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SYSTEM RATIO ANALYSIS AS AN INSTRUMENT OF FINANCIAL EFFICIENCY MEASUREMENT OF THE AGRIBUSINESS COMPANIES OF POLAND

The main goal of the research was to analyze the efficiency of joint-stock companies from the agribusiness sector listed on Warsaw Stock Exchange using traditional profitability ratio analysis and the DuPont Model. The research was based on the annual financial statements of these companies for the period 2004-2008. The joint-stock companies from agribusiness sector were characterized by different levels of financial efficiency depending on the type of industry. The highest level of efficiency was demonstrated by the companies from oil and confectionary industries while the lowest – by the enterprises from the meat and fish industries. It was noticed that the level of efficiency was determined by a number of factors related both to investment and financing decisions. According to the results of DuPont Model estimation the highest capital profitability was achieved under the conditions of overall positive influence of all factors including operational profitability, assets turnover and capital structure.

***Keywords**: Ratio Analysis; Profitability; Financial Efficiency; DuPont Model Introduction*

Regarding an economic entity the category of efficiency is treated as a relation of effects and expenditures [6]. It means that in financial perspective managers should aim at a maximum rate of return per defined level of the shareholders' capital. According to this a financial efficiency measurement is one of the main issues in the modern science of corporate finance and management. The most common and popular instrument for the estimation of the company's performance is ratio analysis focusing on the categories of profitability, liquidity, indebtedness and asset management. The main disadvantage of the traditional financial analysis is the limited capacity of information produced by each particular ratio. This fact makes it difficult to get a complex picture of a company's financial situation by calculating only few ratios. To solve this problem analysts use some alternative methods based on system approach to the relations between the financial ratios. One of such methods is a DuPont Model that describes the connections between profitability, capital structure and operational efficiency of the enterprise. Due to its simplicity and understandability this method became one of the most popular instruments for the financial efficiency measurement used both in financial literature and day-to-day practice.

DuPont Analysis is an expression which breaks the Return on Equity ratio (ROE) on three factors. It illustrates the influence of profit margin, asset turnover and equity multiplier on the Return on equity ratio [4]. The research of the joint-stock companies showed the positive correlation between the return on sales ratio, assets turnover ratio, return on equity ratio and equity multiplier [8]. According to the research on the sample of the companies from food industry from Warsaw Stock Exchange in 2006-2008 the greatest influence on the return on equity had a return on sales ratio [5]. Another research shows that the return on equity was also influenced by the degree of financial leverage that was shaped both by the changes in the capital structure and financial costs [2].

Goal and methods of the research. The main goal of the research was to analyze the efficiency of joint-stock companies from the agribusiness sector listed on Warsaw Stock Exchange using traditional profitability ratio analysis and the DuPont Model. The research was based on the annual financial statements of these companies for the period 2004–2008. Profitability analysis was conducted with the help of such measures as gross margin percentage, operating margin, return on sales ratio, return on assets ratio and return on equity ratio (table 1).

***Table* 1**

Profitability Ratios of a Company

Ratio	Construction
Gross margin percentage	(Revenue-Cost of goods sold)/Revenue*100%
Operating profit	Income on sales/Revenue
Return on sales	Net income/Revenue
Return on assets	Net income/Total Assets
Return on equity	Net income/Shareholder equity

Source: own research on the base of Wędzki D.: Analiza wskaźnikowa sprawozdania finansowego. Tom 2. Wolters Kluwer, Kraków 2009. – p. 354–365.

Gross margin percentage informs what percentage of revenue is formed by the gross margin (the value of fixed costs plus operational income) [10]. This ratio should be on high level that enables to cover the changeable costs such as administration costs, costs of sales, financial and other costs [3]. It should be mentioned that the gross margin percentage is characterized by a great sensi-

tivity regarding to the revenue because the change in sales determines the outstanding fall or growth of this ratio. Operating profit ratio is a measure of net income from sales per one monetary unit of sales. This ratio describes the effectiveness independently from the capital structure [3]. Return on sales ratio describes the final financial effect after tax in relation to revenue. This ratio takes lower values in the companies that are characterized by short operational and sales cycles [1]. Return on assets ratio demonstrates the efficiency of company's assets use, while return on equity ratio shows the net income from every monetary unit of equity employed [4]. Generally the higher values of this ratios are perceived as more favourable for a company. The basic formula of DuPont model used in the research can be presented as an equation:

$$ROE = ROS \times TAT \times m_E,$$

where ROE – Return on Equity (Net income/Shareholders equity),
ROS – Return on Sales (Net income/Revenue,
TAT – Total assets turnover (Revenue/Total assets),
m_E – Equity multiplier (Total assets/Equity).

