

THE APPLICATION OF THE METHOD OF LOGARITHM FINDING IN THE CAUSAL ANALYSIS OF THE FINANCIAL RESULTS OF ENTERPRISES OF THE FOOD SECTOR

Beata Szczecińska

Agricultural University in Szczecin, Poland

Abstract. Causal analysis facilitates to determine the cause-and-effects relations between economic phenomena in order to understand the changes and prepare decisions' fundamentals about the future. In the cause analysis financial results can be calculated as the result of a multiplication of two, three or four factors. In this paper a four factors model was applied. This approach looks into the causes which influence on the level of net profits as: changes in the level of employment, changes in the equipment per employee and other quality factors as assets' productivity and sales profitability. In order to determine the influence of particular factors on the result of the analyzed phenomenon the method of logarithm finding was applied. This method provides relatively exact results. The analysis contains selected enterprises of the food sector. Based on the results managing efficiency was evaluated for analyzed enterprises. These results could be useful in the future to improve the decision making process from an economic point of view and compare levels of resources efficiency utilization of enterprises of a similar production profile.

Key words: causal analysis, net profit, the method of logarithm

INTRODUCTION

The companies functioning in present conditions demand analyses which expose factors stimulating the increase of the management effectiveness. The financial analysis allows to estimate the financial state of the firm and gives a relatively comparable financial information. The financial estimation means a search for cause-effect relationships between economic phenomena, an assessment of causes of changes in those phenomena and a preparation of decisions concerning the future. The practical value of the financial analysis is subject to the adequate assessment of the factors influencing the financial condition of the firm and the exact assessment of their trends.

Corresponding author – Adres do korespondencji: Beata Szczecińska, Zakład Analizy Systemowej, Wydział Ekonomiki i Organizacji Gospodarki Żywnościowej, Akademia Rolnicza w Szczecinie, ul. Monte Cassino 16, 70-466 Szczecin, tel.: (+48 91) 4231012, e-mail: bszczecinska@e-ar.pl

This goal of this work is an attempt to assess the factors which are most powerful in affecting the financial result of the analyzed firms and an estimation of the management efficiency on the basis of the conducted investigations. The method of logarithm and the partial difference method were used. The study comprised the years 2002–2005.

MATERIAL AND METHODS

Three confectionery manufacturers were subjected to an analysis. They are joint stock companies.

The first part of the investigations comprised the ratio analysis of the companies. It is possible to employ ratios of a variable economic substance and a various informative-analytical significance in the ratio analysis. Regarding a great number and similarities concerning both the components and the research areas, it is necessary to select the ratios and classify them correspondingly. The most typical solution allows to distinguish four areas of the ratio analysis: liquidity, financial support, productivity, rate of return [Bednarski 1997].

The second part of the investigation concerns the causal analysis of the financial result in the companies. The most universal model which shows the subjection of the net profit to the degree of the production factors usage is the four factors model. It allows to examine the dependencies affecting the profit rate of the quantitative factors such as the changes in the employment and the rate of the equipment per employee and the qualitative factors not often demanding supplementary expenses, i.e. the assets productivity and the return on sales [Urbańczyk 1997]. The profit in this method is considered as a product of four factors:

$$Z_n = R \times T \times W_{pm} \times W_{rs}$$

where:

Z_n – net profit,

R – employment,

T – equipment per employee (total assets/employment),

W_{pm} – assets productivity (yield on sales/total equipment),

W_{rs} – return on sale (net profit/yield on sales).

The causal analysis of the net financial result of the analyzed companies comprised a comparison of two periods. The results of the analysis were presented in the form of a comparison with the preceding year, therefore they refer to the years 2003–2005. The numerical assessment of the influence of the respective factors on the value of the investigated phenomenon uses various mathematical methods. This study applies the method of logarithm. The choice of the method of logarithm was caused by the possibility of its application with four factors and the achievement of exact results which are the closest to the deviation values calculated by means of the function method. Apparently this method can seem complicated regarding the necessity of logarithms calculation. Assuming, however, the use of a computer in the logarithm finding, the difficulty in this method and the laboriousness are considerably scarce [Bednarski et al. 1996].

The method of logarithm has, however, certain limitations. It cannot apply to a situation in which at least one ratio of the dynamics has a negative value (there is no logarithm of a negative number). Therefore, another method, e.g. the partial difference method, should be applied. However, its results are less accurate.

