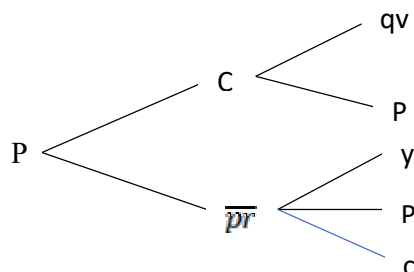
$$\Delta p = \left(\sum qv_1p_1 - \sum qv_1c_1 \right) - \left(\sum qv_1p_0 - \sum qv_1c_1 \right) = - \left(\sum qv_1p_1 - \sum qv_1p_0 \right) \\ = -240 \text{ mil. lei}$$

At the end of the analysed period, compared to the level set in the revenue and expenditure budget, there was an increase of turnover by 365 million lei and 18.25%, respectively. The increase in turnover profit affects the exploitation result, the current result, the gross and net result of the year.

Analysing the influences of the factors, we find the following:

- exceeding the physical volume of production sold by 8.7% results in a profit increase of 174 million lei. The influence of the volume of production sold shows that there is demand for the production of the entity, i.e. the market is not saturated;
- the structure of the turnover influenced the profit in the sense of the increase by 108.5 million lei, a situation which is explained by the increase of the share of the products sold at which rates of profitability were expected higher than the average rate per unit total and the decrease of the share of the products with rates expected lower returns than the average programmed rate per entity;
- the full unit costs exerted a positive influence on the profit, causing it to increase by 322.5 million lei, a situation caused by the decrease of the costs of the products having the main weight in the total sales. The influence of costs is appreciated as favourable provided that the quality of the products sold has not been affected. This positive situation may be the result of increasing productivity, reducing specific consumption, increasing the use of production capacity, etc.;
- the sales prices were reduced compared to the level provided for the varieties holding the majority weight in the turnover and determined the decrease of the profit mass by 240 million lei. This situation can be determined by the decrease in the product quality level (in which case the appreciation is negative) and by the action of the conjuncture factors (higher supply than demand, lower purchasing power of customers, etc.).

The system of factors acting on the appropriate profit, model "b", is the following:



The methodology of factorial analysis of profit implies:

$$\Delta P = P_1 - P_0 = 2365 - 2000 = (+365) \text{ milion lei}$$

of which, due to:

1. the influence of the turnover change: $\Delta CA = (CA_1 - CA_0) = +150 \text{ milion lei}$

1.1. the influence of the change in the volume of sales sold:

$$\Delta qv_1 = (\sum qv_1 p_0 - \sum qv_0 p_0) \times \bar{pr}_0 = +174 \text{ mil. lei}$$

1.2. the influence of the change in average unit sales prices:

$$\Delta p = (\sum qv_1 p_1 - \sum qv_1 p_0) \times \bar{pr}_0 = -24 \text{ mil. lei}$$

2. influence of the change of the average profit to 1 leu turnover:

$$\Delta \bar{pr} = CA_1 (\bar{pr}_1 - \bar{pr}_0) = +215 \text{ mil. lei}$$

of which, due to:

2.1. the influence of the change in the structure of production sold on products:

$$\Delta y = CA_1 \left[\left(1 - \frac{\sum cv_1 c_0}{\sum cv_1 p_0} \right) - \left(1 - \frac{\sum cv_1 c_0}{\sum cv_1 p_0} \right) \right] = CA_1 (\bar{pr}' - \bar{pr}_0) = +107,5 \text{ mil. lei}$$

2.2. the influence of the change in average unit sales prices:

$$\Delta p - CA_1 \left[\left(1 - \frac{\sum qv_1 c_0}{\sum qv_1 p_1} \right) - \left(1 - \frac{\sum qv_1 c_0}{\sum qv_1 p_0} \right) \right] - CA_1 (\bar{pr}'' - \bar{pr}') = -215 \text{ mil. lei}$$

2.3. the influence of the change in unit costs:

$$\Delta p = CA_1 \left[\left(1 - \frac{\sum qv_1 c_0}{\sum qv_1 p_1} \right) - \left(1 - \frac{\sum qv_1 c_0}{\sum qv_1 p_1} \right) \right] = CA_1 (\bar{pr}_1 - \bar{pr}'') = -322,5 \text{ mil. lei}$$

The increase of the profit related to the turnover was obtained in the proportion of 41.1% on account of the increase of the turnover and in the proportion of 58.9% on account of the increase of the average profit to 1 leu sales.

Turnover increased to 1,500 million lei, contributing to a profit increase of 150 million lei. Studying in depth the influence of the turnover through the two factors of the second degree, it is noticed that the physical volume of the sold goods has positively influenced the increase of the profit by 174 million lei, while the decrease of the average unit sales prices had the effect of decreasing the profit with 24 million lei.

The increase of the average profit for 1 leu sales by 0.01 lei, which signifies an increase of the rate of commercial profitability at the enterprise level by 1%, resulted in an increase of turnover profit by 215 million lei. The influences of the indirect factors that act on the profit through the average profit at 1 leu turnover (structure, prices, costs), are interpreted similar to the model presented above (model "a" analysis).

According to the model "c" analysis, the system of factors is the following:

$$P = T - \frac{Mf}{T} - \frac{CA}{Mf} - P - CA$$

where:

T - represents the total labour time;

$\frac{Mf}{T}$ - represents the degree of technical endowment of labour;

$\frac{T}{CA}$ - represents the efficiency of the use of fixed assets, expressed as average sales of 1 leu fixed assets.

4. Conclusions

The notion of “profit” is used in economics in an accepted form. The simplest and most recognised definition of profit is the difference between total income and total cost. The capitalist economic system, the capitalist civilization as a whole, the civilization of profitability highlight vital values such as: individual achievement of success, individualism and acceptance of selfinterest, devotion to activity and work in general, efficiency and pragmatism, moral orientation, freedom, equality, material comfort, external conformism, reason and morals in addressing any problem.

References:

1. Iosif, G., 2000. *Economic and financial analysis of the company in the agri-food sector*. Bucharest: Tribuna Economica Publishing House.
2. Robu, V., Vâlceanu, G. and Georgescu, N., 2004. *Economic and financial analysis*. Bucharest: Economica Publishing House.
3. Spătaru, L., 2004. *Economic and financial analysis: an instrument of enterprise management*. Bucharest: Economica.