Total assets turnover ratio characterizes the efficiency of asset management in relation to revenue and the equity multiplier describes the degree of financial leverage in the company.

Results of the research. The analysis of the profitability ratios of the companies under research gave an answer to a question whether these enterprises generated financial surplus from business and what the efficiency of asset and capital management was (table 2).

***Table* 2**

Profitability ratios according to the type of industry of joint-stock companies from agribusiness sector listed on Warsaw Stock Exchange (%)

Industry	Years	Ratio				
		Gross margin percentage	Operating profit	Return on sales	Return on assets	Return on equity
Meat	2004	14,2	2,3	3,2	5,2	12,5
	2005	16,1	4,0	4,1	7,1	17,1
	2006	16,4	4,3	4,3	6,0	12,5
	2007	16,3	3,3	4,1	5,5	11,9
	2008	15,1	0,5	-4,0	-5,4	-15,7
	Total	15,7	2,7	1,7	2,5	5,9

***End table.* 2**

Oil	2004	17,3	6,8	3,6	4,0	12,1
	2005	18,4	5,7	2,2	2,6	8,1
	2006	20,5	7,9	5,1	4,0	13,4
	2007	17,5	7,6	6,4	6,9	15,5
	2008	23,1	11,3	8,8	13,1	30,1
	Total	20,1	8,7	6,4	7,3	18,9
Fish	2004	13,9	2,0	1,1	1,8	3,5
	2005	19,7	2,0	0,1	0,2	0,3
	2006	19,8	2,7	3,2	3,2	9,1
	2007	20,8	2,7	4,5	4,4	9,0
	2008	20,8	0,7	1,5	1,5	3,2
	Total	19,4	2,0	2,2	2,5	5,4
Confectionary	2004	34,3	5,5	8,2	8,4	17,0
	2005	37,8	7,6	5,8	6,2	12,9
	2006	34,4	6,9	7,7	9,5	17,9
	2007	34,2	5,6	10,8	11,0	21,0
	2008	40,0	6,5	-0,4	-0,3	-0,5
	Total	36,3	6,4	6,1	6,1	11,2
Other	2004	26,3	3,6	3,0	3,1	8,8
	2005	29,7	6,9	5,3	5,1	12,8
	2006	28,3	5,3	4,3	4,1	9,9
	2007	33,3	5,5	10,0	8,2	20,3
	2008	32,5	6,2	-0,8	-0,6	-1,4
	Total	30,4	5,6	4,0	3,5	8,7
Total	2004	20,2	4,2	3,7	4,5	11,5
	2005	22,7	5,4	3,8	4,7	11,7
	2006	22,7	5,8	4,9	4,9	12,6
	2007	21,4	5,6	6,6	7,1	15,7
	2008	24,0	6,6	2,6	3,0	7,0
	Total	22,5	5,7	4,3	4,8	11,5

Source: own research

In the companies under research the ratio of gross margin percentage was on the stable level of 20,2–22,7% in 2004–2007, while in 2008 it increased to 24,0%. The highest ratios of gross margin percentage were noticed in the companies from Confectionary industry and in the companies of Other production, respectively at the level of 36,3% and 30,4%. The lowest gross margin percentage was 15,7 % in the Meat industry.

In the years 2004–2007 in all defined groups of joint-stock companies, with the exception of an Oil industry, a growth of the gross margin percentage was noticed, that could be an evidence both of the higher efficiency of operational activities and higher operational risk due to a substantial share of fixed costs in gross margin. In 2008 comparing to the previous year a decrease in a gross margin percentage by 1,2 pp was noticed in Meat industry and by 0,8 pp in joint-stock companies from Other industries, while in the rest of the groups there was noticed the growth of this ratio. This could be caused by financial crisis on the local market in 2007-2008.

In the sample under research the ratio of Operating profit grew from 4,2% in 2004 to 6,6% in 2008, that demonstrated the increase in operational effectiveness of the enterprises. The highest rate of operating profit was noticed in the companies from Oil industry (8,7%), comparing to the low ratio of gross margin percentage this implied the decrease of operational risk. The lowest ratios of operating profit appeared in Meat and Fish industries – respectively on the level of 2,7% and 2,0%. This proved the large share of fixed costs in gross margins of this companies.

