Efficiency and its Reserves in the Agriculture of Visegrad Countries - Benchmarking Analyzing

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Abstract

During the latest years the chances in the demand for the food and agricultural products the efficiency analyzing of the agricultural production has become the crucial topic of agro-economic research activities. As agricultural world tending toward liberalism, efficiency and competitiveness are the cornerstones of development strategies especially in the countries with higher share of agriculture in their economy. This presentation is based on the research that uses the Malmquist index able to examine relative efficiency and its elements in the agriculture of new member states of EU. Our research aim is double: on one hand to compare the efficiency and efficiency elements of the COP plants production focusing on Visegrad countries; on the other hand to examine whether the present system of Common Agricultural Policy (CAP) helps the new member states to catch up, and increases the competitiveness of their agriculture inside of European and world market as well.

Key words: Visegrad Countries, agriculture, effectiveness, Malmquist index **JEL Classification:** Q16, Q18

1 Introduction

The changes that have taken place in food and energy demand of the agricultural and food products in the last few years, directed the interest of professionals towards the question of efficiency of production. The new sales opportunities require the production of comparative analysis and the reconsideration of benefits of the re-faceted approach.

In our paper, we try to find the answer for and to describe the evolution of agricultural production efficiency in our country and in – similarly affected by the EU accession – other "Visegrad" member countries. Were these countries able to make use of favourable opportunities offered by the Common Agricultural Policy in this area? Is the closing up already have done, or are there clear visible signs of it in the past few years.

On the basis of comparing some aggregate indicators – that is the relation of production value and expenses – it becomes necessary to search for causes of differences in efficiency of farming practice above all in the group of the Visegrad countries and the EU-15. Therefore, as a first step we wanted to examine the differences in the cost structure of the EU countries and the Visegrad group at the beginning of EU membership and later. As the FADN database is only accessible to the years beyond 2004, national-level data were used to the investigation. Beside the factors of production according to cost analysis - as a complement - it was considered necessary to analyse the efficiency according to another segment. This test is meant of mapping the ability to change producers' efficiency approach (the need for and possibility of). The procedure for the Malmquist index, based on benchmark analysis was terminated. This will help to obtain answers to the economies of efficiency within the group of what moves were made, how it was formed after the cutting-edge and economic efficiency in relation to each other, how the farmers could set up and operate the production factors combination - the technology –in their technical optimum. We are also wondering whether there were any excess expenses or other efficiency defaults/losses due to management. We comlited this benchmark analyses with examining of financial sources of technological change. In so doing, we examined the connection between the investment and the commitment of assets, and investments and amortization.

If you look firstly at - the FADN (Farm Acountancy Data Network) database, the EU in 2006 is calculated some indicators of countries mentioned in the introduction yield investment conditions, and effectiveness seem to have shaped differences (Table 1).

Industry		EU-15	Visegrad countries				
	Return on total assts	subsidies/ gross production value	Net sales/ total costs	Return on total assts	subsidies/ gross production value	Net sales/ total costs	
Specialist COP	23,5	29,3	87,3	3,7	24,7	78,1	
Other field crops	29,1	17,6	106,3	6,8	17,0	88,7	
Horticulture	14,6	2,2	112,0	25,3	1,7	123,2	
Vineyard	46,3	7,5	135,4	19,4	9,4	108,1	
Fruit	25,4	3,6	120,9	36,1	6,4	127,4	
Milk	27,7	16,7	106,4	-6,9	26,5	68,4	
Sheep and goat	37,3	30,5	95,4	-9,0	40,0	54,6	
Beef cattle	30,9	31,2	90,1	-2,0	48,9	50,1	
Pig and poultry	20,5	4,6	115,1	3,5	2,8	100,5	

 Table 1 Comparison of effectiveness of agriculture between EU-15 and Visegrad countries (2006)

Source: Own calculation based on the FADN-database

Examining the ratios of the output value and the total cost we experience, that COP (cereals, oilseeds, protein) plants produced deficit in the EU-15, and in the Visegrad Group also. The former is also a loss of beef cattle, sheep and goats. The line of loss-making sectors in the latter case is supplemented by milk production. While in the EU-15 the rest of the sector is profitable, by the Visegrad countries horticulture, grapes - fruit are regarded as such.