RESULTS OF RATIO ANALYSIS

Shareholders and managers of the companies assess the economic-financial situation upon the ratios. The conducted ratio analysis indicated a considerable diversification of the investigated companies in comparison of both time and space.

The highest rate of the current liquidity in the investigated period was achieved by Jutrzenka Co., to be followed by Wawel Co. Those companies in the years 2002–2005 did not have problems with the payment of their current liabilities. On the other hand, that ratio in Mieszko Co. was below 1.1 in all the analyzed years, what indicates the threat to the financial safety of the firm. The analysis of the rate of the gross debt allows to state that the highest share of the foreign equity in the firm activity was observed in Mieszko Co. in the years 2002–2005. The average time of the payments amounted to 100 days in Jutrzenka Co., 99 days in Mieszko Co., and 90 days in Wawel Co. It is thus evident that those firms freeze liability assets for over 3 months. The calculated profitability ratios in Jutrzenka Co. and Wawel Co. indicated insignificant fluctuations while compared in time. The highest rate of the return on sales was noted by Jutrzenka Co. in 2004 (14.6%), whereas the highest rate of the return on assets and the return on equity were noted in Wawel Co. in 2004 (16.5% and 27.7%, respectively). The increase of all the profitability ratios in the years 2003–2005 was positively estimated in Mieszko Co.

Results of the causal analysis with the use of the method of logarithm

Extension of the ratio analysis with the causal analysis of the financial result employing the four factors model allows to assess its dependencies of the profit deviation on the degree of the production factors usage. For the number assessment of the influence of the respective factors on the deviation of the net profit, the method of logarithm was used in seven cases, whereas the partial difference method in two cases (Mieszko Co. in 2003 and 2004). The results of the causal analysis are shown in Table 1.

Jutrzenka Co. noted a betterment of the net profit in 2003 and 2004 in comparison to the previous year by PLN 4 953 000 and PLN 21 030 000, respectively. A positive effect on the above deviations was exercised in both years by the intensive factor, ie. the return on sale, the increase of which resulted in the betterment of the net profit by PLN 4 626 100 in 2003 and by PLN 19 798 900 in 2004. A drop in the employment contributed to a negative deviation of the profit by PLN 217 900 and PLN 1 513 900, respectively. The increase of the assets productivity in 2003 caused the increase of the net profit by PLN 683 000, whereas a decline of the equipment per employee affected a decline of the net financial result by PLN 138 200. A positive effect on the deviation of the net profit in 2004 was exercised by a betterment of the equipment per employee, whereas a negative one – by a decline of the assets productivity. The financial condition of Jutrzenka Co.

Table 1. Results of the causal analysis in the investigated companies
 Tabela 1. Wyniki analizy przyczynowej badanych przedsiębiorstw

Company	Deviation of net profit (thousands PLN)	Partial deviations (thousand PLN)			
		Quantitative factors		Qualitative factors	
		Employment	Equipment per employee	Assets productivity	Return on sale
Year 2003					
Jutrzenka	4 953.0	-217.9	-138.2	683.0	4 626.1
Mieszko	-18 331.0	-1 450.8	2 734.1	-1 123.9	-18 490.4
Wawel	1 973.0	-295.7	844.5	48.9	1 375.3
Year 2004					
Jutrzenka	21 030.0	-1 513.9	10 417.9	-7 672.9	19 798.9
Mieszko	12 365.0	305.4	-193.3	-1 455.6	13 708.5
Wawel	13 707.0	-993.3	3 051.1	-165.8	11 815.0
Year 2005					
Jutrzenka	-11 549.0	9 461.3	-7 222.5	7 101.5	-20 889.3
Mieszko	1 319.0	-21.7	67.6	-25.4	1 298.5
Wawel	4 254.0	-1 320.4	9 274.1	-6 101.6	2 401.9

Source: Author's calculations.

Źródło: Obliczenia własne.

worsened in 2005 when it noted a drop in the net profit by PLN 11 549 000 in comparison to the previous year. The company was still profitable, however, its return on sale significantly worsened which contributed to the decrease of the net profit by PLN 20 889 300. The other qualitative factor, i.e. the assets productivity, as well as the increase in the employment had a positive influence on the deviation of the profit.

