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The Relationship between the Effectiveness of Production Factors and Business Performance in Agriculture

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Abstract*: The effectiveness of production factors can be evaluated against several relations, which must always be understood as relations between output and input. The aim of this paper is to assess the relationship between the effectiveness of production factors and business performance. One-factor productivity (more precisely labour productivity), total productivity (TFP) - on the basis of economic profit and Return on Assets (ROA) – the most synthetic indicator of profitability, were the applied indicators at approx. 820 agricultural enterprises. In the reference period (2004 – 2010) it was possible to describe the impact of the Czech Republic´s accession to the European Union on the selected agricultural enterprises. The agricultural enterprises system was further classified according to several criteria to verify the assumption that enterprises with higher efficiency of production factors have a higher Return on Assets (ROA).*

Key words: Efficiency · Productivity (one-factor, total factor) · Return on Assets (ROA) · Agricultural enterprise

JEL Classification: G31 · G32 · Q14

1 Introduction

The issue of how to measure profitability or return on invested capital is included in many decision-making processes in which it is necessary to take the economic benefit of resources expended on particular purposes into account. The measurement of profitability is the part of the calculation of, the so called, maximum offering price and it is widely used in the process of internal management. Although every enterprise has its specific objectives, the common goal of all enterprises is to achieve a satisfactory return on invested capital, but it must be assessed in relation to the solvency and financial stability (Grünwald & Holečková, 2007).

Profitability indicators belong to the most used indicators in financial analysis as they best describe the ability of an enterprise to achieve the highest returns and, on this basis, to fulfil the basic aim of the enterprise in the form of maximizing its market value (Marek, 2006). Three main types of profitability indicators are distinguished in the theory: return indicators or the rate of returns (if returns are in the numerator), profit indicators or the rate of profits (if profit is in the numerator); and financial profitability indicator (if the cash flow is in the numerator (Marek, 2006)). The most general form of this indicator is:

$$ROIC = \frac{Return}{Capital\ invested}$$

In the process of substituting the numerator and denominator it is acceptable to feed both quantities which are consistent. The most synthetic indicator representing the basic measure of profitability or enterprise performance is Return on Assets (*ROA*). That is because the Return on Assets

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measures the achieved effect to the total invested capital into business activity. In practice, it is difficult to distinguish which effect is caused by investing purely a company's own capital or by foreign capital. Therefore, Earnings before Interest and Taxes (*EBIT*) should be included in the numerator (Kislingerová & Hnilica, 2005). The indicator constructed in this way is considered as the best measure, because, at the time, it abstracts both from the tax changes and the changes in capital structure adjustment. The Profitability indicator, in this form, can be considered as a standardised indicator, which can be compared with the same constructed indicators of comparable firms in both industries and the market as a whole. This method is known as benchmarking (Petřík, 2009). For their complexity, Return on Assets indicators is often used as one of the top indicators in the frame of the pyramidal system and they are further factoried. Another view of the efficiency assessment is to determine the effectiveness of production factors through various defined productivity indicators. Their application depends on the aim of measurement as well as on the data availability. Productivity of the enterprise is defined as a quotient of outputs to invested inputs:

$$Productivity = \frac{outputs}{inputs}$$

If the production process involves only one output and one input, the calculation is trivial. If there is more than one input, which is a more common situation, it is necessary to apply, when calculating productivity, the methods of inputs aggregation. In talking about productivity, the effectiveness of all production factors is taken into consideration. The traditional concept of productivity includes, for example, labour productivity in manufacturing companies, fuels productivity in the power plants or soil productivity in the agricultural companies. These measurements are called the partial rates of productivity. If we assess these partial rates separately we can come to misleading results regarding the total productivity Coelli, Rao, O´Donnell & Battese, 2005).