Results from the subsidies's share of the COP crops and hog rising, except in the Visegrad group of countries are greater, the difference varies between 2% and 18%. In contrast, the profit on total assets (including subsidies) by sector, in the EU-15 is more equal (20-46%). By Visegrad countries, the same number is between -9% and 36%.

Overall, it can be concluded that the EU-15 yield value extraction without subsidy formed most favorably compared with a similar indicator of the Visegrad countries. The differences in benefit values between the sectors are smaller than the Visegrad countries within agriculture. The EU-15 sector-specific differences of benefit valu further reduce subsidies, while in the case of the Visegrad Group it will further increase.

That raises the question of where these differences between the two group of memberstates what can be traced back. To answer this question, first of all the factor efficiency divorce proceedings - the Malmquist index resolution – is called for help. This procedure will describe the cutting-edge technology, and the subsequent development of effective economic role, and then the two country groups, the structure of expenditure and investment willingness are taken into consideration with respect to what extent our statements, gained by the Malmquist index, confirmed.

The Malmquist index, which has been applied in this research, based on Farrel efficiency concept [1], is suitable to compare the efficiencies between countries, regions and companies by means of measuring the distances between the input-output proportions of a given vector and of the most effective examination unit found in the sample (the frontier) [2]. The main advantage of Malmquist approach does not require the assumption of efficient production, but instead identifies the 'best-practice' countries, regions or farms in every period, which gives an efficient production frontier, and measures each unit's output relative to the frontier [3] [4]. The Malmquist can be decomposed into two components technical efficiency change (catching-up) and technical change. The value of decomposition is that it provides information about the sources of productivity change; additionally DEA allows decomposing the index of technical efficiency change into pure technical efficiency change and scale efficiency change by running linear programming under constant return to scale and variable return to scale. The pure technical efficiency captures the efficiency of management practices while the scale efficiency shows whether the farm operates under the optimal size [5] [6] [7] [8]. An analysis of the determinants of relative efficiency indicates which aspects of the farming could be targeted in order to improve farm efficiency [9].

2 Efficiency of agriculture of Visegrad

2.1 Extension of research and database

Our calculations was made by using the FADN public database of available classes from the COP crops, other field crops, horticulture, wine and fruit, milk production, sheep and goat, the beef cattle raising, as well as pig and poultry production. The examinations were performed at the level of the EU member countries. Three categories: the Visegrad countries and the old member states between 2004 and 2006, and the old member states from 2000 to 2006 period are involved.

The Malmquist index calculation –Latruffe-Davidova; Fogarassy-Latruffe and Fekete-Farkas et al, have applied in the agriculture before - sector yield value, and major costs were used. [5] [6] [7] [8].

In this study for the COP plants the land, labor, depreciation, seed, fertilizer, pesticide, machinery, energy and other direct operating and overhead costs were used. By the livestock sectors the labor, feed, machinery, energy, depreciation, other livestock, other direct and general operating costs were taken into account.

2.2 Research Results

By stating the Malmquist-index, that is examining the change in the total factor efficiency in two member states groups between 2004 and 2006, essentially the same trends are observed, just like between the yield value and effectiveness studies in 2006.

Table 2 Indices derived from decomposing Malmquist index for the EU-15 and the
Visegrad countries

Sectors	Total	Technological change	Technical efficiency change	Scale efficiency	Pure tech. efficiency
	(TFPC)	(TC)	(TEC)	(SC)	(PC)
Specialist COP Visegrads C. (2004-06)	-1,5	-4,0	2,6	-3,3	6,1
Specialist COP EU-15 (2004-06)	1,6	7,4	-5,3	-1,8	-3,6
Specialist GOP EU-15 (2000-06)	3,1	1,0	2,1	2,4	-0,3