Ratios based on the category of net income gave a further evidence for the conclusions formulated from the analysis of operational efficiency of the companies. In 2004–2007 in the companies under research the general growth of the main profitability ratios was noticed: the return on sales ratio from 3,7% to 6,6%, the return on assets ratio from 3,4% to 7,1% and the return on equity ratio from 11,5% to 15,7%. Only in 2008 comparing to the previous year the profitability of such industries as Meat, Confectionary and Other came down that could be also explained by the negative consequences of the financial crisis of 2007. In 2008 the return on equity for the whole group of the companies under researched decreased by 8,8 pp. The highest ratios of return on sales and return on equity were noticed in the companies from Oil industry (respectively 6,4% and 18,9%) and the lowest – in the companies from Meat industry (respectively 1,7% and 5,9%). Companies from the Oil industry increased the profitability mainly due to a substantial growth of the prices for their products in 2008. The companies from Confectionary industry and from the Other industries showed average rates of return in the analyzed period. It should be also mentioned that the companies under research were characterized by different relations between the level of efficiency and liquidity [12]. The companies from the Oil industry that achieved outstanding ratios of return demonstrated a high solvency, while the companies from the Fish industry showed low profitability along with the high level of liquidity. In the first case

this could be explained by high surplus of cash from operations deposited on bank accounts, while in the second one – by insufficient cash funds.

The reasons for the differentiation of the efficiency level depending on the type of industry could be explained not only by the profitability ratios but also by the quality of asset management and the degree of financial leverage. To determine the relations between these categories DuPont Model was used, that helped characterize the dependencies between such values as ratios of return on assets, assets turnover and the degree of leverage as well as their influence on the return on equity (table 3).

DuPont model definitely points the correlation of the mentioned factors, giving a complex view on the shareholders value creation from different business perspectives. Considering the relatively stable structure of sources of financing in the joint-stock companies [11] the main factor of the improvement of return on equity was the higher efficiency of sales operations measured by the return on sales ratio. The increase of this ratio from 3,7% in 2004 to 6,6% in 2007 for the whole sample of companies was accompanied by the growth of the return on equity ratio from 11,5% to 15,7%, while the reduction of return on sales ratio to 2,6% in 2008 in average caused the decrease of return on equity ratio to 7,0%. It should be mentioned that the reduction of the debt of the companies expressed by the equity multiplier, from 2,5 in 2004 to 2,3 in 2008 was the additional factor leading to the decrease of the company's value for shareholders, because this caused the lower profit covering 1 PLN of owners' capital. More so the fall of the total assets turnover ratio from 1,2 in 2004 to 1,1 in 2008 proved the decreasing sufficiency of asset management in the companies under research.

***Table* 3**

DuPont Model according to the type of industry of the joint-stock companies from agribusiness sector listed on Warsaw Stock Exchange

Industry	Years	Ratio			
		Return on sales (%)	Total assets turnover	Equity multiplier	Return on equity (%)
Meat	2004	3,2	1,6	2,4	12,5
	2005	4,1	1,8	2,4	17,1
	2006	4,3	1,4	2,1	12,5
	2007	4,1	1,4	2,2	11,9
	2008	-4,0	1,3	2,9	-15,7
	Total	1,7	1,4	2,4	5,9

***End table.* 3**

Oil	2004	3,6	1,1	3,0	12,1
	2005	2,2	1,2	3,1	8,1
	2006	5,1	0,8	3,4	13,4
	2007	6,4	1,1	2,3	15,5
	2008	8,8	1,5	2,3	30,1
	Total	6,4	1,1	2,6	18,9
Fish	2004	1,1	1,6	1,9	3,5
	2005	0,1	1,5	1,9	0,3
	2006	3,2	1,0	2,9	9,1
	2007	4,5	1,0	2,0	9,0
	2008	1,5	1,0	2,1	3,2
	Total	2,2	1,1	2,1	5,4
Confectionary	2004	8,2	1,0	2,0	17,0
	2005	5,8	1,1	2,1	12,9
	2006	7,7	1,2	1,9	17,9
	2007	10,8	1,0	1,9	21,0
	2008	-0,4	0,8	1,6	-0,5
	Total	6,1	1,0	1,8	11,2
Other	2004	3,0	1,0	2,8	8,8
	2005	5,3	1,0	2,5	12,8
	2006	4,3	0,9	2,4	9,9
	2007	10,0	0,8	2,5	20,3
	2008	-0,8	0,8	2,5	-1,4
	Total	4,0	0,9	2,5	8,7
Total	2004	3,7	1,2	2,5	11,5
	2005	3,8	1,2	2,5	11,7
	2006	4,9	1,0	2,6	12,6
	2007	6,6	1,1	2,2	15,7
	2008	2,6	1,1	2,3	7,0
	Total	4,3	1,1	2,4	11,5

Source: own research

The highest efficiency of equity management demonstrated the companies from the Oil industry, and reason for this was the outstanding efficiency of sales (6,4% in total) as well as the higher leverage in the structure of financing (2,6 in total). These factors determined the Return on equity of 18,9% averagely, that was by 7,4 pp higher than in the whole group of companies. In case of confectionary industry substantially lower level of leverage

along with the average return on sales ratio led to the reduction of the return on equity to 11,2% for 2004–2008.