According to the range of considered inputs, Synek (2007) divides productivity into partial and total productivity. The total productivity is crucial for a company, but due to the complex transfer of effect of different forms of reified labour on the total productivity, the analysis of partial productivity plays an important role in practice as well. Labour consumption, materials and energy consumption and capital consumption belong to the production factors. Total factor productivity (TFP) can be generally expressed as the efficiency of inputs transformation into outputs (Synek, 2007). In practice, the productivity assessment is usually narrowed down to only the labour productivity assessment. The definition of labour productivity indicators may be different (Novotná & Volek, 2008):

- Revenues per worker
- Value added per worker
- Revenues on 1 CZK of personal costs
- Value added on 1 CZK of personal costs

Out of these indicators, the most suitable definition tends to be labour productivity from value added, because it is not dependent on output consumption (for example: an increase in material purchases does not improve the efficiency of production factors). Conversely, it shows the processing value added per one worker - per 1 CZK of personal expenses. Labour productivity growth is a determinant for company growth and the growth of living standards of workers, which is linked to the employee's wages. This leads to the stabilisation of and improvements to the labour force, positively affecting the success of the company. The productivity growth rate is affected by the growth rate of the output and the growth rate of the input. In the current economic literature (i.e. Zhengfei & Lansink, 2006), the Malmquist growth rate index is often used to describe the measure of total factor productivity (Fare, Grosskopf, Norris & Zhang, 1994).

The Malmquist index is based on the use of, the so called, distance functions, which helps to characterise production technology with multiple inputs and outputs. The Malmquist TFP index measures the change in the total factor productivity (*TFP*) during two periods based on the principle of calculating the distance ratio of each data point from the technology (i.e. it describes the distance between the value measured in period '*t*' and technology in period '*s*') (Fandel, 2002).

The Malmquist productivity index is a theoretical index based on real technology. Fried, Lovell & Schmidt (2008) describe two different approaches regarding the construction of this index. The older approach, which is more popular, uses the information about prices in places where the technology is presented and uses empirical approximations of the indices. The newer approach avoids the information about prices and uses the econometric or mathematical programming techniques to estimate the Malmquist productivity index. Two indicators can be derived from the Malmquist index-efficiency change and technical change. The most common methods used for distance estimating are the methods of linear programming, specifically the DEA type (Data Envelopment Analysis), used for estimations by Fare, Grosskopf, Norris & Zhang (1994).

Production factors productivity can also be constructed with respect to economic it (Neumaierova & Neumaier, 2002). In this approach, *TFP* is an alternative expression of *EVA* (Economic Value Added). This productivity indicator suits best both the traditional demands of operational management, as well as the new demands of process management and lean manufacturing, including asset management. This is, mainly, because it reflects the consumption efficiency and the efficiency regarding holding (tying) the production factors (and, thus, the economic es from tying the financial resources) and can be effectively used when analysing the level and development of economic value added (*EVA*) creation, or the fulfillment of the company objectives (Klečka, 2007).

The other approach to productivity measurement, stated by O'Donnell (2010), analyses the total factor productivity (*TFP*) indices containing the well-known indices of Laspeyres, Paasche, Fischer, or Tornquist and Nick Moorsteen. These decompositions do not concern the Malmquist TFP index. Particularly useful is the use of Lowe's indices for analysing the panel data, because they are time and space transitive. O'Donnell (2010) analyses the data obtained from the Economic Research Service (ERS) in the USA, applying: the prices, 3 outputs (livestock, crops, other outputs) and 4 inputs (capital, land, labour, material). When evaluating the productivity in agriculture, it is possible to meet the different specifications given by the sector. Many scientific studies try to analyse the impact of researches and scientific knowledge on the agrarian sector. The key weaknesses, when evaluating the productivity, presented by Alston (2010) are as follows:

a) providers or processors (public or private sources) do not always correctly identify the productivity components;
b) the time factor plays its role (i.e. there is a time delay before the research outcome will take effect, e.g. in case of innovation).

2 Methodology

The own database of agricultural companies, containing about 820 observations, was used for the scope of the project research. The database was formed during 2004 – 2010 using the financial statements (balance sheet, profit and loss) and a questionnaire. 47% of the observed firms were cooperatives, 37% were joint stock companies, 15% limited liability companies and around 1% was categorized as the others (mostly individuals). The average agricultural area in the sample was 1783 ha, having 456 meters altitude and about 72 employees.