Visegrads C. (2004-06)	4,3	2,5	1,7	-9,2	12,0
Other field crops EU-15 (2004-06)	4,9	5,4	-0,5	-2,0	1,5
Other field crops EU-15 (2000-06)	2,3	2,5	-0,1	-0,8	0,7
horticulture Visegrad C. (2004-06)	11,9	34,7	-17,0	-13,3	-4,2
horticulture EU-15 (2004-06)	5,7	14,1	-7,4	-2,2	-5,3
horticulture EU-15 (2000-06)	3,5	7,0	-3,3	0,6	-3,8
vineyard Visegrádi O. (2004-06)	-21,8	-21,8	0,0	0,0	0,0
vineyard EU-15 (2004-06)	3,2	-4,0	7,5	0,1	7,4
vineyard EU-15 (2000-06)	4,0	-2,3	6,5	8,7	-2,0
fruit Visegrad C. (2004-06)	4,6	10,8	-5,7	-5,7	0,0
fruit EU-15 (2004-06)	0,0	3,1	-3,0	-4,7	1,7
fruit EU-15 (2000-06)	2,4	4,9	-2,4	-4,0	1,6
milk Visegrad C. (2004-06)	-0,6	-4,7	4,4	4,4	0,0
milk EU-15 (2004-06)	3,4	5,5	-1,9	-0,7	-1,3
milk EU-15 (2000-06)	3,4	5,1	-1,6	0,1	-1,7
sheep and goat Visegrad C. (2004-06)	-1,1	-9,6	9,5	-29,2	54,7
sheep and goat EU-15 (2004-06)	-3,6	0,4	-4,0	1,1	-5,1
sheep and goatEU-15 (2000-06)	2,5	2,8	-0,4	0,1	-0,5
beef cattle Visegrad C. (2004-06)	-1,2	-1,4	0,2	0,2	0,0
beef cattle EU-15 (2004-06)	2,2	2,9	-0,6	-3,1	2,5
beef cattle EU-15 (2000-06)	4,4	2,8	1,6	2,3	-0,7
pig and poultry Visegrad C. (2004-06)	-4.1	-12.0	9.0	9.0	0.0
pig and poultry EU-15 (2004-06)	-2.3	-3.5	1.2	1.1	0.1
pig and poultry EU-15 (2000-06)	-2.0	-2.1	0.1	1,1	-1.0
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Source: Own calculation based ont he FADN-database

This is not surprising, as we now looked at the trends, result status of which were examined - as cicumstances - in the first point. Regarding to TFPC also set the values for horticulture and fruit reflecting favorable position of the Visegrad group of countries can be concluded. The effectiveness of grape wine production, however was powerfully (annual average of 21.8%) in decline as a result - and therefore from a much better position - got to a 108.1% return input value ratio into the indicated position.

The other sectors - with the exception of sheep and goats less dominant industries - it can be said that the efficiency was increased in the EU-15, or - as in the case of pigs and poultry - the decreasing in total factor productivity was lower for the three-year period. Both group of countries, the vast majority of industries, found that the dominant change was in the technical development (best practice farms, shifting of frontier). Opposing trends were observable-namely, that the economic catching-up of lagging farms were more intensified - only for the EU-15 production plants in the COP plants was longer, seven-year period, and their grape production, both in the short and the long stage of the investigation. The later is also thought provoking, because it is a trend in the assumption of technological development, which approximates the upper limit of possibilities. In other words, of course it can be said only about the old member states, and only with great care to imagine the situation - which of those two values is amplified sector - namely, that there are sectors in which the efficacy of the technology development of exploitable reserves are close to their end. In any case, this assumption can tie in with the returns to scale, showing the values of these two sectors, when

this indicator, which - as mentioned above - suggests that the effort in how closely the technical optimum use of factors of production. From 2000 to 2006 the scale efficiency in production of COP plants increase by 2.4%, but it decreased by 1.8% in the last 3 years of examined period. The same indicator of the vine industry - the seven-year 8.7% increase, and the last three years of slowing growth of 0.1% - gives a similar picture.

Leading farms (best practice) took a decisive role in changes, but there were significant differences in the directions, and it should be noted that basically, to the detriment of the Visegrad countries. In fact, by the COP plants, 4%, 1.4% of the beef cattle, pigs and poultry 12%, 4.7% for milk production, sheep and goats 9.6% in the vine of 21.8% per annum average efficiency failure was detectable in the three-year period, in the leading farms of Visegrad group. In contrast, by the EU-15 in the vast majority of industries - in the pig and poultry industry and the wine growing apart - the cutting-edge development of dynamic economies can be detected, which are not converging, and they could hardly keep step.

The scale efficiency changes, and the pure technical efficiency change with the indicator, "at the expense of each other" - trade-off style – influence the changes of efficiency of following farms, which generally concluded that the Visegrad group of countries, thereby limiting the frontrunners - mentioned above - a experienced negative change of efficiency. In the process of moderating efficiency failure change of scale efficiency had a decisive role against the pure technical efficiency change. The test industry figures reflect the fact that capacity utilization affects the changes in the efficiency of the catching-up less than the other management decisions.