An interesting situation was noticed in the companies from the industries of the relatively low return on equity ratios. From one hand, in the Meat industry the return on equity ratio was by 0,5 pp higher, while return on sales by 0,5 pp lower than in the Fish industry. From another hand, the total assets turnover ratio and the equity multiplier in the Meat industry companies was higher by 0,3 comparing to Fish industry companies. This meant that lower operational efficiency of meat companies was compensated by the positive effect of the financial leverage and faster turnover of assets.

According to risk-return concept the most rational was the financial strategy of the companies from the Confectionary industry, because it enabled achieving of average profits accompanied by a relatively low level of financial risk. Application of aggressive strategy in Oil industry targeting at higher ratios of profitability could lead to insolvency in short-term and as a result – the loss of companies value in future. Nevertheless in the industries with lower ratios of return on equity it should be attempted to improve the efficiency of sales by the reduction of operational costs. Besides holding of outstanding debt ratios could lead to higher profitability of the capital.

Summary. In the article the analysis of the efficiency of joint-stock companies from the agribusiness sector listed on Warsaw Stock Exchange using traditional profitability ratios and the DuPont Model was conducted. To sum up joint-stock companies from agribusiness sector were characterized by different levels of financial efficiency depending on the type of industry. The highest level of efficiency was demonstrated by the companies from Oil and Confectionary industries while the lowest – by the enterprises from the Meat and Fish industries. It was noticed that the level of efficiency was determined by a number of factors related both to investment and financing decisions. In the operational perspective the most significant influence on the return ratios was made by the level of operational costs; besides the companies with lower return on sales were characterized by relatively low degree of operational leverage. According to the results of DuPont Model the highest capital efficiency was achieved under the conditions of overall positive influence of all factors including operational profitability, assets turnover and structure of sources of financing. Additionally higher financial efficiency gave an opportunity to improve the quality of asset management and capital structure in future.

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СИСТЕМНИЙ АНАЛІЗ ПОКАЗНИКІВ ЯК ІНСТРУМЕНТ ВИЗНАЧЕННЯ ФІНАНСОВОЇ ЕФЕКТИВНОСТІ КОМПАНІЙ АПК ПОЛЬЩІ

Головною метою статті був аналіз ефективності акціонерних товариств з сектора АПК, що представлені на Варшавській біржі цінних паперів, за допомогою традиційних коефіцієнтів рентабельності та моделі ДюПонт. Для дослідження використано дані з річних фінансових звітів компаній за період 2004–2008 рр. Акціонерні товариства з сектора агробізнесу характеризувалися різними рівнями фінансової ефективності відповідно до галузевої приналежності. Найвищий рівень фінансової ефективності продемонстрували підприємства з галузі виробництва олії та кондитерських виробів, а найнижчий – компанії з галузі переробки м'яса та риби. Відмічається, що рівень фінансової ефективності залежав від багатьох факторів зі сфери інвестиції та фінансування. Згідно із результатами розрахунку моделі ДюПонт найвища рентабельність капіталу досягалася за умови загального додатного впливу всіх факторів, у т.ч. операційної рентабельності, оборотності активів та структури капіталу.

Ключові слова: *аналіз співвідношення; рентабельність; фінансова ефективність; модель Дюпона.*

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СИСТЕМНЫЙ АНАЛИЗ ПОКАЗАТЕЛЕЙ КАК ИНСТРУМЕНТ ОПРЕДЕЛЕНИЯ ФИНАНСОВОЙ ЭФФЕКТИВНОСТИ КОМПАНИЙ АПК ПОЛЬШИ

Главной целью статьи был анализ эффективности акционерных обществ из сектора АПК, представленных на Варшавской бирже ценных бумаг, при помощи традиционных коэффициентов рентабельности и модели ДюПонт. Для исследования были использованы данные годовых финансовых отчетов за период 2004-2008 гг. Акционерные общества из сектора агробизнеса характеризовались различными уровнями финансовой эффективности в соответствии с отраслевой принадлежностью. Наивысший уровень эффективности продемонстрировали предприятия из отрасли производства масла и кондитерских изделий, а наиболее низкий – компании из отрасли переработки мяса и рыбы. Отмечено, что уровень финансовой эффективности зависел от многих факторов из сферы инвестиций и финансирования. Согласно результатам расчета модели ДюПонт наивысшая рентабельность капитала достигалась при условии общего позитивного влияния всех факторов, в т.ч. операционной рентабельности, оборотности активов и структуры капитала.

Ключевые слова: *анализ соотношения; рентабельность; финансовая эффективность; модель Дюпона.*