The aim of this paper is to analyse the relations between the efficiency of production factors and agricultural companies' performance. Labour productivity (measured in several ways - revenues per worker, value added per worker) formed the main observed indicator of the one-factor productivity. The added value was taken from the profit and loss statement and, therefore, serves as the aggregate trade margin and the difference in performance and power consumption. To evaluate the relations between labour productivity dynamics and wages dynamics, the average monthly salary and its growth rate were further investigated. Total factor productivity (*TFP*) was determined on the basis of economic value added (Neumaierová & Neumaier, 2002). When calculating the indicator, Weighted Average Cost of Capital (*WACC*), to determine the cost of equity (re), the modular method, according to the methodology of the INFA model available on www.mpo.cz, was used (Benchmarking diagnostic system of financial indicators INFA, 2012).

For a broader analysis, in the context of business performance the profit indicator and its structure was implemented, as well as the return on assets (*ROA*) indicator, observed in two versions:

1. as a Earning After Taxes (*EAT*) divided by assets;
2. as a share of *EBIT* (Earnings Before Interest and Taxes) and assets. A higher *ROA* value means better utilisation of the capital and faster growth rate of a company's development.

The indices values were calculated separately for each company. The final tables form a simple average values per targeted year and indicator.

The assumption that firms with higher returns on assets have higher labour productivity, or the total factor productivity (*TFP*), was further examined using a selected sample categorised into three groups: I.: companies with $TFP > 1$, II.: companies with $ROA > 0$ (positive return on assets) and III.: companies with $ROA < 0$ (negative return on assets). Return on assets was analysed only in option 2. This indicator is the most suitable for the purpose of research, due to the fact that it doesn´t depend either on capital structure or interest and tax rate. It depends only on the effective allocation of capital into profitable property and on its economical use (Grünwald & Holečková, 2007).

3 Results and discussion

The traditional indicator, whose maximisation in recent years has been considered as the main goal of business, is profit. Its structure is shown for the complexity of the whole analysis - Table 1. Besides that, the indicator is also included in other calculations.

Table 1 Profit and Subsidies in 2004 - 2010 (in thousands CZK)

Item	2004	2005	2006	2007	2008	2009	2010
Profit/loss:							
- operating	5 088	3 655	2 881	8 128	5 696	-148	4 229
- financial	-830	-873	-775	-1 019	-1 118	-1 015	-965
- ordinary activity	4 258	2 782	2 106	7 109	4 577	-1 163	3 265
- extraordinary	239	432	308	247	279	87	285
- accounting period – total brutto	4 496	3 214	2 414	7 356	4 856	-1 077	3 549
- accounting period – total netto (after taxation)	4 152	2 904	2 030	6 910	4 351	-1 001	3 091
Operating subsidies	9 815	11 462	12 707	13 995	14 516	14 153	14 232

Source: Authors´own research based on survey of the own database of agricultural companies

In the agricultural sector the amount of profit/loss is significantly affected by ral and climatic conditions influencing both crop and livestock production. Operating it, generated from the core business activities, should remain in positive values - the

ny should, therefore, make a profit and, thus, fulfil the purpose of its activity. Long-term business operations at a loss are not possible, since this leads to a reduction in equity and creates financial instability that can cause crisis development and result in the termination of the business.

Except for 2009, profit was achieved during all of the observed years. Unfortunately, profit results do not show a growing trend. As already mentioned, profit results are mainly caused by climatic and natural conditions followed by both domestic and worldwide price development of agricultural commodities. The key profit component, which generates a positive profit for several years, is the amount of operating subsidies. Taking into account its important role in the agrarian sector, these subsidies were quantified separately, reaching about 6.5% p.a. growth rate. According to Czech accounting legislation, these subsidies are included in other operating income. Their composition is in accordance with the Common Agricultural Policy of the EU and has several main components: SAPS (area payment), TOP-UP (complementary payments) and LFA payments (subsidies according to the Horizontal Rural Development programme and Rural Development Plan). The sources of these subsidies are mainly obtained from the EU budget co-financed by the Czech Republic. It is certain that, after subsidy deduction, the total profit from the operating activities (or even total) of farms is negative.