On this basis, the question arises what a significant change in efficiency and effectiveness of existing significant differences between the two economies of member states group, stems from. One possible answer can be given by of their cost structure. If it were considering the two groups, significant disparities exist in some kind analysis of costs then this is valid to look for the reasons in these costs and in represented investigation. If there are no marked differences, they and the extend of their temporal changes in capacity utilization and unnecessary expenses (which are too small or too large) can be explained by the scale efficiency change which pure technical efficiency change indicators also indicate.

When looking at - and not more specifically, because of size constraints - cost structures of the two member state groups, based on the table 3, be noted that there are high shared cost in both, but they are also approximately the same in terms of shares in both groups. Such as the feedstock costs, charges and amortization. On the cost structure of the two disproportionately large costrate, differences do not exist.

Another explanation could be rooted in the willingness for development, technical and technological changes back to the need for profitability considerations. The willingness of investment can be driven by economic possibilities and/or challenges. Szabo -Katona (2008) on a multilateral basis examines environmental aspects of this [10].

Sector	Labor cost	Leased labor	Own labor cost	Seed and plantation	fertilisers	pestisidies	Other cost of plant production	Bite	Grain	Other animal husbandry costs	Current expenses	Building and machinery costs	Energy cost	Services	Other direct costs	amortization
Visegrad countries																
COP	5,2	3,3	1,9	7,2	9,1	8,2	2,3				27,5	5,1	11,1	5,4	5,9	14,3
Other field crops	6,6	4,2	2,4	7,8	7,0	7,2	2,1				28,2	6,0	9,8	5,3	7,2	12,9
Horticulture	8,0	4,8	3,1	16,2	5,5	6,1	5,9				31,4	11,5	9,6	6,4	3,9	8,2
Vineyard	11,9	7,5	4,4	0,7	1,5	5,3	5,1				35,4	3,7	7,1	3,6	21,0	13,8
Fruit	9,8	5,7	4,1	0,7	2,5	7,2	7,9				35,7	11,3	6,9	7,6	9,9	15,6
Milk	6,6	5,7	0,9					19,5		2,8	20,0	4,1	8,2	3,1	4,6	23,1
Sheep and goat	7,1	5,3	1,7					17,8		2,5	22,0	4,3	7,7	3,7	6,3	26,1
Beef cattle	6,7	5,3	1,4					16,3		2,1	29,9	5,4	9,0	5,1	10,4	20,1
Pig and poultry	4,0	3,1	0,9						52,0	7,7	15,2	3,2	5,7	1,0	5,3	6,0
EU-15																
COP	2,8	0,5	2,2	5,1	9,9	7,5	1,3				30,0	8,3	7,7	5,9	8,1	17,0
Other field crops növények	2,7	0,8	1,9	7,8	6,8	7,2	3,1				29,1	8,1	6,8	6,4	7,8	15,0
Horticulture	3,0	1,9	1,0	13,0	2,8	1,8	10,8				29,8	4,6	15,2	2,3	7,8	9,6
Vineyard	6,6	1,9	4,7	0,8	2,1	5,4	8,5				31,6	6,7	4,2	3,5	17,2	19,7
Fruit	5,0	2,8	2,2	1,7	2,2	7,1	12,7				23,7	6,5	4,4	3,1	9,8	15,3
Milk	2,8	0,4	2,4					31,8		6,6	22,5	6,5	5,0	5,7	5,4	14,9
Sheep and goat	5,5	0,7	4,8					20,5		7,2	29,1	8,7	6,0	5,1	9,2	17,5
Beef cattle	3,6	0,3	3,2					25,6		5,4	25,9	7,6	6,0	5,0	7,2	19,2
Pig and poultry	1,4	0,5	0,9						48,5	7,3	15,6	4,0	4,9	2,4	4,4	10,6

Table 3 Differences between the cost structure of the EU-15 and Visegrad countries

Source: Own calculation based on he FADN-database

The reasons for the investment management related indicators do not give a direct answer, but for the existence and extent, yes. Therefore we examined some of the assets and investments, and their conditions with different indicators. These can be seen in Table 4.