Mieszko Co. noted a decrease of the net financial result by PLN 18 331 000 merely in 2003 as compared to the previous year. From a profitable company in 2002 it became a losing one, subject to the following factors: the return on sale, the assets productivity and the employment. Their decline caused a decrease in the financial result by PLN 21 065 100. The increase of the equipment per employee reduced merely a negative influence of the presented factors by PLN 2 734 100. The financial condition of the firm was successively improving in the following years. That resulted mainly from the intensive factor – the return on sale, the betterment of which caused an increase of the financial result by PLN 13 708 500 in 2004 and PLN 1 298 500 in 2005.

Wawel Co. was improving its financial result in each of the analyzed years. The highest increase of the net profit was noted in 2004 by PLN 13 707 000 in comparison to the previous year. A positive influence was exercised by two factors: a quantitative one – the equipment, and a qualitative one – the return on sale. Their betterment caused an increase of the net profit by PLN 3 051 100 and PLN 11 815 000, respectively.

On the basis of the conducted investigations and the positive effect of both qualitative factors on the deviation of the profit, it can be stated that Jutrzenka Co. and Wawel Co. were economically effective merely in 2003. Mieszko Co. was ineffective in using its resources in 2003. In the remaining years the investigated companies were characterized by a diversified effectiveness. The conducted analysis indicates that an immense effect

on the deviation of the financial result both positive and negative was due to the return on sale (intensive factor). In this connection the managing staff should analyze with full particulars the volume of sale, the production structure and the sales prices in order to improve that ratio.

CONCLUSIONS

The following conclusions emerge from the conducted study:

1. The ratio analysis indicated considerable diversification of the examined companies at the achieved rate of the respective economical ratios. It is hard to uniformly state if better management was in the firm which achieved a higher rate of productivity or in another, characterized by the optimum rate of the liquidity, considered as the basic measures in the estimation of the financial situation of the companies.
2. The causal analysis of the financial result has a practical application in the estimation of the effectiveness of the joint stock companies. Obtained results can be used by the managing staff in the more effective management of the possessed resources, while the continuation of the causal investigations concentrated on a separate, detailed estimation of each factor would allow to reach the root causes affecting the effectiveness of management.

REFERENCES

- Bednarski L., Borowiecki R., Duraj J., Kurtys E., Waśniewski T., Wersty B., 1996: *Analiza ekonomiczna przedsiębiorstwa*. Wyd. Akademii Ekonomicznej we Wrocławiu, Wrocław.
- Bednarski L., 1997: *Analiza finansowa w przedsiębiorstwie*, PWE Warszawa.
- Urbańczyk E., 1997: *Metody analizy sytuacji finansowej przedsiębiorstwa*, ZAPOL Szczecin.

WYKORZYSTANIE METODY LOGARYTMOWANIA W ANALIZIE PRZYCZYNOWEJ WYNIKU FINANSOWEGO PRZEDSIĘBIORSTW GOSPODARKI ŻYWNOŚCIOWEJ

Streszczenie. Analiza przyczynowa pozwala na określenie związków przyczynowo-skutkowych między zjawiskami gospodarczymi, określanie przyczyn zmian w tych zjawiskach oraz przygotowanie decyzji dotyczących przyszłości. W analizie przyczynowej wielkość wyniku finansowego może być traktowana jako iloczyn wynikający z pomnożenia oddziałujących na niego dwóch, trzech lub czterech czynników. W opracowaniu do analizy przyczynowej wyniku finansowego netto wykorzystano model czteroczynnikowy. Pozwala on na zbadanie zależności wpływających na poziom zysku netto czynników ilościowych, takich jak: zmiany w stanie zatrudnienia i w poziomie wyposażenia majątkowego na jednego zatrudnionego oraz czynników jakościowych, to jest: produktywności majątku i rentowności sprzedaży. Do liczbowego określenia wpływu poszczególnych czynników na wielkość badanego zjawiska zastosowano metodę logarytmowania. Metoda ta daje stosunkowo dokładne wyniki. Analizie poddano wybrane przedsiębiorstwa gospodarki żywnościowej. Wyniki przeprowadzonej analizy stały się podstawą do oceny efektywności gospodarowania badanych przedsiębiorstw. Wyniki badań mogą być wykorzystane dla celów podejmo-

wania ekonomicznie uzasadnionych decyzji oraz porównania efektywności wykorzystania zasobów przez przedsiębiorstwa o podobnym charakterze produkcji.

Słowa kluczowe: analiza przyczynowa, zysk netto, metoda logarytmowania

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