Long-term loss (approx. 1 million CZK) from financial activities is not so surprising (as well as in other sectors), due to the payment of interest expenses on loans. This relates to the financing-primarily the financing of investment activities, as a result of insufficient budgeting for agrarian farms. There is, again, an ongoing relation to the subsidies for the purchase of long-term assets. Those are, in accordance with accounting legislation, accounted for as a reduction in the down-payment on the market entry price of a property. It applies the principle of co-financing, in which the subsidies form a certain percentage of the market entry price of the property and the rest must be financed by the applicant. However, often due to an applicants' lack of available funds (farms), they are forced to use bank loans instead.

The profit/loss from extra activities (at the level of approx. 300 thousand CZK) is created, mainly, by the compensation of the costs related to the extra activities – i.e. refund from the insurance companies.

The total economic results (the average value is approx. 3.5 million CZK) then, basically, copies the development of operating economic results, while its net value is approx. 500 thousand CZK lower due to income taxes. Besides the subsidies mentioned above, the entry to the EU did not have a major impact on profit growth. Conversely, entry to the EU represents a higher risk for Czech farmers – i.e. the necessity to meet the standards and regulations which cause a costs increase; problems with production on the European market related to the prices of agricultural commodities (their worldwide depression since 2008).

A more comprehensive view of efficiency can be observed from the return on assets (Table 2), as it takes into account the volume of input added to create such output (profit). It is visible that the *ROA* tends to copy the analysed economic results and fluctuates about 6% or 7% in absolute values, having the total average value of 3.8%. 2007 appears to be the most successful year, when the agrarian companies achieved the highest return on assets. In this year, the companies, also, reached the highest labour productivity calculated from the value added.

The analysis of indices of company efficiency is due to be completed with an analysis of efficiency of factors of production. Table 2 shows the calculation of labour productivity by way of differently defined indices. Productivity, checked by way of revenues per worker, during the whole period for the monitored group of agricultural companies, grew (the most significant growth was in 2007 and 2008 – successful years in agriculture). Nevertheless, the same growth rates are not shown

by the second probed indicator in sequence – Value added per worker. Here, during the whole period, we can see an inter-annual decrease, except in the year 2007, when the Value added per worker increased one and a half times. A significant fall of Value adder per worker is possible to see in 2009; this can be due to a less successful period for farmers, on the one hand, and, on the other, to the impact of the worldwide crisis. This fact, in terms of agricultural companies, might be caused by operating subsidies, which are recorded in the other operating revenues. In calculation of productivity from Value added (the difference of performance and power consumption), the subsidies are not included. In reality, it means that, the first mentioned indicator (revenues/workers) illustrates the effectiveness of the factor of production of labour, including the subsidies, and the second indicator (Value added/workers) without the impact of subsidies.This implies a different development, not only in the level of these indices, but, also, in the dynamics, when only successful years– from the point of view of agriculture- interfere with this trend (e.g. 2007). From the point of view of efficiency growth, every company tries to increase the productivity of labour.Herein, it is necessary to mention an important relation between labour productivity and the average wage. The point is that the dynamics of labour productivity should be higher than the dynamics of average wages. Failing that, the wage cost rate in a company will be increasing and the rentability of a company will be decreasing. The comparison of the dynamics of labour productivity, calculated from the revenues and an average wage, implies that, in the first two monitored years wages grow faster than productivity; whereas, in the following years, the development is favourable. In total, the average growth rate of wages over the monitored interval corresponds with the average growth rate of labour productivity.