Table 4 The investment willingness of EU-15 and the Visegrad countries

Sector	Amortization/ total cost	Fixed assets/ total assets	Br. investment/ Fixed assets	Br.investment/ amortization	Investment subsidy/ total subsidies	Investment subsidy./ Br. investment
Visegrad countries	(1)	(2)	(3)	(4)	(5)	(6)
COP crops production	15,1	71,7	8,0	78,6	5,31	11,43
Other fieldcrops	13,8	72,2	6,6	76,0	2,22	3,83
Horticulture	8,9	76,4	2,6	52,2	0,65	0,30

Vineyard	15,6	72,2	4,3	81,0	2,15	1,92
Fruit production	17,3	82,6	5,6	78,5	11,97	7,71
Milk production	24,7	81,1	3,6	30,4	5,47	18,01
Sheep and goat	28,1	80,7	6,7	50,3	7,66	19,71
Beef cattle	21,6	74,9	0,9	7,8	0,41	11,67
Pig and poultry production	6,2	77,1	5,0	135,9	11,68	4,04
EU-15						
COP crops production	17,5	86,9	2,1	83,9	0,36	0,89
Other fieldcrops	15,4	83,0	3,9	121,9	1,41	1,70
Horticulture	9,9	75,4	8,4	111,9	9,17	2,13
Vineyards	21,1	68,3	4,6	93,6	18,32	10,13
Fruit production	16,1	82,2	4,9	105,2	12,52	3,30
Milk production	15,3	86,6	5,4	176,8	5,08	4,01
Sheep and goat	18,5	84,2	2,7	81,6	2,18	6,07
Beef cattle	19,9	81,7	4,8	121,7	4,46	7,51
Pig and poultry production	10.7	79.4	7.5	154,4	6.10	2,02

Source: Own calculation based on he FADN-database

The (1) indicator shows the asset demand of the production technology. Studies on the cost basis of this logic is followed by the index of country groups - differences between sectors, taking into account - there are no marked differences. A (2) reports showing the productive factor/asset endowment of production. Outstanding differences between the groups is even less observable than in the previous indicator.

The (3) shows the degree of equipment development, the extent of equipment renewing. The differences between the member state groups are not markeable, though, there have been more marked differences in expectations. A (4) indicator shows the need for development, its desirable extent, in short, expresses the willingness of the development for. This striking difference is observed in the sector as a whole averaging a 51.1% rate difference the EU-15 in favor. In contrast to other indicators of 5% less than average value. The ratedifference according to the sector is between the 5.3% and the 146% range, while by the other indicators, the volatility of less than 10%.

By the EU-15 only COP crops and milk sector indicators are less than 100%, the annual value of the investment is less than the annual depreciation. In Visegrad countries, only the pig - and investment in poultry (136%) exceeded the rate of depreciation over a year. The annual investment of beef cattle breeding did not reach the 8% of any depreciation in value. The (5), showing the importance of investment in public perception, while (6) showing the development sector, reflecting its chances. The investment in the EU-15 is slightly more important, while the chance for that is significantly better in the Visegrad group of countries.

3 Conclusion

Examinations, placing a different emphases, which has been carried out so far on a number of research results and experience reached the same diagnosis. The drivers of the efficiency mostly defined by the willingness for investments. If a stronger social support is aimed, while the market fails to reach a better value for lobbying sales prices, the uncertain future of the industry depends on the cyclical successfulness and it can be reassuring. The food and energy options, mentioned in the introduction, can provide a short period for increasing of agricultural income, which in themselves will not be sufficient to start a spiral of investment to be sustained by the Visegrad group of countries.

Our calculation failed to extend the post-2006 period, because – as it has been mentioned - the data in the available database is not fully contained. Thus, our results do not reflect the latest trends and they are based on aggregate values for the two countries groups. A deeper analysis of dispersions behind the average indicators and the reasons requires further research work. During the assessment, we also should keep in our mind that the smallest units of observation

farm are not included in the FADN sample. Nevertheless, we feel our results showed marked differences between the two groups, which can not be changed by the presented restrictive conditions. Therefor our study fund that monopolistic power of market partners –both on input and output side – has an important effect on price cost margins especially in the Visedrad countries because of missing cooperation between the farmers. A possible suggestion that can be drawn from our studies is that future agricultural policy should include measures to improve the capacity of farmers of new memberstates to apply the available technology more efficiently and to incease their willingness for creation of marketing cooparatives in order to improve their viability and competitiveness.

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