Table 2 Selected indicators of performance/efficiency in 2004 – 2010

Item	2004	2005	2006	2007	2008	2009	2010
Total profitability:							
ROA I. (EAT/A)	5.01%	2.51%	1.73%	5.84%	2.76%	-1.06%	2.44%
ROA II. (EBIT/A)	6.03%	3.45%	2.83%	7.02%	4.04%	-0.08%	3.68%
Productivity:							
Revenues/workers (in thousands CZK)	990.43	1030.65	1053.05	1244.42	1363.06	1214.27	1378.91
Value added/workers (in thousands CZK)	242.30	216.39	186.16	281.00	267.26	156.29	242.91
TFP (index number)	0.9662	0.9401	0.9256	0.9633	0.9202	0.8510	0.8983
Average month wage (in CZK)	12 924	14 325	14 812	16 433	17 908	17 848	18 732

Source: Authors´own research based on survey of the own database of agricultural companies

In the next step of the analysis, the multifactor productivity (*TFP*) and the closely connected indicator of weighted average costs of capital (*WACC*) were calculated. The *WACC* index, which can reach the values from the riskless rate or the rate of the least risk asset (annual state bonds) up to +35% in dependance on risk additional charges of individual companies, reached the highest average value in 2008. Total factor productivity (*TFP*), based on economic costs did not exceed value 1 in any year (the limit value of effectiveness of factors of production).

The precondition that companies with higher rentability of assets have higher labour productivity or productivity of factors of production (*TFP*) was examined further. The group of agricultural companies (tables 3-5) were classified according to several criteria into the following groups:

- Companies with $TFP > 1$,
- Companies with $ROA > 0$,
- Companies with $ROA < 0$.

For each group of companies, again the indices of productivity and profitability were found. Furthermore, the growth rate of monitored indices was added.

Table 3 Selected indices in companies having *TFP > 1* in 2004 - 2010

Item	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
TFP (ratio number)	1.07	1.05	1.03	1.06	1.04	1.07	1.03
- index TFP		0.99	0.98	1.03	0.98	1.03	0.97
- number of companies	39	20	24	32	17	3	13
- ratio over 1 to all (in %)	28.47	16.53	19.05	27.83	14.78	2.68	13.27
ROA (v %)	10.11	9.49	7.03	11.08	10.63	14.42	9.51
- index ROA		0.94	0.74	1.58	0.96	1.36	0.66
Revenues/worker (in thousands CZK)	1116.63	1144.70	1123.13	1375.05	1436.17	1614.53	1584.49
- index		1.03	0.98	1.22	1.04	1.12	0.98
Value added/worker (in thousands CZK)	255.34	209.74	147.22	270.30	286.01	-7.32	233.01
- index		0.82	0.70	1.84	1.06	-0.03	-31.82
Average month wage (in CZK)	12 852	14 183	15 078	16 982	18 158	19 325	18 967
- index		1.10	1.06	1.13	1.07	1.06	0.98

Source: Authors´own research based on survey of the own database of agricultural companies

The first group is formed by sufficiently efficient companies regarding the total productivity (*TFP > 1*), which concerned 21% of monitored companies in the period 2004-2008. At the same time, these companies proved the return on assets from approx. 7% in 2006 to approx. 14.4% in 2009. The average value return on assets of effectively working companies was undoubtedly higher than the average in all the companies (values approx. 10%). Higher values are apparent, also, in the labour productivity calculated from the revenues, enabling the statement to be made that every year they significantly exceed the average of all companies (Table 2). This statement does not stand any longer for the labour productivity calculated from Value added as the indices oscillate about the average, but it is impossible to say that they exceed the average significantly. Table 3 shows clearly that, in 2009, the average Value added per worker is, negative. The reason is a small sample of companies (this year *TFP > 1* was in 3 companies) and, in particular, the Value added of one individual company influenced the total result. That is, the outputs of the company failed to cover the power consumption, although its operating result of management was positive. With a more detailed search it can be seen that it was caused by drawing on a multimillion reserve. It is, thus, evident that the companies with total productivity above the limit value have higher labour productivity calculated from the revenues (having higher revenues), but not labour productivity calculated from the Value added. Thus, we can conclude that, the reason for being more effective is not due to their outputs, but to the other factors of yields, i.e. the amount of subsidies, drawing on existing reserves etc. Another possibility is the saving of some cost items, except for the power consumption – e.g. decreasing wage costs etc. It should be said, that these conclusions are made on the basis of a relatively small number of companies and that it will, certainly, be necessary to analyse the structure of revenues and costs later on using a bigger sample number of companies, which is the authors´future intention.

The assumption that the profit-making companies will, also, be economising efficiently with factors of production was necessary to be verified using the second group of companies, according to the classification (Table 4).

Table 4 Selected indices in companies having *ROA > 0* in 2004 – 2010

Item	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
TFP (ratio number)	0.97	0.95	0.94	0.96	0.93	0.89	0.90
- index TFP		0.98	0.99	1.03	0.97	0.95	1.02
- number of companies	131	103	107	113	98	63	88
- ratio over 1 to all (in %)	95.62	85.12	84.92	98.26	85.22	56.25	89.80
ROA (v %)	6.31	4.53	4.08	7.16	5.36	3.29	4.42
- index ROA		0.72	0.90	1.76	0.75	0.61	1.34
Revenues/worker (in thousands CZK)	1020.24	1080.02	1096.86	1249.67	1420.78	1290.11	1389.67
- index		1.06	1.02	1.14	1.14	0.91	1.08
Value added/worker (in thousand CZK)	256.90	235.59	200.87	282.70	286.01	195.30	250.08
- index		0.92	0.85	1.41	1.01	0.68	1.28
Average month wage (in CZK)	13147	14374	15018	16446	18193	18191	18824
- index		1.09	1.04	1.10	1.11	1.00	1.03

Source: Authors´own research based on survey of the own database of agricultural companies

The reverse dependence is not so evident, i.e. the profit-making companies (with $ROA > 0$) do not reach the level of sufficient effectiveness of factors of production. The growth rate, *TFP*, indicates more of a stagnationor, on average, a slight decrease; whereas the growth rate of *ROA* is more or less unstable: the success of the year in agriculture is dependent especially on climatic factors. Stronger divergences are apparent here in comparison with the first group. These companies, on average, did not exceed the limit value, *TFP*, in any of the monitored years; also, the average *ROA* is, apparently, lower than in the first group of companies. Profit-making companies have higher labour productivity; the biggest differences between profitable and unprofitable companies (Tables 4 and 5) were noticed in the Value added/workers. Furthermore, profitable companies, on average, pay their employees slightly higher wages than unprofitable ones (e.g. in 2008 an unprofitable company paid a 7.7% lower wage).

On the basis of an accomplished analysis in agriculture in the USA over the period 1960-2004, O´Donnel (2010) concludes that the main driving force of the change of productivity is a technical change. Furthermore, he explains that efficient companies tend to oscillate around ther level of production possibilities trying to react to changes in input and output prices. In connection with production technology, companies achieve changes in productivity from savings resulting from experience, on the one hand, and from savings resulting from extent, on the other hand.

The third group is formed by unprofitable companies (*ROA < 0*) showing, at the same, he value of productivity of factors of production lower than 0.9 (Table 5). In the growth rate, *TFP*, we can see bigger divergences over the years, but on average, over the whole monitored interval, the growth rate is 1 (i.e. neither an increase nor a decrease). Return on assets (*ROA*) reached the lowest value in 2006, followed by 2009. Resulting from mathematic relations, it is necessary to start from the inverse index value (ratio of period 0 and 1) to obtain the correct interpretation of the growth rate or chain indices of negative values of *ROA*. The efficiency of agricultural companies operating

below the profitability limit reacts even more sensitively to changes of climatic conditions. Also, the indices of labour productivity, calculated from revenues or Value added are significantly lower in comparison with the average for all companies.

Table 5 Selected indices in companies having *ROA < 0* in 2004 – 2010

Item	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
TFP (ratio number)	0.84	0.87	0.86	0.91	0.85	0.81	0.87
- index TFP		1.05	0.98	1.06	0.93	0.95	1.07
- number of companies	6	18	19	2	17	49	10
- ratio over 1 to all (in %)	4.38	14.88	15.08	1.74	14.78	43.75	10.20
ROA (v %)	-1.84	-2.70	-4.59	-0.89	-3.44	-4.42	-2.88
index ROA		0.68	0.59	5.15	0.26	0.78	1.53
Revenues/worker (in thousands CZK)	746.93	845.90	879.29	947.84	1077.77	1116.70	1284.28
- index		1.13	1.04	1.08	1.14	1.04	1.15
Value added/worker (in thousands CZK)	70.50	110.45	104.29	184.64	172.55	106.13	179.83
- index		1.57	0.94	1.77	0.93	0.62	1.69
Average month wage (in CZK)	10168	14175	13755	15687	16713	17408	17921
- index		1.39	0.97	1.14	1.07	1.04	1.03

Source: Authors´own research based on survey of the own database of agricultural companies

The question is to what extent the productivity growth can be explained, also, by other factors, e.g. meteorological conditions, institutional changes or savings from extent? According to Alston (2010), these are open questions for further research, but in many cases it is possible that an organised research would help the productivity growth.

4 Conclusion

There are lots of approaches for how to analyse the effectiveness of factors of production. The simplest possibility is the measuring of partial (one-factor) productivity. More complex calculations and, also, a number of different approaches can be noticed in an aggregate (multifactor) productivity. The analysis can start from the general economic theory, based on production functions or Malmquist´s index, or Laspeyre´s, Paasche´s, and Fischer´s indices, or analysis based on economic value added (*EVA*). Less frequent are approaches analysing productivity, i. e. efficiency of factors of production, on the one hand, and profitability, on the other hand.

The aim of this article is to analyse relations between the efficiency of factors of production, measured both by productivity of factors of production on the basis of economic profit (*TFP*) and labour productivity from revenues or Value added and profitability of a company measured by the most synthetic Return on assets (*ROA*).

Another positive assessment concerns the fact that labour productivity, measured by the most used indicator (revenues/workers), is growing and, in 2010, it reached approx.1.4 mil. CZK per worker. Its average annual growth rate corresponds with an average annual growth rate of wages and reaches the amount of 8%. The growth rate of labour productivities, measured by indices from Value added, is not so satisfactory. The reason for different results might be the fact that VA does not include operating subsidies. These are a significant part of aggregate revenues typical for agricultural companies.

The sample of selected agricultural companies proved that the average *TFP* value over the monitored period of 5 years always oscillated below the limit level (in the range of 0.85-0.97) with an average drop rate of 0.1%. The ratio of companies having a higher output than input (*TFP* higher than 1) during the whole monitored period did not exceed even a third of companies from the sample – being about 21% on average. This partial conclusion is not satisfactory as it testifies that the effectiveness, in most companies, is low and their inputs are higher than outputs: although, on average, they reached positive profitability. Furthermore, it was proven that companies, which are managed effectively ($TFP > 1$), have significantly higher Return on Assets (*ROA*) – in an average 10.32% compared with the average profitability of all companies, which was 3.85%. At the same time, calculations of labour productivity (from revenues) showed that the reason for the greater successfulness of these companies is their higher revenues not the Value added (Labour productivity calculated from Value added is lower in some years than an average for all companies). Higher revenues might be influenced by different factors, e.g. by the volume of operating subsidies depending on the area of agricultural land or by drawing reserves (proving as a decrease of costs behaving like a revenue) or by selling of property etc. A more detailed analysis of these companies will remain the authors´ constant interest.

We can assume that profitable companies ($ROA > 0$) will also have a higher *TFP* value. However, this partial concusion is impossible to validate, i. e. not all profitable companies reached productivity of factors of production higher than 1. Unprofitable companies ($ROA < 0$) showed both lower values of total factor productivity and lower value of one-factor productivity (labour productivity), i.e. they fell behind in factors of production efficiency as well.

From the obtained analytical data it can be assumed that an efficient management of agricultural companies cannot rely, only, on positive profitability of assets – when the companies are profitable, i. e. they reach a positive value of accounting profit, but they might not reach an economic profit at the same time (i. e. the value of companies measured on the basis of *EVA* can drop). The analysis revealed that those agricultural companies having a higher *ROA* than 10.32%, in a monitored period, generate both accounting and economic profit.

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